CHARLES UNIVERSITY IN PRAGUE

FACULTY OF SOCIAL SCIENCES
INSTITUTE OF ECONOMIC STUDIES

RIGOROUS THESIS

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FOREIGN-OWNED BANKS AND HOST ECONOMIES

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DECLARATION OF AUTHORSHIP

The author hereby declares that she compiled this thesis independently, using only the listed and properly cited resources and literature.

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Prague, February 13, 2014

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Charakteristika tématu a jeho dosavadní zpracování žadatelem (rozsah do 1000 znaků)**:** *In the past two decades, significant changes have been shaping and transforming the banking sectors worldwide. Among these trends we find a surge in foreign bank ownership which is especially remarkable in the countries of the Central, Eastern and South-Eastern European region. Using the sample of 17 countries and filtering out 140+ domestically-operating foreign-owned banks, I examine the determinants of their performance in relation to host country conditions and home country banking sector performance over the period of seven years between 2005 and 2011. By means of system GMM model, I reveal that macroeconomic fundamentals of the host country affect the foreign-owned banks' performance but do not suffice in explaining it. Moreover, the depth of the current crisis as demonstrated in the home country impacts negatively on the host-country-operating foreign-owned banks. I did not find any convincing evidence of the host sovereign debt and bank ownership nature of relationship.*	
Předpokládaný cíl rigorózní práce, původní přínos autora ke zpracování tématu, případně formulace problému, výzkumné otázky nebo hypotézy (rozsah do 1200 znaků)**:** *The key purpose of this thesis is to examine the relationships between foreign bank ownership and bank performance while looking at this problem from both home and host country perspective. Also, as the current global economic situation raises many issues, we provide an insight into the link between sovereign debt and bank ownership. In our study, we consider three hypotheses*	

states below and test each of them on a unique sample of 143 banks, 165 banks and 24 banking sectors respectively over a seven-year period from 2005 to 2011.

- *First hypothesis: The economic fundamentals in the host country influence directly the performance of foreign-owned banks in the host country.*
- *Second hypothesis: The performance of a foreign-owned bank is negatively influenced by the depth of the financial crisis in the home country.*
- *Third hypothesis: There is a correlation between foreign ownership of banks and the level of sovereign debt in the host country.*

Předpokládaná struktura práce (rozdělení do jednotlivých kapitol a podkapitol se stručnou charakteristikou jejich obsahu)**:**

1 Introduction

2 Theoretical Background of the Foreign Bank Ownership

- provides an introduction into the evolution of the foreign bank ownership, and a summary of literature related to our research

3 Structural Description of Analysed Banking Sectors

- provides a brief description of the banking sectors of selected countries in order to introduce the reader into the topic and to point out some of the differences that occur throughout the group and serves for reference purposes; the sectors are looked at from more perspectives, the main focus is placed on structural characteristics including share of foreign ownership, concentration and latest development

4 Empirical Part

- divided into three subsections according to the analysed hypotheses (X); each of these subsections has four parts commenting on

4.X.1 Data and Methodology

4.X.2 Variables

4.X.3 Descriptive Analysis

4.X.4 Results and Findings

and is followed by

4.4 Summary of Results

4.5 Further Research Opportunities

- comments on possible future extension of the research

5 Conclusion

Vymezení podkladového materiálu (např. analyzované tituly a období, za které budou analyzovány) **a metody (techniky) jeho zpracování:**

For the general selection of countries, whose banks and financial sectors are analysed the following criteria were applied:

1. Country is either member of OECD or geographically belongs to Europe;

and

2. Total share of assets within the country's banking sector owned by a foreign entity exceeds 60%.

Countries meeting the criteria and for which sufficient data was available are Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Ireland, Latvia, Lithuania, Luxemburg, Malta, New Zealand, Poland, Romania, Serbia and Slovakia.

As a primary data source, the BankScope database is used throughout the analysis complemented by variety of other sources such as Bloomberg, the IMF, OECD iLibrary and World Bank databases, Eurostat and individual countries' national banks. Due to lower reliability of BankScope data in case of transition countries as described in (Bonin, et al., 2005), the dataset was thoroughly reviewed and cross-referenced with other authors and using more sources. For the analysis, five types of financial institutions (as categorized in the BankScope database) are considered: bank holdings & holding companies, commercial banks, cooperative banks, real estate & mortgage banks, and savings banks. Thus, central banks, investment banks, leasing companies and other types of financial institutions are excluded from the sample. Only those banks with majority foreign ownership are considered. Altogether, 504 credit institutions match the stated criteria; the sample varies according to tested hypothesis and data availability. Primarily, data was collected for the period from 2005 to 2011. The features of the dataset make it especially suitable for the analysis by means of General Method of Moments, even though fixed or random effects approach is also commonly used in the literature.

Základní literatura (nejméně 10 nejdůležitějších titulů k tématu a metodě jeho zpracování; u všech titulů je nutné uvést stručnou anotaci na 2-5 řádků)**:**

- *Arellano, M. & Bond, S., 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equation. Review of Economic Studies, Volume 58, pp. 277-297.*
  - *paper presents specification tests that are applicable after estimating a dynamic model from panel data by the generalized method of moments (GMM), and studies the practical performance of these procedures using both generated and real data*
- *Arellano, M. & Bover, O., 1995. Another look at the instrumental variables estimation of error-components model. Journal of Econometrics, Volume 68, pp. 29-51.*
  - *article develops a framework for efficient IV estimators of random effects models with information in levels which can accommodate predetermined variables; the formulation clarifies the relationship between the existing estimators and the role of transformation in panel data models*
- *Bijlsma, M. & Zwart, G., 2013. The changing landscape of financial*

markets in Europe, the United States and Japan. Bruegel working paper 2013/02.

- paper compares the structure of the financial sectors of the EU, Japan and the United States, looking at a set of 23 indicators; large variation within the EU are discovered in the structure of the financial sectors; by means of principal components analysis, robust groups of EU countries with special characteristics are identified

■ Blundell, R. & Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics, Volume 87, pp. 11-143.

- estimation of the autoregressive error components model; when the autoregressive parameter is moderately large and the number of time series observations is moderately small, the usual Generalised Methods of Moments (GMM) estimator obtained after first differencing has been found to be poorly behaving; here the authors consider alternative linear estimators that are designed to improve the properties of the standard first-differenced GMM estimator

■ Bonin, J. P., Hasan, I. & Wachtel, P., 2005. Bank Performance, efficiency and ownership in transition countries. Journal of Banking and Finance, Volume 29, pp. 31-53.

- using data from 1996 to 2000, authors investigate the effects of ownership, especially by a strategic foreign owner, on bank efficiency for eleven transition countries in an unbalanced panel consisting of 225 banks and 856 observations; applying stochastic frontier estimation procedures, profit and cost efficiency scores are computed taking account of both time and country effects directly

■ Claessens, S. & van Horen, N., 2012. Foreign banks: Trends, Impact and Financial Stability. International Monetary Fund Working Paper 12/10.

- paper introduces a comprehensive database on bank ownership for 137 countries over 1995-2009, reviews foreign bank behavior and impact, and documents substantial increases in foreign bank presence, with many more home and host countries

■ Heffernan, S. A. & Fu, M., 2010. Determinants of financial performance in Chinese Banking. Applied Financial Economics, 20(20), pp. 1585-1600.

- investigates a large unbalanced sample using annual data (1999-2006) from 96 Chinese banks; economic value added is employed as a dependent variable in addition to the standard measures of profitability, Return on Average Assets (ROAA) and Return on Average Equity (ROAE) and Net Interest Margin (NIM)

■ Moon, W., 2009. Foreign Ownership and Performance of Banks: The Case of Korea. [Online]

- paper examines the impact of the increase in foreign ownership on the performance of Korean banks; according to this paper, foreign banks outperform domestic banks in terms of efficiency, productivity and stability related indicators; author suggests that Korean government policy that aimed at opening Korean banking market to foreign investors was successful

- *Teplý, P. & Tripe, D., 2011. The Impact of the Global Crisis in Central European Countries and Lessons for and from New Zealand. In: Polouček, S.; Stavárek, D., Lessons Learned from the Financial Crisis. Proceedings of 13th International Conference on Finance and Banking. Karviná: Silesian University, School of Business Administration, pp. 694-708.*
  - introduces macro vulnerability index (TT Index) that evaluates each investigated country based on a total score (TT index) comprising seven variables. Firstly, we have selected these seven macroeconomic variables: 1. Liquidity ratio, 2. Credit growth, 3. Current account balance, 4. Loan-deposit ratio, 5. Government debt-to-GDP ratio, 6. FX loans I (% of total household loans), 7. FX loans II (% of total corporate loans)

- *To, H. M. & Tripe, D. W. L., 2002. Factors Influencing the Performance of Foreign-Owned Banks in New Zealand. Journal of International Financial Markets, Institutions and Money, Volume 12, pp. 341-357.*
  - article reviews factors affecting the performance of foreign-owned banks in New Zealand, where they control 99.2% of all banking system assets; two sets of pooled cross-sectional time-series data—seven banks over the 10-year period 1991–2000 and eight banks over the 8-year period 1991–1998—provide the basis for the econometric analysis

- *Yildirim, H. S. & Philippatos, G. C., 2003. Efficiency of Banks: Recent Evidence from the Transition Economies of Europe – 1993-2000. European Journal of Finance, 13(2), pp. 123-143.*
  - study examines the cost and profit efficiency of banking sectors in twelve transition economies of Central and Eastern Europe (CEE) over the period 1993-2000, using the stochastic frontier approach (SFA) and the distribution-free approach (DFA).

Diplomové a disertační práce k tématu (seznam bakalářských, magisterských a doktorských prací, které byly k tématu obhájeny na UK, případně dalších oborově blízkých fakultách či vysokých školách za posledních pět let)

Fišerová, T., 2013. Foreign-owned banks and host economies. Prague: Institute of Economic Studies, Faculty of Social Sciences, Charles University.

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ABSTRACT:

In the past two decades, significant changes have been shaping and transforming the banking sectors worldwide. Among these trends we find an intensive surge in foreign bank ownership which is especially remarkable in the countries of the Central, Eastern and South-Eastern European region. Using the sample of 17 countries and filtering out more than 140 domestically-operating foreign-owned banks, we examine the determinants of their performance in relation to host country conditions and home country banking sector performance over the period of seven years between 2005 and 2011. Due to the topic's currency, we additionally provide an insight into the link between sovereign debt and bank ownership. By means of system GMM model, or fixed effects model, we reveal that macroeconomic fundamentals of the host country affect the foreign-owned banks' performance but do not suffice in explaining it fully. Moreover, the depth of the current crisis as demonstrated in the home country impacts negatively on the host-country-operating foreign-owned banks. We did not find any convincing evidence of the host sovereign debt and bank ownership nature of relationship.

ABSTRAKT:

Za poslední dvě desetiletí, bankovní sektory napříč světem prošly významnými změnami, jež je utvářely a přetvářely. Jednou z těchto změn je intenzivní nárůst zahraničního vlastnictví bank, které je obzvlášť patrné v regionu střední, východní a jihovýchodní Evropy. Za pomoci vzorku 17 zemí a více než 140 zahraničně vlastněných bank činných v těchto zemích zkoumáme klíčové faktory jejich výkonnosti v kontextu podmínek v hostitelských ekonomikách a výkonnosti domácích bankovních sektorů, a to během sedmiletého období mezi lety 2005 a 2011. Vzhledem k aktuálnosti tématu rovněž přinášíme vhled do vztahu státního dluhu a bankovního vlastnictví. Analýza zobecněnou momentovou metodou, příp. metodou vázaných efektů, odhaluje, že makroekonomické podmínky v hostitelské zemi se dotýkají výkonnosti zahraničně vlastněných bank, pro její plné osvětlení však nepostačují. Zároveň, hloubka současné krize tak, jak se projevuje v domácí ekonomice, negativně dopadá na výkonnost zahraničně vlastněných bank činných v hostitelské ekonomice. Povaha závislosti mezi státním dluhem hostitelského státu a bankovního vlastnictví se nepodařila prokázat.

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ACRONYMS

AR	Autoregressive
CE	Central Europe
CEE	Central and Eastern Europe
CESEE	Central, Eastern and South-Eastern Europe
GMM	Generalized Method of Moments
HHI	Herfindahl-Hirschman Index
NIM	Net Interest Margin
NPL	Non-performing Loans
ROAA	Return on Average Assets
ROAE	Return on Average Equity

1 INTRODUCTION

In the past two decades, significant changes have been shaping and transforming the banking sectors worldwide. Among these trends we find an intensive surge in foreign bank ownership which is especially remarkable in the countries of the Central, Eastern and South-Eastern European region. Before that, there have been only a few countries with low share of predominantly domestically-owned banks. The relatively rapid increase in the foreign bank ownership in the CESEE countries enable us to study this phenomenon using a more extensive sample of banking institutions over a sufficiently long period of time.

The key purpose of this thesis is to examine the relationships between foreign bank ownership and bank performance while looking at this problem from both home and host country perspective. Also, as the current global economic situation raises many issues, we provide an insight into the link between sovereign debt and bank ownership. In our study, we consider three hypotheses states below and test each of them on a unique sample of 143 banks, 165 banks and 24 banking sectors respectively over a seven-year period from 2005 to 2011.

- First hypothesis: The economic fundamentals in the host country influence directly the performance of foreign-owned banks in the host country.
- Second hypothesis: The performance of a foreign-owned bank is negatively influenced by the depth of the financial crisis in the home country.
- Third hypothesis: There is a correlation between foreign ownership of banks and the level of sovereign debt in the host country.

The thesis is further organized as follows. In the next section, brief introduction of the foreign bank ownership development is described along with summary of related literature. Section 3 provides an insight into the banking sectors of countries selected for analysis with focus on structural characteristics and recent performance mostly in terms of non-performing loans and profitability. Section 4 addresses the process of data collection and methodology used and further introduces the authors' own application. The hypotheses are tested out followed by presented and discussed results. In Section 5, main points of the thesis are reviewed followed by Appendices in Section 6. Section 7 provides number of references for further reading.

2 THEORETICAL BACKGROUND OF THE FOREIGN BANK OWNERSHIP

In its first part, this section provides an introduction into the evolution of the foreign bank ownership, and in the second part, we provide a summary of literature related to our research.

2.1 INTRODUCTION TO FOREIGN OWNERSHIP OF BANKS

In the recent 20 years, we have witnessed significant changes that have been shaping and transforming banking sectors worldwide. Among these trends we find volume expansion of the individual banks' balance sheets, spreading securitization, maturity shortening and also, particularly in some parts of the world, an intensive surge in foreign bank ownership (Brunnenmeier, 2009). From 1995 to 2009 the number of foreign-owned banks worldwide rose by more than 72% from 774 to 1334. In terms of share, it represents an increase from 19.9% to 34.1%. It is worth mentioning that the absolute number of banks in the world remained nearly at the same level with only a subtle rise of 16 banking institutions (Claessens & van Horen, 2012). The development is reported in Figure 2-1.

The growth of foreign ownership was however neither smooth nor evenly distributed over the observed period. There are generally two periods of slower increase: 2000 to 2004 and 2008 onwards. This pattern may be associated with the occurrence of global economy's slowdowns. In the Central and Eastern

European region, the most rapid increase took place in the second half of 1990s due to the sector's deregulation and on-going financial integration, and obviously after the Eastern enlargement of the European Union (Irsova, 2009; Bijlsma & Zwart, 2013).

Figure 2-1: Number of banks in the world (1995-2009)
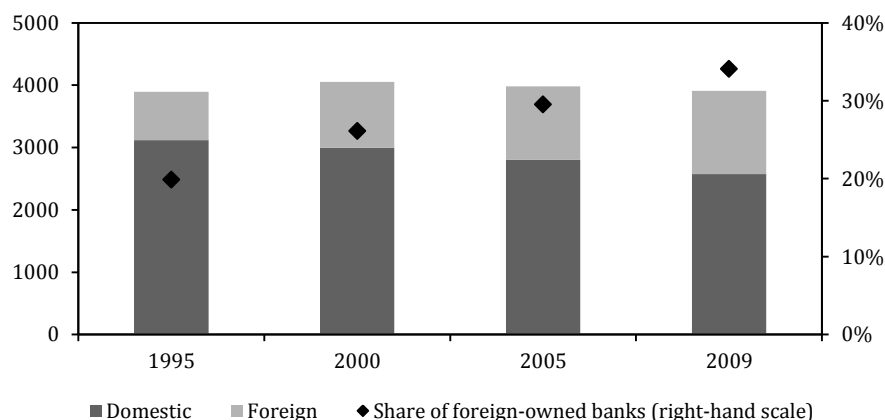
Source: (Claessens & van Horen, 2012), Author

The relative importance of foreign banks in developing and transition economies is generally higher, as Claessens and van Horen (2012) conclude. The average share in these countries ranges from 45 to 50% as opposed to only 20% in developed countries. There are also 11 countries in the world with no foreign participation in their banking sectors. These are Haiti, Qatar, Sri Lanka, Ethiopia or Cuba, to name some (Claessens & van Horen, 2012).

2.2 RELATED LITERATURE

Many interesting topics have been in focus of researchers concerning the foreign bank ownership, for illustration there are several ones pointed out: Lee et al. (2012) assesses the impact of foreign-owned banks presence in the sector on the behaviour of domestic banking institutions. Mutual influence of ownership structure and monetary policy transmission in Indian banking sector is studied by Bhaumik et al. (2011), while Claessens and van Horen (2012) scrutinize the topic of credit provision in relation to foreign ownership. Some other examples include financial stability which is examined by Hull (2002) or Buch et al. (2003).

Bank performance is another significant part of the research. The literature on bank performance can generally be divided into two streams based on the methodology approach chosen by the authors. The first stream makes use of parametric and non-parametric methods for cost and profit efficiency estimation for banking performance evaluation such as Stochastic Frontier Approach (SFA), Data Envelopment Analysis (DEA) or Meta-Regression Analysis where the first two mentioned are far the most popular. Most of the below presented studies utilize either one of these approaches or provide their comparison (Berger & Humphrey, 1997; Weill, 2004; Irsova, 2009).

Further examples of research include Bonin et al. (2005), William and Gardiner (2003); these mostly concentrate on the comparison of foreign-owned and domestically-owned bank's efficiency (Yildirim & Philippatos, 2003) or gaps in efficiencies among regions (Weill, 2007). Generally, conclusions suggest foreign-owned banks to be more efficient than domestically owned.

Extensive amount of studies has been written about bank efficiency in particular. However, there are a few issues worth mentioning. Firstly, the studies concern vastly U.S. banks (Berger & Humphrey, 1997; Berger, 2007) or secondly, when focused on Europe, they almost entirely provide evidence from Western European countries or the Eurozone (Allen & Rai, 1996; Altunbas, et al., 2001; Casu & Molyneux, 2003; Alzubaidi & Bougheas, 2012). Thirdly, there are not enough up-to-date studies which would make use of the crisis data, i.e. from 2007 onwards. This issue concerns both Central and Eastern European region and New Zealand (Stavárek, 2005).

The second stream's authors use profitability ratios as obtained from financial statements to measure performance. Usually, more than one indicator enters the analysis while the most popular are ROAA and ROAE, in some cases even net interest margin (NIM).

Considering this approach, studies focus mostly first on consequences of the entry of foreign banks which are found to be positive in areas of competition, increased access to financial services, cost of financial intermediation etc. (Claessens, et al., 2001; Claessens, 2006; Chopra, 2007; Cull & Martinez Peria, 2011) and second, on impacts on financial stability (De Haas & Van Lelyveld, 2010). There are also several country- or region-oriented studies: Yi et al. (2009) examine the effects of increased foreign-ownership in Korea, To and Tripe (2002) investigate factors influencing the performance of foreign-owned banks in New Zealand, Farazi et al. (2011) assess the role of ownership in

countries located in the Middle East and North African region, and Liuhto et al. (2006) estimate effects of foreign banks' entry in CEE.

Recently, alternative measures for bank performance have been explored. Millar (2005)[1] compares Economic Value Added with more commonly used ROAA and ROAE, suggesting the supremacy of EVA. ECB (2010) considers ROAE inappropriate especially in relation to recent financial crisis and calls for more complex models for bank performance evaluation. Heffernan and Fu (2008) argue that EVA is more sensitive to certain parameters concerning capital.

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[1] As cited in Heffernan & Fu (2010).

3 STRUCTURAL DESCRIPTION OF ANALYSED BANKING SECTORS

This section provides a brief description of the banking sectors of selected countries[2] in order to introduce the reader into the topic and to point out some of the differences that occur throughout the group and serves for reference purposes. The sectors are looked at from more perspectives, the main focus is placed on structural characteristics including share of foreign ownership, concentration and latest development. The Appendix and following sections offer further comparison of selected indicators. Interestingly, the transition countries provide more information publicly, especially concerning the banking sectors' structure and foreign ownership. In case of high income countries (such as Luxembourg), we sometimes have to rely on studies provided by paid agencies and consultancy firms.

3.1 BOSNIA AND HERZEGOVINA

Bosnia and Herzegovina was severely affected by the Yugoslav Wars terminated as late as 1995 with the Dayton Agreement (Mágel, 2005). Its financial and, in particular, banking sector after undergoing a series of changes (including reconstruction, privatization and consolidation) became relatively sound and stable and moderately concentrated. There are 29 banks operating in Bosnia and Herzegovina while 89.4% of total assets are held by foreign entities.

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[2] Individual banks of these countries will later in the thesis be subject to performance analysis.

This is the lowest share in the last 5 years culminating in 2008 with 91.3%. The domestic sector owns only 10.6% of the banks' assets while there is one state-owned institution. From the remaining 28 banks, 19 are mostly foreign owned and all of them are licenced as branches operating under domestic legislation (Central Bank of Bosnia and Herzegovina, 2011).

Considering the concentration of the banking sector, the three largest banks (UniCredit Bank, Raiffeisen Bank and Hypo Alpe Adria) together control 44.6% of the market and five largest (NLB and Intesa Banka) account for 56.3% (Central Bank of Bosnia and Herzegovina, 2011). These figures are rather stable over time. The Herfindahl-Hirschman index reached 1498 units in 2012 indicating a moderate concentration.[3] However, the value of the index decreased by 46 units from 2011 and the declining tendency is present in this indicator since 2008 when the value reached 1710 units (Banking Agency of The Federation of Bosnia and Herzegovina, 2010, 2012).

Currently, Bosnia and Herzegovina struggles with non-performing loans stabilization and overall bank asset quality. In 2011, the banking sector returned back to black numbers with the profit reaching around EUR 70 million (Raiffeisen Research, 2012).

3.2   BULGARIA

Major transformation of the Bulgarian banking sector occurred after 1989 with the reestablishment of commercial banks and again after the 1996 crisis enabling privatization and entry of foreign banks (Nenovsky, et al., 2008). With the entry of ISBANK in 2011, there are currently 31 banks operating in Bulgaria of which 7 are branches of foreign banks and 24 are licensed in Bulgaria (Bulgarian National Bank, 2012). The Bulgarian banking sector's profit has been declining steadily by an average yearly rate of almost 25% from approximately EUR 557 million in 2008 to EUR 242 million in 2011 (Bulgarian National Bank, 2009, 2011). The situation may be turning over as the system reported an overall profit of EUR 308 million in November 2012 (Bulgarian

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[3] Herfindahl-Hirschman index approximates the concentration of the banking sector and is computed from the data using individual bank's total assets market share No concentration for HHI below 1000; moderate concentration for HHI between 1000 and 1800; high concentration for HHI above 1800 (Banking Agency of The Federation of Bosnia and Herzegovina, 2012).

National Bank, 2012). The liquidity and capital position is very solid. The capital ratio reaches 17.5% keeping the system resistant to credit risk (Bijlsma & Zwart, 2013).

Market share of foreign-owned banks was 76.5% in 2011. 73.4% of assets are owned by entities from the European Union while 3.1% belong to non-EU banks and branches. The domestic banks gradually gain on share reaching 23.5%, 4.23 percentage points more than as of December 31, 2010. Overall, the five largest banks in Bulgaria (UniCredit Bank, DSK Bank, United Bulgarian Bank, Raiffeisen Bank and First Investment Bank) own over 51% of the assets. There is a low concentration within the system as the Herfindahl-Hirschman index hardly exceeds 1000 units (European Central Bank, 2010).

The current issues for Bulgarian banking sector lie in deleveraging household sector and lowering the non-performing loan ratio.

3.3 CROATIA

The transformation process from socialism to capitalism was easier for Croatia as there was already a two-tier system at place which makes it significantly different from other CEE countries (Reininger & Walko, 2009). The system is overall stable due to precautionary measures taken by the regulatory bodies prior to the recent financial crisis. The profit has been evolving steadily even though rather slowly. In 2011 it reached approximately EUR 517 million.

The Croatian banking system comprises as of 2012 of 32 banks. Two banks are state owned, 13 domestic privately owned and 17 foreign owned. Domestic ownership accounts for 9.4% of total assets while foreign for 90.6% where 61.4% of total assets are owned by Austrian shareholders. This fact is rather common for former Yugoslavian countries (Croatia National Bank, 2011).

The three largest banks in Croatia (Zagrebancka Banka – member of UniCredit Group, Privredna Banka – part of Intesa Sanpaolo, and Erste Bank) hold together 57% of the total assets. The share of 23 smallest banks is only 8.4% and thus a surge of consolidation is expected with the Croatian EU entry in June 2013 (Croatia National Bank, 2011).

Croatia will have to face the stagnation of its economy as well as banking sector in the next years and deal with increasing non-performing loans ratio which has already exceeded 12% (World Bank, 2012).

3.4 THE CZECH REPUBLIC

There are four interesting characteristics that distinguish the Czech Republic from its peers in Europe. Firstly, the financial sector is vastly dominated by the overall 44 banks as these account for 99.4% of total assets while the rest (0.6%) belongs to other credit institutions, the 14 credit unions (European Banking Federation, 2012). There could be more reasons for this fact, but generally, the Czech financial sector, as well as banks in their operations, is traditionally rather conservative.

Secondly, the foreign-ownership ratio belongs to the highest in Europe. As in the 1990s, a default of many state-owned banks took place and in order for the functionality of the system to be maintained, a large wave of privatization to foreign entities was performed. Nowadays, the share of total assets that are held by foreign, mostly Western European shareholders, is 96% (Bijlsma & Zwart, 2013). There are 15 foreign-controlled banks and 21 branches of foreign banks operating in the Czech Republic, two banks are state owned (International Monetary Fund, 2012).

The sector is getting more concentrated as there is a rising tendency in the Herfindahl-Hirschman index which currently exceeds the 2000 unit threshold (Bijlsma & Zwart, 2013). The four largest banks (Ceska sporitelna – member of Erste Group, Komercni banka – part of Societe Generale Group, CSOB – owned by KBC Group and UniCredit Bank) control 57.6% of the total assets, the top 10 banks control around 78%. This is the third largest fraction in the region after Slovakia and Croatia, and exceeds the Central European average by 2 percentage points (Deloitte, 2012).

The third characteristic worth mentioning is that most of the Western European banks' subsidiaries operating in the Czech Republic are net creditors to their parent banks. This situation could possibly be dangerous in case of spillovers from the home countries; the IMF's stress testing (2012) however concludes that Czech banks are capable of withstanding extensive shocks and that capital unease would only occur in case of a severe double dip. Capital ratio in the

system surpasses 15% and non-performing loans dropped to 5.6% in 2011 as the asset quality ameliorates (World Bank, 2012).

Last but not least, around 18% of all Czech banking assets represent bank holdings of government debt. After Japan, this is the second largest proportion in the world. Such an exposure could generate significant losses through various channels in case of adverse interest rate movements (International Monetary Fund, 2013).

Table 3-1: Capital adequacy and NPL ratio (CE region comparison)

	2007	2008	2009	2010	2011
Capital adequacy (%)					
Czech Republic	11.6	12.3	14.1	15.5	15.3
Hungary	10	11.1	13.1	13.3	13.5
Poland	12	10.7	13.3	13.7	13.1
Slovakia	12.8	11.1	12.6	12.7	13.4
Average	11.6	11.3	13.3	13.8	13.8
Non-performing loans (%)					
Czech Republic	2.7	3.2	5.2	6.2	5.6
Hungary	2.3	3	6.7	9.7	10.4
Poland	5.2	4.5	8	8.8	8.4
Slovakia	2.5	2.5	5.3	5.8	5.8
Average	3.2	3.3	6.3	7.6	7.6

Source: World Bank, National banks of the countries, Author

The Czech banking sector recorded a net profit of EUR 2.1 billion in 2011 which is about EUR 100 million less than in 2010 due to the Greek bonds write-off. The numbers for the first 9 month of 2012 suggest a favourable development as the sector's profit has already reached EUR 2 billion (Czech National Bank, 2012). Thus, the Czech banking sector further remains one of the most profitable in the region.

3.5 ESTONIA

The Estonian banking sector can above all be characterized by its extreme concentration. The Herfindahl-Hirschman index reached 6677 units in 2008; the value was slightly lower in 2010 and currently gets close to 9000 units (European Central Bank, 2010; Bijlsma & Zwart, 2013). The largest bank, Swedish-owned Swedbank alone controls 46.5% of the market which in

absolute numbers represents assets of EUR 7.8 billion. The market share of the second largest, also Swedish-owned, SEB and the third in a row Nordea accounted for 19.16% and 13.45% as of June 2012 respectively. Combined, the three hold more than 90% of the sector's total assets (Banking Union of Estonia, 2012).

There are seven credit institutions licensed domestically and 9 branches of foreign banks operating in Estonia. The overall share of foreign ownership is as high as 99% and stable (OECD, 2010; Claessens & van Horen, 2012). There is no participation of countries outside the European Union present in the Estonian banking sector which is slightly surprising given its proximity to Russian Federation (European Central Bank, 2010). Three banks are domestically owned.

The non-performing loans ratio keeps low at 4.8%, profitability improves gradually. In 2011, the sector reported net profit of EUR 663 million, the highest ever reported profit in its modern, post-communist era. More than half of the profit was generated by a sale of Latvian and Lithuanian shares of Swedbank (Bank of Estonia, 2012).

3.6   HONG KONG

The Hong Kong banking sector is based on a three-tier system and there are currently 154 licensed banks, 20 licence restricted banks and 25 deposit taking companies. More than 60 banks are subsidiaries of foreign incorporated institutions while these entities are located in over 30 countries worldwide. Moreover, most of the world's major players (such as the American JP Morgan & Chase, Bank of America or Citibank or European Societe Generale, Erste, Deutsche Bank, BNP Paribas or KBC) operate in Hong Kong (Hong Kong Special Administrative Region Government, 2013).

Almost 60% of the total assets belong to the three largest banks (HSBC, Bank of China and Hang Seng Bank) which in absolute terms amount to USD 975 billion (KPMG, 2011). However, the sector is only mildly concentrated with the Herfindahl-Hirschman Index reaching 690 units. This indicator is fairly stable in time (Census and Statistics Department (The Government of Hong Hong), 2012).

The sector is very mature with strong capital position. Since the severe drop in H2 2008 caused by the financial crisis, the pre-tax profit of the sector has been oscillating but positive and higher than 1% of the total assets, which account for over 750% of the territory's GDP. The non-performing loans ratio has not exceeded 2% since 2004, and as of 2011, it kept below 1% (Hong Kong Manetary Authority, 2013; World Bank, 2012).

The main threat for the Hong Kong banks stems from their exposure to mostly European financial institutions, especially those located in the United Kingdom, Germany and France. Also, the unfavourable movements on the property price markets pose significant risk to the sector (Hong Kong Manetary Authority, 2013).

3.7 HUNGARY

The Hungarian banking sector's performance is unstable as the asset quality deteriorates, the non-performing loan ratio is constantly rising exceeding 10% in 2011 and the sector lost its profitability (World Bank, 2012). Since 2008, the after-tax profit has been on a decline, and in 2011 the sector reported a loss of EUR 318 million as opposed to EUR 42 million profit in 2010. Between 2008 and 2009 the total assets dropped by 10% and since then, there has been a stable 4% annual growth (Deloitte, 2012).

Figure 3-1: Banking sector concentration (CESEE region)
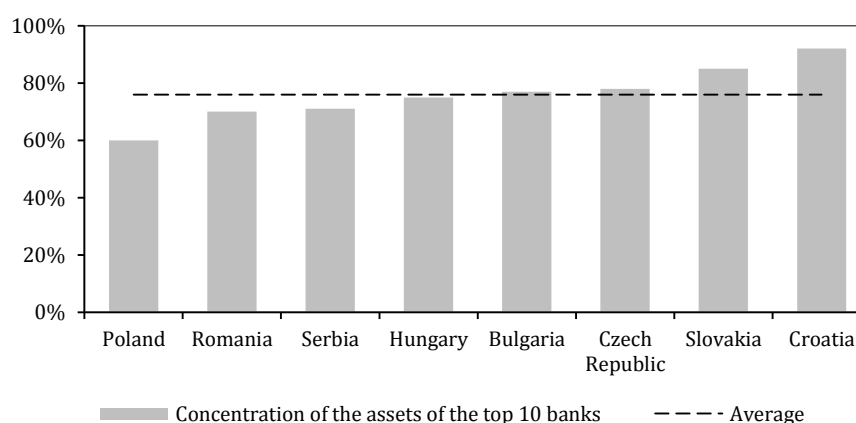
Source: (Deloitte, 2012), Author

One of the reasons for Hungarian banking sector's vulnerability is the relatively high share of foreign currency loans which made it more prone to exchange rate risk. As much as 67% of household loans were taken out in other than domestic currency while the overall most popular one was Swiss Franc (International Monetary Fund, 2005).

Currently, there are 35 banks operating in Hungary. The market shares of each of the banks are rather small, there is only a single bank whose share exceeds 10% - the OTP. Together, the 5 largest banks (OTP, Erste Bank, K&H – member of the KBC Group, MKB – owned by BayernLB, and CIB – part of Intesa conglomerate) account for just under 52%. The top ten banks control 3/4 of the total assets (Deloitte, 2012; Raiffeisen Research, 2012). Also the Herfindahl- Hirschman index suggests moderate concentration of the sector and a stable development of this characteristic (European Central Bank, 2010).

The Hungarian banking sector is further endangered by the macroeconomic development and there are still major risks present to the financial stability. With rising unemployment, high public debt, necessary austerity measures and high dependency on foreign exchange swap market, the performance predictions are not too optimistic.

3.8 IRELAND

Altogether, there are 42 banks with total assets reaching 840% of Irish GDP which is the second largest share from the analysed European countries. Out of that, 60% of the assets are controlled by entities from outside Ireland and 15% are state controlled. The Irish banking system is highly concentrated. The Herfindahl-Hirschman index exceeded 2500 units in 2011. The Irish "Big Four" consists of Allied Irish Bank, Bank of Ireland, National Irish Bank, and Ulster Bank (Bank of Ireland, 2012; Bijlsma & Zwart, 2013).

During the crisis, Irish banking sector had to receive significant amount of liquidity injections. The first two banks mentioned above received a bailout of EUR 2 billion back in 2008. At that time, many banks found themselves at the edge of insolvency. Despite the non-performing loans ratio tripling between 2008 and 2009 to exceed 9%, it still remained relatively low in comparison to other countries. In the last decade, Ireland was an AAA country until 2009 when it started being gradually downgraded to the final BBB+ status. In 2010, the sector experienced pre-tax loss of over EUR 30 billion. For further

development, deleveraging of the sector will be the main issue (Kelly, et al., 2010; Woods & O'Connell, 2012; World Bank, 2012).

3.9 LATVIA

Latvia's growth as one of the Baltic tigers did not prove sustainable as it experienced a severe shock in 2008/9. Since then, the recovery has been sharp and fairly stable. The year-on-year GDP growth reached up to 6.9% in the beginning of 2012. In 2012, Latvia was upward graded from BBB- to BBB by Fitch with a positive outlook. The non-performing loans ratio peaked in 2010 at 19% and now stands slightly above 10% (Bank of Latvia, 2011; Fitch, 2013).

Table 3-2: Rating evolution of selected countries

	2007	2008	2009	2010	2011	2012	2013	
Estonia	A	A-	BBB+	A	A+	A+	A+	
Hungary	BBB+	BBB	BBB	BBB-	BBB-	BB+	BB+	
Ireland	AAA	AAA	AA-	BBB+	BBB+	BBB+	BBB+	
Latvia	BBB+	BBB-	BB+	BB+	BBB-	BBB	BBB	
Lithuania	A	BBB+	BBB	BBB	BBB	BBB	BBB+	

Source: (Fitch, 2013), Author

There are 26 banks operating in Latvia with 66% of total assets being owned by foreign entities. 82% of that is controlled by parent banks from the Scandinavian region. As Latvia is likely to join the Euro area in January 2014, certain decline in the number of banks is expected (Bijlsma & Zwart, 2013).

The concentration of the Latvian banking sector is rather low, especially in comparison to its regional peers Estonia and Lithuania. The Herfindahl-Hirschman index does not exceed 1000 units. The top three banks account for over EUR 12 billion which is approximately half of the total sector's size (Bank of Latvia, 2012; Treasury of Latvia, 2013).

3.10 Lithuania

More than 4/5 of the Lithuanian financial system is formed by the banking sector which consists of nine domestically licensed banks and eleven branches of foreign banks. The Scandinavian countries play an important part as five out of seven banks with market share exceeding 5% are owned by one of the Nordic countries' banks: Sweden (SEB bankas and Swedbank), Norway (DnB Nord bankas), Finland (Nordea Bank), Denmark (Danske Banke). Prior to the crisis, the mentioned Lithuanian banks were subject to noteworthy loan flows from their parent banks which contributed to the stability of the sector. The crisis, however, pointed out the urge for more reliance on domestic deposits (Bank of Lithuania, 2012; Finasta, 2011).

The concentration of the Lithuanian banking sector is high as the Herfindahl-Hirschmann index exceeds 2000 units. In the last decade the HHI was on decline but it increased sharply in 2011 with the default of Bank Snoras. The top three banks (already mentioned SEB, Swedbank and DnB NORD) hold together 69.1% of all banking assets (Bank of Lithuania, 2012).

The non-performing loans ratio reaches 20% which is higher than the one of Latvian banking sector, and it exceeds the Estonian non-performing loans almost four times. The main concerns are related to external factors such as sovereign debt crisis in the Euro area and associated spillovers or severe trade contraction (World Bank, 2012).

3.11 Luxembourg

According to the law, banks operating in Luxembourg are divided to 'Universal banks' and 'Banks issuing covered bonds'. There is 137 of the former and 6 of the latter registered in the sector. Altogether, there are 143 banking institutions with prevailing equity from over 20 countries. The largest share of 29% belongs to German entities that control 42 credit institutions; France follows with 13 and Belgium with 11 banks (share of 11% and 10% respectively). Almost 20% of foreign owners originate outside the European Union (KPMG, 2012). Five banks are domestically owned (PwC, 2011).

The above-mentioned numbers suggest the fragmentation of the sector. The Herfindahl-Hirschman index supports the statement as its value does not exceed 1000 units indicating low concentration. The market share of the top five credit institutions (Deutsche Bank, Societe Generale, BGL BNP Paribas, BCEE – state owned, and CACEIS Bank – owned by Credit Agricole Group) accounts for about 30% (European Central Bank, 2010).

Concerning performance indicators, the Luxembourg banking sector experienced a painful decrease of almost 25% between 2010 and 2011when the net profit fell from EUR 3.82 billion to EUR 2.91 billion. The non-performing loans, on the other hand, remain far below 1% (The Luxembourg Bankers' Association, 2012; World Bank, 2012).

3.12 MALTA

The Maltese banking sector is large in terms of assets. The banking assets to GDP ratio reaches 800% and is the third largest proportion from the analysed countries after Luxembourg and Ireland. As the fourth country in order is Cyprus,[4] the soundness of Maltese financial sector has recently been under much scrutiny. There is, however, limited evidence on behalf of which Malta should be considered unstable. As of March 2013, Malta is rated as an A+ country, while Cyprus was downgraded to B in January 2013 after being in the 'B' scale from August 2011(Central Bank of Malta, 2012; Fitch, 2013).

There are 24 banks operating in Malta; 3 are predominantly domestically owned, the rest has a majority foreign owner. Most of the foreign-owned banks have an Austrian interest. In terms of assets, 57% of the banking assets are held by foreign entities. The three largest banks (Bank of Valletta, HSBC and CommBank Europe) cover more than 80% of the market. The concentration in Malta is high which is also documented by the Herfindal-Hirschman index reaching 2529 units in 2011 (Bijlsma & Zwart, 2013).

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[4] In March 2013, Cypriot request for EUR 10 billion bailout for its banking sector recapitalisation was approved by the European Commission, European Central Bank and the International Monetary Fund. Cyprus became the fifth European country to receive a financial assistance since the crisis outbreak (European Central Bank, 2013).

Profitability of Maltese banking sector remains fairly stable, the only drop came in 2008 when the sector's return on assets turned negative (-0.51). Since then, it has been moving around its pre-crisis levels of 1. The non-performing loans ratio is gradually rising, currently peaking at 8.2% (World Bank, 2012).

3.13 NEW ZEALAND

Similarly to the Czech Republic, banking sector dominates the financial sector in New Zealand. More than 80% of the overall financial sector assets are associated with banks as opposed to nearly 60% in neighbouring Australia where, however, the financial sector is almost ten times larger.

Currently, there are 22 banks operating in New Zealand while ten of those are branches of overseas incorporated banks and three are owned domestically. Banks under Australian ownership account for almost 90% of the banking assets and around 70% of the financial sector (Reserve Bank of New Zealand, 2009).

In comparison to countries of the CEE (or CESEE) region, the phenomenon of foreign-bank ownership is nothing new in New Zealand. The main surge in banking deregulation took place in the 1980s and had significant impacts in the 1990s mostly represented by tougher competition, resulting in country's extremely low share of domestically owned banking assets.

As to the concentration of the banking sector, the Herfindahl-Hirschman index exceeded 2000 units from 2006 onwards keeping New Zealand banking sector the highly concentrated. High concentration can also be documented by the fact that 90% of total assets are owned by the top four banks (ANZ National, Bank of New Zealand, Westpac and ASB – all branches of Australian-incorporated banks) (Reserve Bank of New Zealand, 2009).

Together with the fifth largest New Zealand bank (KiwiBank), the Australian quartet reported a decrease of 0.6% of before tax profit between 2011 and the first half of 2012. Sectoral non-performing loans peaked in March 2011 reaching 2.1%, since then keeping below the two percent threshold (Reserve bank of New Zealand, 2012; Jang & Kataoka, 2013).

3.14 POLAND

The Polish banking sector is unique for its scale which is incomparable with other Central European markets, and also for its extensive branch network of cooperative banks which reaches the amount of 574 and overall accounts for only 6.1% of the market. Given the demographic specifics of Poland, with 40% of the population still living outside urban areas, there were 2821 inhabitants per a bank branch but only 67% penetration in 2011 giving the sector a large growth potential (Central Statistical Office of Poland, 2012; Deloitte, 2012; European Banking Federation, 2012).

Besides cooperative banks, there are 63 commercial and 3 affiliating banks operating in Poland. Of the commercial banks, 45 are licensed domestically, 18 represent branches of foreign financial institutions. Polish equity is prevailing in 6 commercial banks while 4 are mostly state owned and they account for more than 20% of total assets as the largest Polish bank, PKO BP whose assets exceed EUR 45 billion, is in majority in state ownership. Foreign-owned banks represent almost 70% of total assets (National Bank of Poland, 2010; Bijlsma & Zwart, 2013; European Banking Federation, 2012).

The concentration of Polish banking sector is fairly low since the Herfindahl-Hirschman index does not exceed 600 units. The top three banks (PKO BP – state owned as mentioned above, Bank Pekao – member of UniCredit Group, and BRE Bank – owned by Commerzbank) hold 31.6% of total assets (Raiffeisen Research, 2012). The largest ten banks hold about 60% of the market which is far below the region's average (Deloitte, 2012).

Since the beginning of the current crisis, the non-performing loans ratio has stabilized at seven to eight percent. The sector is, moreover, highly profitable with reported EUR 3.85 billion of net profit in 2011. For 2012, the value is expected to rise by 3% (Reuters, 2012). Polish financial sector is, however, exposed to substantial foreign exchange risk due to the volatility of Zloty making hedging a very common practice (Raiffeisen Research, 2012).

3.15 ROMANIA

The financial crisis affected Romania significantly causing a fall in GDP between 2009 and 2010 by 7.1% and between 2010 and 2011 by 1.3%. The banking sector's net profit has been in negative numbers for the past two years, too. In 2008, Romania reported magnificent EUR 1.1 billion net profit only to lose more 82% of it by 2009. In 2010 and 2011, the numbers turned red and the loss reached EUR 120 million and EUR 100 million respectively for the sector as a whole. However, some individual banks were able to remain profitable even in the hostile economic environment (Ensight Management Consulting, 2012).

The Romanian banking sector is structured as follows. Out of the 41 banking institutions operating on the market, 39 are privately owned and their asset share fluctuates around 91%. There are 34 banks with prevailing foreign capital, 8 of those are branches of foreign banks. In terms of total assets, the foreign-owned banks accounted for 81.2% in June 2012. The share is slightly declining since 2008 by average 1.7 percentage points annually. The largest market share is held by entities from Austria (38%), France and Greece (approximately 14 and 13% respectively) (National Bank of Romania, 2012).

The largest three banks (BCR – part of Erste Group, BRD – owned by Societe Generale and Banca Transilvania – under EBRD) control 41% of the assets, five largest (CEC Bank – state owned, Raiffeisen Bank) then around 55%, a value slightly lower than the EU27 average. The Herfindahl-Hirschman index indicates high degree of sector concentration ending up at 1866 in 2012 which is approximately 600 units above the EU27 average. Also due to necessary austerity measures, the number of branches dropped by 352 units during the first two quarters of 2012 and the average of braches per inhabitant deeply lags behind the EU as well as region average (National Bank of Romania, 2012).

Concerning the non-performing loans ratio, Romania still seems to have the worst ahead. The percentage of loans overdue more than 90 days was expected to peak in 2012 after reaching 11.9 in 2010 and 14.1 in 2011. Latest available data suggest the share of little less than 17%. The positive news is that the growth rate is slightly decreasing and in the group of small banks, non-performing loans share declined between March and June 2012 (National Bank of Romania, 2012). Until Romania gets the impairment charges under control, the sector cannot improve the profitability indicators.

3.16 SERBIA

The Serbian banking sector can be characterized by below average concentration. Out of the 33 banks that operate in Serbia, only two exceed 10% market share, three banks' share ranges between 7% and 8%, of the remaining 28 banks only one hardly exceed 6% share. The Herfindahl-Hirschman index value of 656 units as of March 2012 only supports the fact of low concentration. The top three banks (Banca Intesa, Komercijalna Banka and UniCredit Bank) together hold 32.7% of total assets, the top five ones (Raiffeisen Bank and Societe Generale) hold 47% (Deloitte, 2012; National Bank of Serbia, 2012).

As to the ownership structure of Serbian banking sector, there are 12 banks in domestic and 21 banks in foreign ownership. The leading position of the latter measured by absolute number of banks belongs to Greece which accounts for 15% of total assets but is in total responsible for EUR 6.2 million pre-tax loss. Measured by share on total assets, Italian entities are the most significant owners with the share of 22%. Overall, 11 foreign banking groups are present in Serbia (National Bank of Serbia, 2012).

There are nine state-owned banks in Serbia, the largest of which is Komercjalna Banka (second largest bank in the country) while the others do not rank in the top 10. Domestically-owned banks account for 30% of profit as well as employment (National Bank of Serbia, 2012).

Figure 3-2: Ownership structure in Serbia (% of total assets)
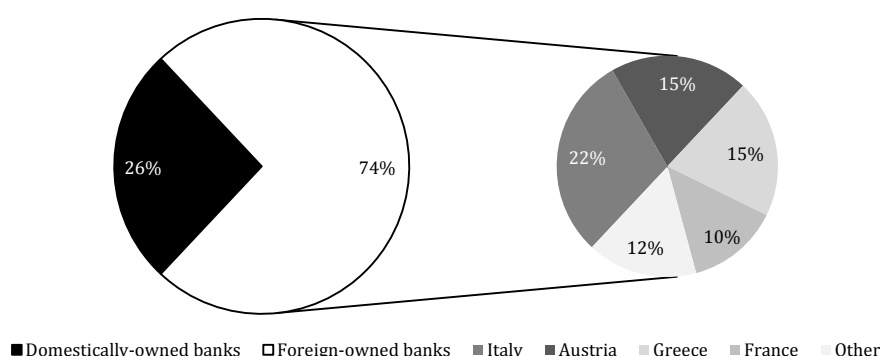
Source:(National Bank of Serbia, 2012), Author

Looking at the net profit of the Serbian banking sector, we can see that it is profitable only just. In 2011, the numbers reached EUR 12 million. In the two preceding years, the situation was somewhat better as the sector reported net profit ranking around EUR 100 million (Deloitte, 2012). The market is, however, highly liquid as the capital adequacy accounts for as much as 20% of risk weighted assets, well above the Central and Eastern European region's average.

3.17 SLOVAKIA

Even though the financial crisis affected Slovakian banking sector severely, it was able to recover quickly and solidly. After three years, the net profit returned to the pre-crisis level when Slovakia reported respectively EUR 550, 250, 500 and 674 million for 2008 to 2011 (Deloitte, 2012). The economic growth remains robust although the growth potential of the banking sector alone is rather limited.

Out of the 31 banks operating in the Slovak Republic, 2 have no foreign capital participation (excluding the National Bank). There are further 12 foreign-owned banks operating under domestic licence and 16 branches of foreign banks. Together, they hold 89% of total assets. Entities originating in the neighbouring Austria (EUR 642.7 million) and the Czech Republic (EUR 560.5 million) have the highest share of subscribed capital equity.[5] More than eight percent of the total assets belong to state-owned subjects (National Bank of Slovakia, 2012).

Concerning the market concentration, Herfindahl-Hirschman index indicates a moderate concentration comparable to the EU27 average. The top three banks (Slovenska Sporitelna – member of Erste Group, VUB Banka – part of Intesa Sanpaolo conglomerate, and Tatra Banka – owned by Raiffeisen International) however, control more than a half of the market (56.1% in 2011). Adding the two following players (CSOB – part of KBC Group and UniCredit Bank), the share exceeds 72%. The concentration of assets of the top 10 banks is the second largest in the Central and Eastern European region surpassing the average value by seven percentage points (Deloitte, 2012).

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[5] As of September 30, 2012.

Slovakian banking sector enjoys stable positive development of non-performing loans that are currently below 6%, and sufficient capital adequacy of 13.4% (World Bank, 2012).

Figure 3-3: Comparison of macroeconomic position (CE countries, 2011)[6]

	GDP growth	Inflation	Unemployment	Interest rate	Debt
Czech Republic	1.89%	1.94%	8.0%	3.71%	40.8%
Hungary	1.69%	3.96%	10.6%	7.64%	81.4%
Poland	4.35%	4.22%	12.5%	5.96%	56.4%
Slovak Republic	3.35%	3.92%	13.3%	4.42%	43.3%

Source: WorldBank, Author

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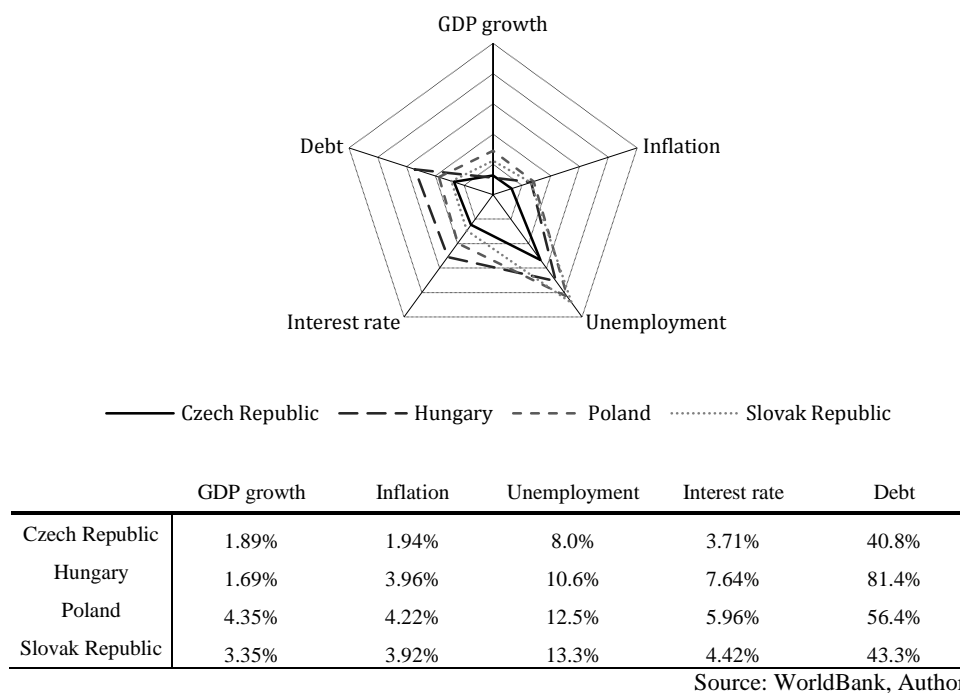
[6] Used variables: Real annual GDP growth rate (GDP growth), Annual inflation rate (Inflation), Annual unemployment rate (Unemployment), ten-year government bond yield (Interest rate), and Central government debt (Debt).

4 EMPIRICAL PART

This section is divided into three subsections according to the analysed hypotheses. Each of these subsections has five parts commenting on

1. Hypothesis description,
2. Data and methodology,
3. Used variables,
4. Descriptive analysis, and
5. Results and findings.

The section is concluded by summary of key findings and possible further research opportunities.

For the general selection of countries, whose banks and financial sectors are analysed the following criteria were applied:

1. Country is either member of OECD or geographically belongs to Europe; and
2. Total share of assets within the country's banking sector owned by a foreign entity exceeds 60%.[7]

Countries meeting the criteria and for which sufficient data was available are Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Ireland, Latvia, Lithuania, Luxemburg, Malta, New Zealand, Poland, Romania, Serbia and Slovakia. Hong Kong is added to the dataset as it is an important international player with high foreign-ownership ratio which belongs, similarly to Luxembourg or New Zealand, to the high-income country group.

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[7] As of 2010.

As a primary data source, the BankScope database is used throughout the analysis complemented by variety of other sources such as Bloomberg, the IMF, OECD iLibrary and World Bank databases, Eurostat and individual countries' national banks.[8] Due to lower reliability of BankScope data in case of transition countries as described in (Bonin, et al., 2005), the dataset was thoroughly reviewed and cross-referenced with other authors and using more sources.

For the analysis, five types of financial institutions (as categorized in the BankScope database) are considered: bank holdings & holding companies, commercial banks, cooperative banks, real estate & mortgage banks, and savings banks. Thus, central banks, investment banks, leasing companies and other types of financial institutions are excluded from the sample. Only those banks with majority foreign ownership are considered. Altogether, 504 credit institutions match the stated criteria; the sample varies according to tested hypothesis and data availability. Primarily, data was collected for the period from 2005 to 2011.

The descriptive analysis is carried out in R statistical software, while the model estimation is carried out in Stata software. In case of GMM estimation the xtabond2 package introduced by Roodman (2006) is employed.

4.1 FIRST HYPOTHESIS: ECONOMIC FUNDAMENTALS AND FOREIGN-OWNED BANKS

The economic fundamentals in the host country influence directly the performance of foreign-owned banks in the host country.

In the first part of the analysis, we examine the relationship between macroeconomic conditions in a country and the performance of foreign-owned banks operating in it. A host country is a country in which an analysed foreign-owned bank operates.

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[8] For the full list of sources see Appendix.

4.1.1 DATA AND METHODOLOGY

The final dataset is a balanced panel covering the seven-year period from 2005 to 2011. Only those banks that are in majority owned by a foreign entity enter the analysis, as stated in the general selection part. At this point of the analysis, the type of owner entity does not matter and all types are included. The data availability enables us to study more than 140 banks, on average over 8 banks per country.

Table 4-1: List of host countries and their ISO code

Bosnia and Herzegovina	:	BA	Hungary	:	HU	New Zealand	:	NZ
Bulgaria	:	BG	Ireland	:	IE	Poland	:	PL
Croatia	:	HR	Latvia	:	LV	Romania	:	RO
Czech Republic	:	CZ	Lithuania	:	LT	Serbia	:	RS
Estonia	:	EE	Luxembourg	:	LU	Slovak Republic	:	SK
Hong Kong	:	HK	Malta	:	MT			

Source: Author

The features of the dataset make it especially suitable for the analysis by means of General Method of Moments, even though fixed or random effects approach is also commonly used in the literature (e.g. Yi, et al., 2009). The following paragraphs summarise the GMM method theoretically, culminating with the final specification of the chosen estimating equation.

Figure 4-1: Types of controlling shareholders of the analysed banks
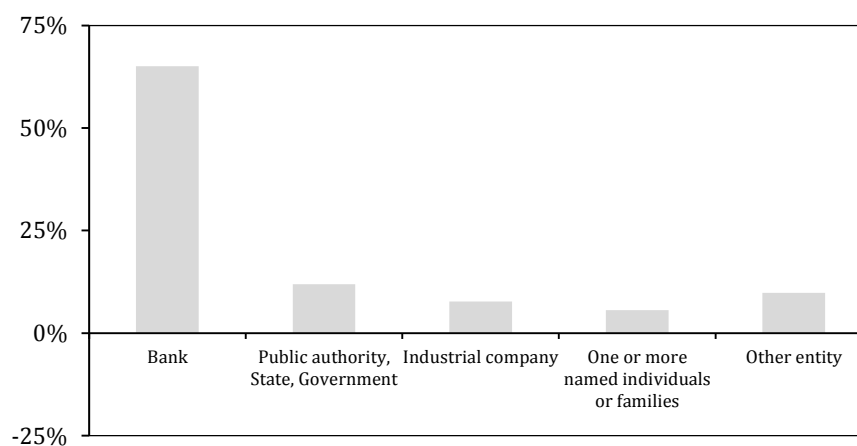
Source: BankScope database, Author

Generally, the data generating process takes the form of

$$y_{i,t} = \alpha y_{i,t-1} + \mathbf{X}'_{it}\beta + \epsilon_{it} \qquad \text{(Equation 4.1-1)}$$

$$\epsilon_{i,t} = \mu_i + v_{i,t}$$

$$E[\mu_i] = E[v_{i,t}] = E[\mu_i v_{i,t}] = 0$$

where $i = 1, \dots, N$ is the individual's index and $t = 1, \dots, T$ is a time index. The disturbance term has two components: μ_i stands for the fixed effects and $v_{i,t}$ for the idiosyncratic shock. Estimating Equation 4.1-1 via OLS results in its inconsistency due to the dynamic panel bias which is caused by the fact that $y_{i,t-1}$ is correlated with μ_i, i.e. the fixed effects error term. If the number of the time periods in the sample (T) was large, the correlation and the endogeneity problem would disappear, however, as this is not the case of our sample, the pooled OLS estimation is a wrong approach (Wooldridge, 2001).

To deal with the correlation problem, we could firstly address the fixed effects term by applying either Least Squares Dummy Variables or a Within estimation. However, using the latter the dynamic panel bias remains. The transformation of the lagged dependent variable under within estimation looks as follows

$$y^*_{i,t-1} = y_{i,t-1} - \frac{1}{T-1}(y_{i2} + \dots + y_{iT}),$$

the transformation of the error term is

$$v^*_{i,t} = v_{i,t} - \frac{1}{T-1}(v_{i2} + \dots + v_{iT})$$

and thus the regressor and the error term are still correlated despite the transformation.

Two types of transformation are commonly applied to treat endogeneity. Firstly, it is the Difference General Method of Moments (Arellano & Bond, 1991; Arellano & Bover, 1995), based on first-difference transformation which when applied to Equation 4.1-1 yields

$$\Delta y_{i,t} = \alpha \Delta y_{i,t-1} + \Delta x'_{i,t}\beta + \Delta v_{i,t}.$$

The main disadvantage of this approach is that first-differencing prolongs gaps in case of unbalanced panels. Considering y_{it} missing, then Δy_{it} as well as $\Delta y_{i,t+1}$ would be missing after transformation. More suitable for unbalanced data is the forward orthogonal deviation. The transformation is carried out by subtracting the average of the future observations that are available which minimizes the potential data loss (Roodman, 2006).

The System GMM (Blundell & Bond, 1998) is based on the use of instrument variables that are not correlated with the fixed effects in order to remove endogeneity and it makes use of including lagged levels and differences. System GMM also allows for time invariant dummy variables which would be erased if difference GMM was employed.

The estimation equation representing our model for each of the performance measures is as follows:

$$Y_{i,t} = \alpha Y_{i,t-1} + \beta X_{i,t} + \gamma Z_{t-1} + \delta W_t + \mu_i + v_{i,t}, \qquad \text{(Equation 4.1-2)}$$

where $Y_{i,t}$ … individual banks' performance in year t (dependent variable)

$Y_{i,t-1}$ … individual banks' performance in year $t-1$

$X_{i,t}$ … vector of individual banks' bank-specific variables in year t

Z_{t-1} … vector of lagged country-specific variables

W_t… vector of banking sector-specific variables

μ_i … unobserved bank-specific time-invariant effect

$v_{i,t}$ … disturbance term.

Variables entering the equation are described in the next part.

4.1.2 VARIABLES

The selection of variables entering the analysis is based on the works of Yi, et al. (2009), Heffernan & Fu (2010), and Miklaszewska & Mikolajczyk (2012).

As dependent variables, three performance indicators were chosen:

Return on average assets (ROAA),

Return on average equity (ROAE),

Net interest margin (NIM).

The explanatory (independent) variables can be classified as bank-, banking sector- and country-specific. The following paragraphs list variables of each of the group and provide a brief description.

1. Bank-specific variables

Natural logarithm of total assets (ln_ta) is commonly used to approximate the size of a bank. The natural logarithm helps smooth out large differences between individual bank's total assets.

Net loans to total assets ratio ($nlta$) captures how large share of total assets is accounted for by the loan portfolio and is considered a risk ratio. The expected sign of estimated coefficient is unclear due to the fact that too high ratios may negatively affect liquidity while low ratios indicate lower interest income.

Loans to deposits and short-term funding ratio ($lstf$) is a liquidity measure and reflects on the structure of the bank's balance sheet and the balance of each bank's business model.

Loan loss reserves to gross loans ($llsgl$) represent the part of loan portfolio that is set aside for potential charge-off and speaks of the bank's asset quality.

Equity to total assets (eta) is a measure of the bank's ability to meet its obligations and absorb potential losses. As a low ratio can be a sign of insufficient capital and a high ratio may cause lost investment opportunities, the resulting coefficient's sign is not clear.

Cost to income ratio (ci) indicates what share of income consumed by operational costs and thus reflects the operational efficiency. Therefore, a negative coefficient sign is expected.

Loan impairment charges to average gross loans (npl) measures the credit quality management by comparing the impairment losses and the size of the loan portfolio. It is used as a proxy of non-performing loans as data on this indicator were not available. A negative sign of this asset quality measure is expected.

Liquid assets to deposits and short-term funding ratio ($lastf$) is another variable capturing the liquidity of a given bank. The expected sign is again ambiguous as too high ratio may result in lost investment opportunities, too low ratio may increase the bank's borrowing rates.

There are also several dummy variables among the bank-specific variables. These are: listing ($dlist$: 0 = listed; 1 = unlisted or delisted), bank owner type ($down$: 1 = bank; 0 = other institution or an individual) and type of bank ($dcomm$: 1 = commercial bank or bank holding; $dcoop$: 1 = cooperative bank; $dsav$: 1 = savings bank; 0 = real estate and mortgage bank).

2. Banking sector-specific variables

Number of financial institutions ($nobanks$) represents the size of the given banking sector.

Herfindahl-Hirschman index (hhi) approximates the concentration of the banking sector and is computed from the data using individual bank's total assets market share. In case HHI is higher than 1800 units, the banking sector is consider highly concentrated, in case HHI is between 1000 and 1800 units, the sector is considered moderately concentrated, low concentration is assigned to sectors with HHI lower than 1000.

Banking assets to GDP ratio (bas) indicates the penetration of the banking sector.

3. Host country-specific variables

Real annual GDP growth rate (gdp), the coefficient is expected to be positive when the rate is positive.

Annual inflation rate ($infl$) represents the year-on-year percentage increase in consumer price index, the relation between bank performance and inflation is expected negative.

*Annual unemployment rate (*unemp*) should affect bank performance adversely.*

*Annual interest rate (*bond*) is approximated by ten-year government bond yield of each of the selected countries.*

Note that the macroeconomic variables are lagged by one year in order to let the conditions get reflected in the financial statements of individual banks.

4.1.3 DESCRIPTIVE ANALYSIS

We start the descriptive analysis by exploring the dependent variables - banks' performance measured by return on average assets and equity (ROAA, ROAE) and net interest margin (NIM). Figure 4-2 captures the mean of each of the dependent variables by bank type. In terms of ROAA and ROAE, cooperative and real estate and mortgage banks perform roughly the same; savings banks' performance on average is relatively the worst throughout the period. The opposite is true when NIM is used as a measure of performance and real estate and mortgage banks rank markedly the lowest. The right panel of the figure shows the evolution of ROAE by bank type in time, from 2005 to 2011.

Figure 4-2: Mean profitability by bank type (2005-2011)

Left panel: Mean ROAA, ROAE and NIM by bank type; right panel: Mean ROAE by bank type, evolution over the period 2005 to 2011

Source: BankScope database, Author

31
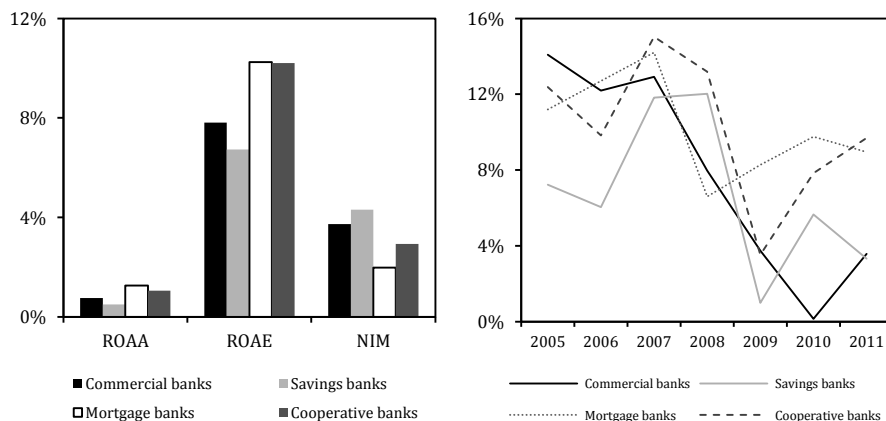
A clear sharp decrease in performance is documented from 2008 to 2009 for all types of banks except for the commercial banks, where the lowest point (just positive) is documented as late as in 2010. The mean was, however, gradually going down from 2007 for this bank type, on average by 4.3% per year. Between 2010 and 2011, the trend turned and commercial banks report an average growth in performance measured by ROAE of 3.5%.

Looking closely at performance of listed and un-/delisted banks, we can see that there is a lot of variability in the sample, mostly concerning the listed banks. On the other hand, the group of delisted banks is very homogenous in terms of ROAA (see Figure 4-3).

Figure 4-4 depicts a relationship between performance measures (ROAA and ROAE respectively) and the non-performing loans proxy (loan impairment charges). The right-hand-side outlier in terms of loan impairment charges is KBC Bank a.d. Beograd in 2005 where the impairment losses more than doubled from 2004.

Figure 4-3: Performance of banks based on listing (minimum and maximum throughout the sample, 2005-2011)
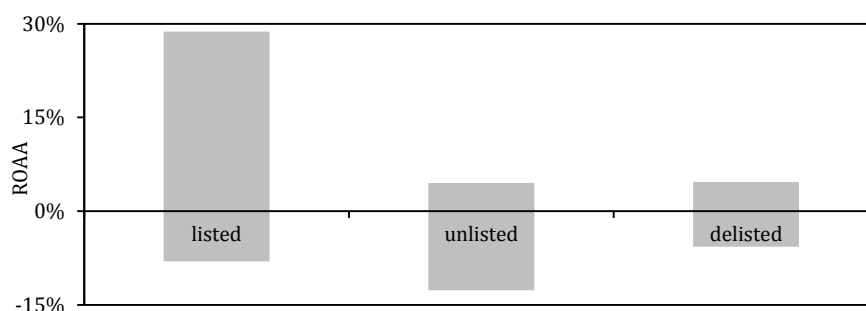
Source: BankScope database, Author

The country-specific indicators for 2011 are reported in Figure 4-5. Serbia experienced the highest inflation from the analysed countries reaching 11.14% and also the second largest unemployment rate, outran by Bosnia and Herzegovina. The lowest GDP growth rate of -0.37% was reported by Romania, the other country with a negative growth is Croatia. The Baltic countries, on the other hand, demonstrate a very healthy and promising GDP growth rate. For all three of them, the rate exceeds 5% per year and they rank on the top followed by Hong Kong and Poland. The Baltic countries are also those most severely hit by the financial crisis, as depicted in Figure 4-6. In 2009, Latvia's real GDP

growth dropped to almost -18%, Latvia remained in red in 2010 as well and reported 5.47% growth rate in 2011.

Figure 4-4: Scatter plot: Performance and loan impairment charges (2005-2011)
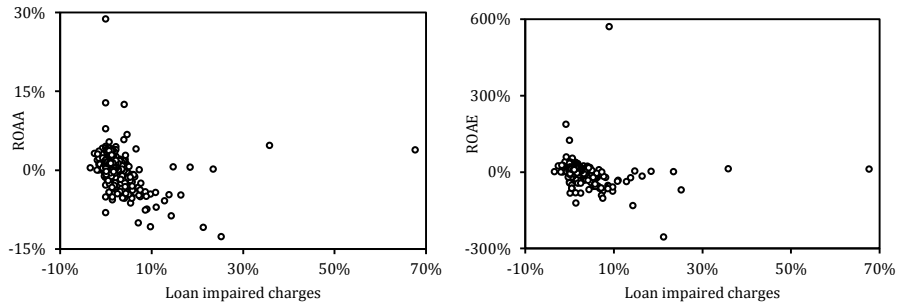
Figure 4-5: Macroeconomic conditions in 2011

Top left panel: Real annual GDP growth; top right panel: annual inflation rate; bottom left panel: annual unemployment rate; bottom right panel: 10-year government bond yield.
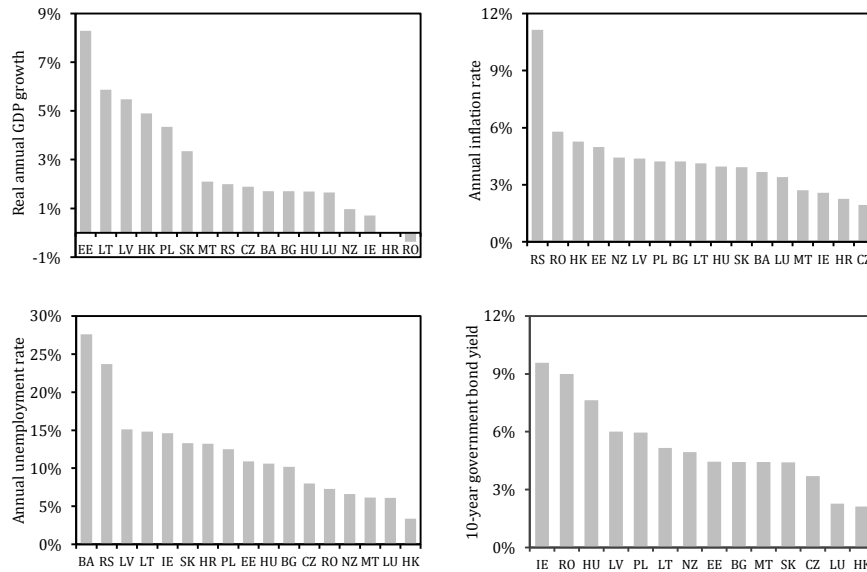
In Figure 4-7, we can see the banking sector size comparison using first number of banks within the sector and second banking assets as a fraction of GDP. In terms of number of institutions, Hong Kong surpasses the second-ranking Luxembourg by 50 units, however, when comparing the penetration of these

two sectors, Luxembourg reports three and a half times larger sector than Hong Kong suggesting the relative smallness of its banks.

Figure 4-6: Real annual GDP growth from 2009 to 2011
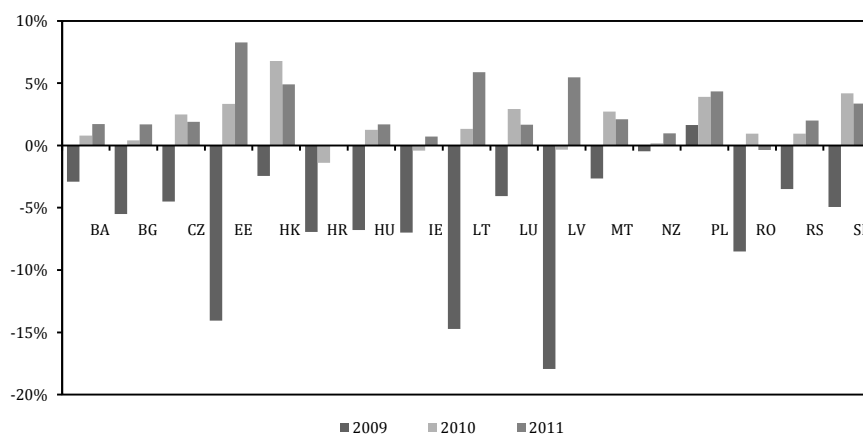
Figure 4-7: Banking sector size in 2011
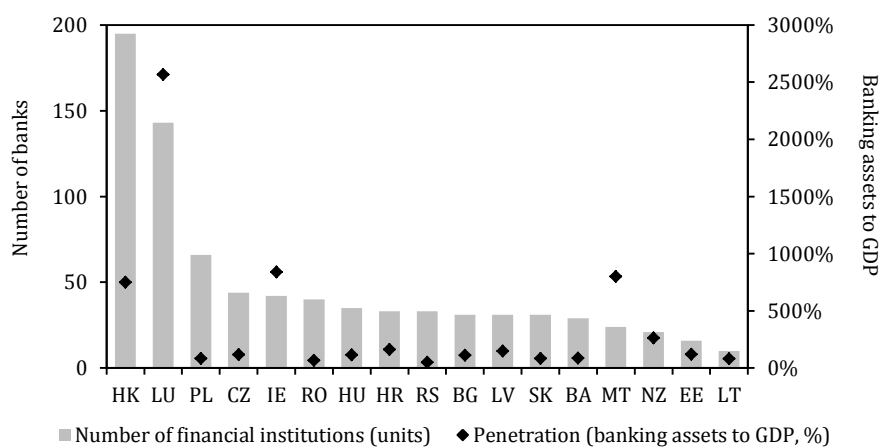
Similarly, while Romania and Ireland have roughly the same number of credit institutions (42 and 40 respectively), their banking assets share differ markedly as the Irish one is twelve times larger. The banking assets share also stands out for Malta accounting for 800% of GDP and thus twice exceeding the sample average in 2011. The lowest relative penetration (measured by banking assets share per credit institution) is reported by Poland, where the value is only 1.27%

(assets as a share of GDP per one banking institution) while the sample average for CESEE countries[9] is 2.73%.

Table 4-2 provides a further summary of the used variables reporting the maximum, minimum, median and 1st and 3rd quartile.

Table 4-2: Summary statistics of used variables

	min	1st quartile	median	3rd quartile	max
bas	44.0%	75.0%	106.0%	169.0%	3225.0%
bond	0.0%	0.0%	4.2%	5.6%	15.5%
ci	0.0%	47.7%	58.9%	72.8%	418.8%
eta	-2.4%	7.4%	9.8%	13.6%	80.6%
gdp	-17.9%	1.0%	4.2%	6.4%	12.2%
hhi	410	710	1205	1544	8822
infl	-4.4%	2.3%	3.8%	6.1%	16.1%
la_stf	-6.5%	17.6%	28.8%	42.5%	496.5%
llr_gl	0.0%	0.9%	2.6%	5.1%	67.8%
ln_ta	9.44	13.02	14.66	16.08	20.14
nim	-0.6%	2.1%	3.2%	4.6%	16.3%
nl_stf	0.0%	60.3%	74.5%	89.5%	597.1%
nl_ta	6.7%	45.4%	58.9%	70.3%	255.6%
nobanks	10	30	35	64	204
npl	-3.4%	0.2%	0.6%	1.5%	67.6%
roaa	-12.6%	0.4%	1.0%	1.5%	28.7%
roae	-255.5%	3.0%	9.5%	16.2%	570.2%
unemp	3.4%	5.8%	8.2%	13.3%	31.8%

Source: BankScope database, Worldbank database, Author

4.1.4 RESULTS AND FINDINGS

Table 4-3 summarises estimation results which are based on the model described in Section 3.1.1 while applying orthogonal deviation transform instead of first differencing, standard errors robust to heteroscedasticity and autocorrelation within cross-sections, adjustments for small samples, and a two-step model. The reported outcome performed best in terms of tested parameters, i.e. the Arellano-Bond AR(1) and AR(2) test, the Hansen test and F test. Variables *unemp* and *bond* were dropped from the estimation for their correlation and better performance of the model both in terms of diagnostics and variable significance. Following the approach of Heffernan & Fu (2010) the

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[9] CESEE countries in our sample include Poland, the Czech Republic, Romania, Hungary, Croatia, Serbia, Bulgaria, Slovakia and Bosnia and Herzegovina.

variable *eta* was excluded from the instrument set to avoid endogeneity problem.

Table 4-3: Estimation results (System GMM model)

	Dependent variable					
	ROAA		ROAE		NIM	
Independent variables	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
constant	0.0135	0.51	-0.0489	-0.13	0.0041	0.22
l.DV	0.3711	4.33 ***	0.0595	0.67	0.7411	9.85 ***
ci	-0.0208	-2.93 ***	-0.1205	-2.28 **	0.0053	1.54
eta	0.0529	2.32 **	0.1401	0.32	0.0328	2.50 **
la_stf	-0.0046	-0.83	0.0031	0.07	-0.0030	-0.91
llr_gl	0.0716	2.00 **	-0.1849	-0.56	-0.0138	-0.58
nl_stf	-0.0004	11.00	-0.0363	-1.52	0.0015	1.43
npl	-0.3657	-4.11 ***	-3.4834	-2.23 **	0.0155	0.29
ln_ta	0.0002	0.14	0.0380	1.96 *	0.0015	1.83 *
nl_ta	-0.0073	-1.23	0.0133	0.29	-0.0040	-1.18
down	-0.0003	-0.08	-0.0641	-1.36	-0.0090	-1.95 *
dlist	-0.0022	-0.68	0.0161	0.28	0.0030	1.28
dcomm	0.0135	1.03	-0.1981	-0.71	-0.0109	-0.87
dcoop	0.0096	0.73	-0.2570	-0.88	-0.0168	-1.28
dsav	0.0197	1.14	-0.3696	-0.90	-0.0167	-0.93
l.infl	-0.0248	-0.75	0.3291	0.86	-0.0236	-1.06
l.gdp	0.0086	0.69	0.4941	1.97 ***	0.0132	1.78 *
hhi	0.0000	-1.53	0.0000	-1.54	0.0000	-1.50
nobanks	0.0000	-0.21	-0.0008	-1.49	0.0000	-2.24 **
bas	-0.0003	-1.8 *	-0.0020	-0.47	-0.0002	-1.26
tt	-0.0011	-3.01 ***	-0.0061	-0.89	-0.0003	-1.51
Estimation diagnostics						
Number of observations	858		858		858	
Number of groups	143		143		143	
Observations per group	6		6		6	
F test	22.27	***	8.7	***	47.57	***
Arellano-Bond AR(1)	-2.94	**	-1.08		-3.89	***
Arellano-Bond AR(2)	1.6		0.89		-1.32	
Hansen test	119.08		121.43		107.19	

*Signif. codes: '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1*

Source: Author's computations

In all cases of dependent variables (ROAA, ROAE and NIM), the F test is highly significant rejecting that the independent variables are jointly

insignificant. Similarly, the Hansen test suggests that the model does not suffer from overidentification, the rule of thumb implying that number of instruments should not exceed number of groups in the sample is also satisfied. Thus, the GMM estimates are valid.

In case of ROAA and NIM, the Arellano-Bond AR(1) test with null hypothesis of no serial autocorrelation in levels is rejected, for all three dependent variables, the AR(2) test with null hypothesis of no second-order serial autocorrelation is not rejected. This result is expected due to the first-differenced equation while assuming no serial correlation within the original disturbance term. These tests are important from the GMM estimators' consistency point of view.

The lagged dependent variable is highly significant for ROAA and NIM and insignificant for ROAE. In all cases, the coefficient is positive. The coefficient of cost income ratio is significant and negatively signed for all the models excluding NIM. This result points out that banks with higher operating efficiency tend to perform better. The equity to assets ratio coefficient is significant for ROAA and NIM and for all three types of dependent variables it is positively signed suggesting that sounder banks' performance is better.

The coefficients of liquidity measures, namely liquid assets and net loans to short term funding, as well as net loans to total assets are insignificant regardless of dependent variable. Moreover, we are unable to specify their effect and draw any reliable inference as the coefficient signs vary. For ROAE and NIM, ln_ta is significant bearing a positive sign which is in line of most studies concentrating on advanced economies and attributing the effect of bank size to benefits stemming from economies of scale. For ROAA, the coefficient is also positive though insignificant. In case of ROAA and ROAE, the coefficient of non-performing loans proxy, npl, is highly significant. The estimation result implies that keeping low level of non-performing loans improves the performance which is consistent with our expectations.

Dummy variables included in the regression are mostly insignificant for all types of performance measurements. Thus, the effect of bank listing or bank type is not proven in our sample. The dummy for whether the owner is a credit institution is significant for NIM and has a negative sign (even for ROAA and ROAE) which suggests that the banks owned by a credit institution perform overall worse than those owned by for instance a government authority, individuals or industrial companies. It is important to bear in mind that the

analysed sample contains foreign-owned banks only. Therefore, we may deduce that there is an adverse effect of parent bank on the performance of its affiliate.

Table 4-4: Estimation results (Fixed Effects model)

	Dependent variable					
	ROAA		ROAE		NIM	
Independent variables	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
constant	0.0266	0.89	-0.1019	-0.15	0.0860	3.62 ***
ci	-0.0184	-10.29 ***	-0.1319	-3.19 ***	0.0002	0.17
eta	0.0580	5.54 ***	0.0427	0.18	0.0537	6.45 ***
la_stf	-0.0026	-1.27	0.0041	0.09	-0.0019	-1.18
llr_gl	-0.0786	-4.71 ***	-0.9758	-2.53 **	-0.0210	-1.58
nl_stf	-0.0002	-0.19	-0.0019	-0.06	-0.0002	-0.15
npl	-0.2815	-13.97 ***	-2.3716	-5.10 ***	0.0197	1.23
ln_ta	-0.0021	-1.19	0.0107	0.26	-0.0045	-3.24 ***
nl_ta	0.0045	1.73 *	0.0586	0.98	0.0016	0.79
l.infl	-0.0591	-3.54 ***	-0.1996	-0.52	0.0163	1.23
l.gdp	0.0440	4.86 ***	0.6203	2.96 ***	0.0367	5.90 ***
hhi	0.0000	-2.39 **	-0.0001	-2.08 **	0.0000	-1.31
nobanks	0.0004	2.29 **	0.0028	0.69	0.0002	1.23
bas	0.0000	0.03	0.0082	0.52	-0.0004	-0.78
Estimation diagnostics						
Number of observations	858		858		858	
Number of groups	143		143		143	
Observations per group	6		6		6	
R^2	0.4993		0.1413		0.2025	
F test (1)	53.86	***	8.89	***	13.72	***
F test (2)	3.49	***	1.87	***	10.6	***

*Signif. codes: '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1*

Source: Author's computations

From the country specific variables, the coefficient of lagged GDP growth is significant for ROAE and NIM and overall has a positive sign suggesting that a growing economy has more efficient banking system and thus better performing banks which is consistent with our expectations. Similarly, negative sign was expected for lagged inflation coefficient as is reported in case of ROAA and NIM being the dependent variables.

An influence of concentration of the host banking sector on a foreign-owned bank's performance is not proven as the *hhi* coefficient is insignificant and its value is very close to zero. The number of banks within the sector is significant

for NIM but the value is again very low for all types of performance indicators. The same holds for banking assets where the coefficient is significant solely for ROAA.

Table 4-5: Estimation results (System GMM, no individual specific variables)

	Dependent variable					
	ROAA		ROAE		NIM	
Independent variables	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
constant	2.0066	3.42 ***	11.9023	0.90	-0,1883	-0,55
l.DV	0.2410	3.51 ***	0.3445	3.67 ***	0,8845	24,51 ***
l.infl	-0.1072	-2.78 ***	-0.9717	-1.98 **	-0,0455	-2,65 ***
l.unemp	-0.0058	-0.36	-0.2651	-1.37	0,0114	1,68 *
l.bond	-0.0484	-1.42	-0.6446	-1.78 *	0,0069	0,47
l.gdp	0.0349	2.28 **	0.6111	2.25 **	0,0210	3,53 ***
hhi	0.0000	-1.44	0.0000	-0.90	0,0000	-2,75 ***
nobanks	0.0000	-0.27	-0.0001	-0.80	0,0000	-2,33 **
bas	-0.0001	-0.85	-0.0011	-0.57	0,0000	-0,02
Tt	-0.0010	-3.40 ***	-0.0059	-0.89	0,0001	0,57
Estimation parameters						
Number of observations	858		858		858	
Number of groups	143		143		143	
Observations per group	6		6		6	
F test	13.57	***	20.6	***	47.57	***
Arellano-Bond AR(1)	-3.31	***	-1.16		-3.99	***
Arellano-Bond AR(2)	-0.22		0.95		-1.91	*
Hansen test	134.72		138.48		131.32	

*Signif. codes: '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1*

Source: Author's computations

Results of fixed effects model estimation are provided in Table 4-4 for robustness check. Clearly, the fixed effects model is not particularly suitable for the data we deal with as it has several limitations: the model does not allow for lagged dependent variable, the estimation of time invariant dummy variables is impossible, biased coefficients arise in case of correlation between lagged dependent variable and regressors. Results, however, suggest the superiority of ROAA as a performance indicator with R^2 of almost 50%. Both F tests are significant for all dependent variables confirming that variables are jointly unequal to zero and the presence of individual effects (within groups).

Results of the GMM and FE models differ mostly in significance of each individual variable making lagged GDP growth and HHI coefficient significant in all cases. However, as already stated, the fixed effects estimator is likely biased.

To explore the relationship between performance and economic fundamentals even more thoroughly, we carry out the estimation of Equation 4.1-2 leaving out the vector of individual banks' bank-specific variables. Table 4-5 reports the results. The significance of some of the variables increased, however the overall fit of the model is worse compared to the previously reported one. Judging from the results, for the performance of a bank in year t, the annual inflation rate and real GDP growth in year $t-1$ matter. Nonetheless, individual characteristics of the bank are also important in explaining its performance. Thus we can conclude that even though some of the economic fundamentals of the host country influence the performance of the foreign-owned banks they are not sufficient in explaining its development.

Table 4-6: Comparison of results

	Dependent variable					
	ROAA		ROAE		NIM	
Independent variables	Coefficient sign	Significance	Coefficient sign	Significance	Coefficient sign	Significance
l.DV	✓	✓	✓	✗	✓	✓
Ci	✓	✗	✓	✓	✗	✗
Eta	✓	✗	✓	✓	✓	✓
lastf	✗	✓	✓	✗	✗	✓
llrgl	✓	✓	✓	✓	✗	✗
nlta	✗	✓	✗	✓	✗	✗
dlist	✓	✓	✗	✓	✗	✓
l.gdp	✓	✓	✗	✗	✓	✓
hhi	✗	✗	✓	✓	✓	✗

✓ ... the results are in accordance with the other studies
✗ ... the results differ from other studies

Source: Author's computations

The final table (Table 4-6) summarises the comparison of results with studies carried out by Moon (2009) and Heffernan & Fu (2010). It is important to bear in mind that these studies concentrate on one banking sector only (Korea and China respectively) which moreover is not dominated by foreign-owned banks. Also, the studies reflect on both foreign- and domestically owned credit institutions operating within the sector.

4.2 SECOND HYPOTHESIS: CRISIS IN THE HOME COUNTRY AND BANK PERFORMANCE

The performance of a foreign-owned bank is negatively influenced by the depth of the financial crisis in the home country.

In this part of the analysis, we examine the relationship between a bank's performance and the conditions in its parent's country of origin, i.e. the home country. We search for empirical evidence to back our assumption that the depth of the crisis in home country adversely affects foreign-owned bank's performance and.

4.2.1 DATA AND METHODOLOGY

The following paragraphs describe in detail the procedure of the dataset compilation. Again, panel data is used with bank performance as dependent variable and the stretch of time from 2005 to 2011.

Each credit institution present in a given country[10] is studied with respect to its ownership structure using data from BankScope database and individual banks' annual reports. Banks with majority foreign ownership are filtered. Further, banks that are nowhere in the structure owned by a credit institution, i.e. a bank, are left out (for example the Slovakian Prima banka a.s. is majority owned by Czech Penta Investments Limited, a private equity firm, which is fully owned by Cyprus based Penta Holding Limited, an industrial company; nowhere in the structure, there is foreign bank, thus Prima banka Slovensko a.s. is not included in the analysed sample).

Finally, the highest ranking foreign bank within the structure is searched and its controlling share, location and other relevant indicators are collected (more in the variables part below). Figure 4-8 captures the number of parent banks' home

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[10] Countries fulfilling the criteria as stated in Section 3: Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hong Kong, Hungary, Ireland, Latvia, Lithuania, Luxemburg, Malta, New Zealand, Poland, Romania, Serbia and Slovakia.

countries for each of the analysed host country's banking sector, telling us for instance that analysed banks operating in Poland have parent banks located in 13 different countries (in case of Poland these among others include Austria, Belgium, Denmark, France, Norway, Ukraine or the United States). Table 4-7 lists the home countries present in the sample together with their ISO codes as used further. There are altogether 33 home countries, two countries (Lichtenstein and Taiwan) were left out from the analysis due to lack of available data; there was one parent bank located in each.

Figure 4-8: Number of home countries of the host economies
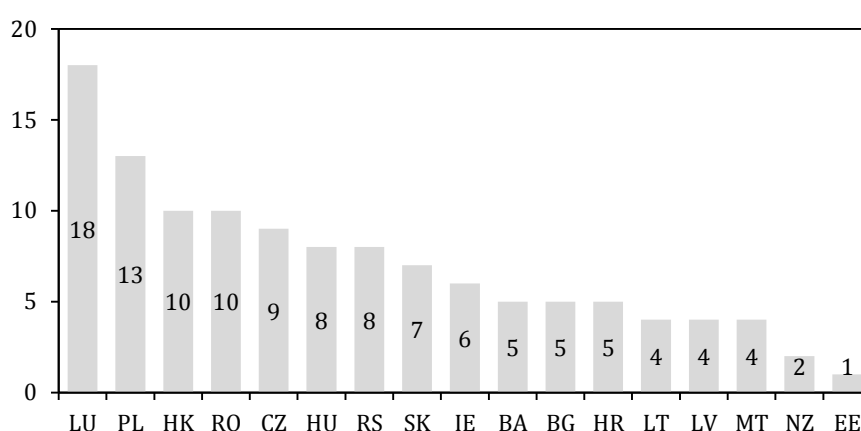
Table 4-7: List of home countries and their ISO codes

Australia : AU	Hungary : HU	Philippines : PH	South Korea : KR
Austria : AT	China : CN	Portugal : PT	Spain : ES
Belgium : BE	Israel : IL	Russian Fed. : RU	Sweden : SE
Brazil : BR	Italy : IT	Serbia : RS	Switzerland : CH
Canada : CA	Latvia : LV	Singapore : SG	Turkey : TR
Denmark : DK	Malaysia : MY	Slovak Republic : SK	Ukraine : UA
France : FR	Netherlands : NL	Slovenia : SI	United Kingdom : GB
Germany : DE	Norway : NO	South Africa : ZA	United States : US
Greece : GR			

Again, the resulting dataset is a short balanced panel with $N = 165$ and $T = 7$, thus the estimation is carried out by means of system GMM which is suitable for this type of longitudinal data. The estimation equation for each of the performance measures takes the form of:

$$Y_{i,t} = \alpha Y_{i,t-1} + \beta X_{i,t} + \gamma Z_t + \delta W_t + \mu_i + v_{i,t},$$

where $Y_{i,t}$ … individual banks' performance in year t (dependent variable)

$Y_{i,t-1}$ … individual banks' performance in year $t-1$

$X_{i,t}$ … vector of parent bank-specific variables in year t

Z_t … vector of home country-specific variables

W_t … vector of home banking sector-specific variables

μ_i … unobserved bank-specific time-invariant effect

$v_{i,t}$ … disturbance term.

Variables entering the equation are described in the next part.

4.2.2 VARIABLES

There are generally three approaches to measuring depth of a banking crisis. Firstly, the depth can be measured by fiscal costs that are caused by a banking crisis, where focus is placed on regulatory policies applied by governments to ease the consequences. This approach has however been questioned as to the reliability of its results, as budgetary transfers may not always be comparable country from country due to their actual representativeness and the different finance accounts.

Secondly, loss of GDP or foregone GDP is used to assess the extent of a crisis. Banking crisis affects the economy in two ways imposing significant costs: credit crunch occurs usually followed by funding liquidity distress which can also be demonstrated (on the liability side) via bank runs. This measure captures the costs concurrent with the described effects rather than those caused by the crisis. On the other hand, the data employed by this approach is reliable and can thus cause no doubts (Hoggarth, et al., 2002; International Monetary Fund, 1998).

Thirdly, post crisis reforms and their restructuring success are sometimes used as a proxy of the depth of a banking crisis. Critics reproach this measure for falsely relating recovery from a banking crisis directly to the magnitude of fluctuation in behaviour of macroeconomic indicators.

Up until now, the depth of a crisis has predominantly been entering the regression analyses on the left-hand side of the equation, i.e. as a dependent variable. However, in our research, we employ depth of the crisis as an explanatory variable and will be examining its effects on the performance indicators of each individual bank. Dependent variables remain the same as in the previous part (*Return on average assets* (ROAA), *Return on average equity* (ROAE), *Net interest margin* (NIM)).

Based on the described drawbacks of the fiscal costs approach and the fact that for assessing recovery reforms of individual economies it is rather too early, we choose the economic cost approach for our analysis. We employ the definition of foregone GDP of (Bordo, et al., 2001). In addition to that, we also use non-performing loans to total gross loans ratio measured for each economy as a whole as an indicator of the crisis depth, following the definition of a systemic banking crisis as described in (Laeven & Valencia, 2012).

While the previous hypothesis was based on macroeconomic and other conditions of the host country as well as the analysed banks' own indicators, this time we focus on the parent bank and its home country. Thus, we can group the variables entering the right-hand side of the regression as parent bank-specific, home banking sector-specific and home country-specific variables. Description follows.

1. Parent bank-specific variables

Shareholding ratio ($share$) is a foreign ownership indicator suggesting how much control the parent bank has over the analysed one.

Natural logarithm of total assets ($lnta$) is commonly used to approximate the size of a bank. The natural logarithm helps smooth out large differences between individual bank's total assets.

2. Home banking sector specific variables

Foregone GDP ($fgdp$) stands for the depth of a crisis in the home country, i.e. the country where the controlling shareholder is located (such as France for banks in the Societé Generale Group or Austria for the banks of Erste Group). The foregone GDP is calculated as forecasted gross domestic

product (measured in constant USD of 2000) using its pre-crisis trend development less actual GDP.[11] The foregone GDP is expressed relatively as a percentage. We expect the variable to negatively influence the bank's performance and therefore the expected sign is positive. In case of a crisis, the real GDP does not reach the trend GDP which results in a negative value of the foregone GDP. Also a larger foregone GDP (greater negative value) demonstrates a more severe crisis.

Non-performing loans to total gross loans ratio (npl) is another indicator of the crisis depth. Similarly to the foregone GDP, we expect a negative effect and thus a negative sign of the estimated coefficient. Individual bank's non-performing loans ratio attests to its health and the overall quality of its loans. Here, the ratio is taken for the economy as a whole and thus representing the economic environment and the extent to which insolvencies and defaults occur.

3. Home country specific variables

Gross domestic product (gdp) is used as a proxy of the size of the home economy and its productivity.

Government debt ($debt$) indicates the country's fiscal position and shows to what extent the development is sustainable. The proportion to GDP is used.

Liquidity ratio (lr) reflects the risk of an external liquidity crisis and is computed as a share of liquid external assets to liquid external liabilities. Higher ratio is a sign of a good external liquidity position.

Current account balance (cab) indicated the foreign trade position of a country.

Net external debt (ned) is calculated as gross external debt minus external liabilities. A positive value indicates that the country is a net debtor while a negative sign indicates that the country is a net creditor.

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[11] Pre-crisis trend is calculated using data from the period of 2003 to 2007; data obtained from the World Bank online database.

4.2.3 DESCRIPTIVE ANALYSIS

Figure 4-9 depicts the real GDP measured in constant USD of 2000 and forecasted GDP calculated as linear trend using data from the pre-crisis period, also measured in constant USD of 2000, for the home countries entering the analysed sample and for the period from 2003 to 2011. The gap between the two series represents the foregone GDP in absolute terms.[12]

From the sample of 33 home countries, only China actually managed to report larger real GDP than the projected trend one. Some other countries, namely Israel, Malaysia, the Philippines or South Korea, experienced a sudden drop in the real GDP in 2009 and since then the gap is either not widening or it is in fact closing. This observation suggests that the GDP decreased in absolute value on a one-time basis but the growth rate is stable or even accelerating.

In Figure 4-10 which shows the relative foregone GDP in 2011, we can clearly see that the countries that suffered the largest GDP loss (marked black) are geographically located in the Eastern European region. Latvia differs from its predicted trend GDP by more than 32% in 2011, followed by Greece with 25% difference.

The Greek sharp fall is also nicely documented in Figure 4-9. While almost all of the countries experienced some recovery in the 2009 – 2011 time span, the GDP of Greece was helplessly sinking. In case of Italy, Portugal and Spain, the recovery is not convincing either hinting that one should stay cautious about the PIGS countries. Moreover, the United Kingdom and Denmark also experienced high foregone GDP of 12% and 14% respectively.

The non-performing loans average of AA- rated countries exceeds the AA average twice and reaches a half of the B rated countries average.[13] The overall average non-performing loans ratio for all of the 33 home countries stood at 2.2%, 4.7% and 5.1% in 2007, 2009 and 2011 respectively.

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[12] All data in trillions of constant 2000 USD
[13] Note that the frequency of sectors within each rating group differs and is most accurate for AAA and AA± ratings.

Figure 4-9: Foregone absolute GDP (real GDP and pre-crisis trend GDP)
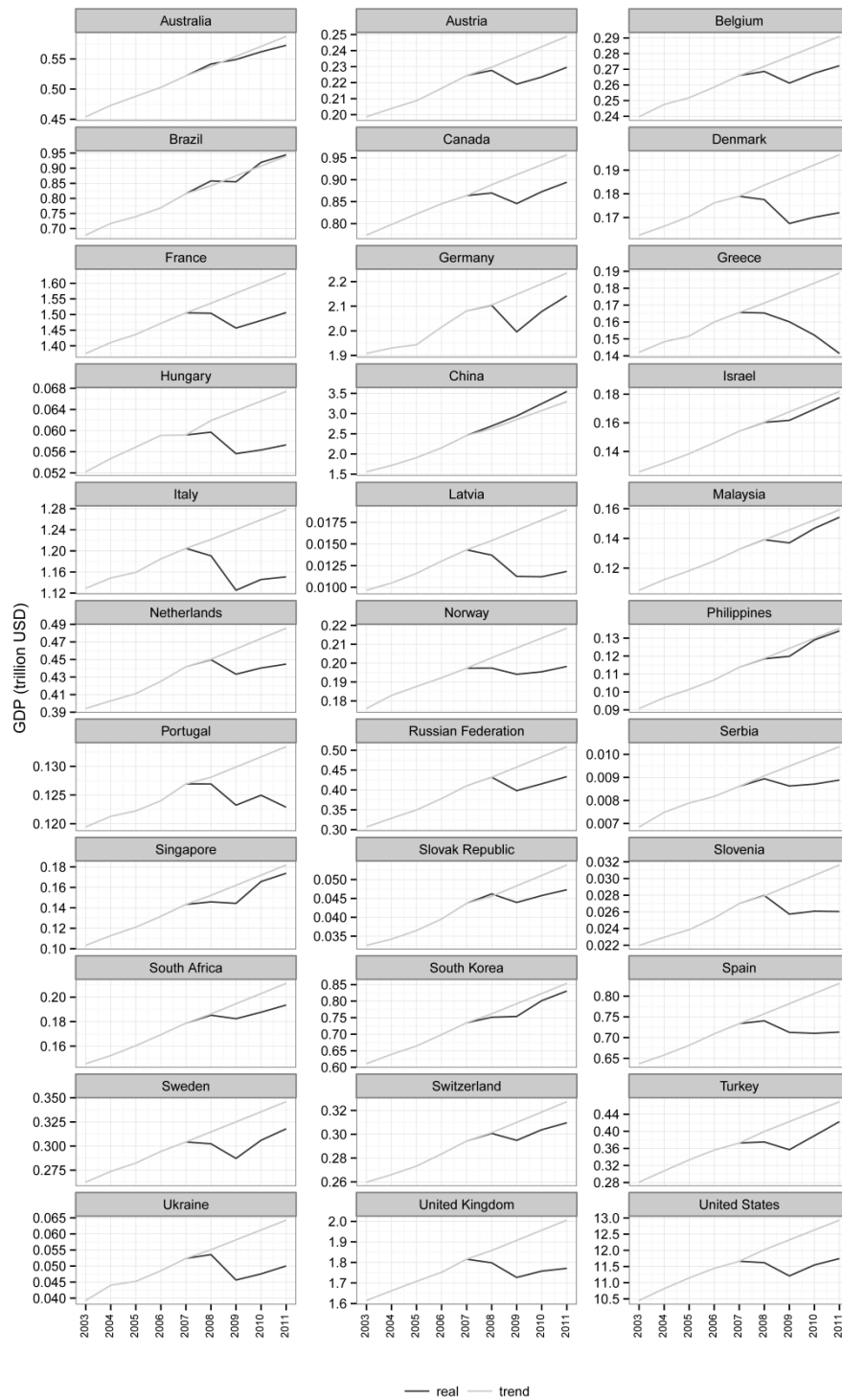
Note: the y-axis scale differs country from country

Source: WorldBank, Author's computations

Figure 4-10: Foregone relative GDP (2011)

Top panel: Foregone relative GDP by country in 2011; bottom panel: Foregone relative GDP in 2011 geographically.

Figure 4-11: Non-performing loans by rating (2007, 2009, and 2011) which demonstrates the evolution of non-performing loans ratio in time by country rating tells us three interesting facts. Firstly, the range of rating labels enlarges with the spreading crisis, secondly, non-performing loans ratio increases in time, i.e. as the crisis progresses, which is a fairly expected result, and thirdly, the difference between group averages for countries rated AAA, AA+ and AA, is relatively small.

In the context of rating, Figure 4-12 captures the external position of the home countries in 2011. The external position is measured by net external debt and there holds that positive value means that the country is a net debtor, negative value means that the country is a net creditor. Switzerland is the largest creditor in the sample with the position of -117% of GDP. On the other side of the scale, Spain is the largest debtor followed closely by Portugal, Latvia, Greece and Hungary. In 2011, the worst rated country from the sample was Ukraine (B), the second worst rated was Serbia (BB-). Altogether 12 countries enjoyed the highest rating (AAA).

Figure 4-11: Non-performing loans by rating (2007, 2009, and 2011)

Figure 4-12: Net external position of the home countries in the context of rating (2011)

Figure 4-13 provides an insight into the major banking groups that enter the analysis by showing the number of subsidiaries of the individual parent banks worldwide.[14] The depicted ones are mostly operating in the Eastern European region. There are three Austrian holdings (Raiffeisen, Erste and Hypo Alpe-Adria), two Italian holdings (UniCredit, far the largest in the region, and Intesa), two German holdings (Commerzbank and Deutsche Bank), and two French ones (Societe Generale and Credit Agricole). In terms of total assets, UniCredit ranks 16 (0.927 trillion EUR, 2011), the largest holding is Deutsche Bank with total assets worth more than EUR 2.16 trillion in 2011.

Figure 4-13: Major banking groups
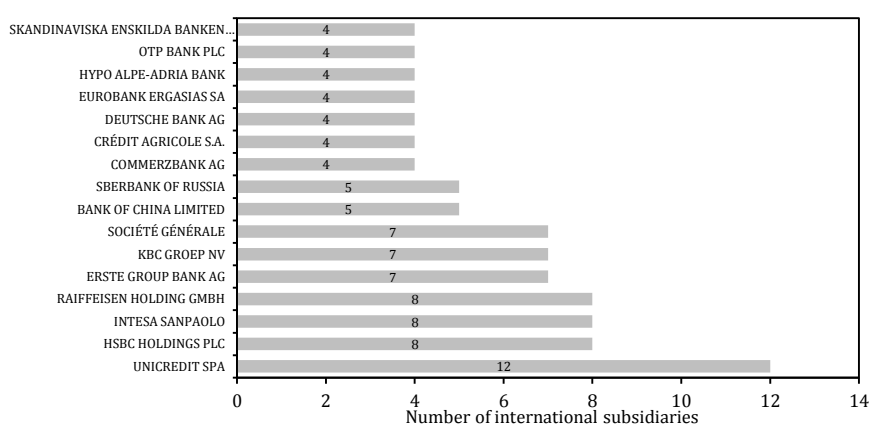
Source: BankScope database, Author

Table 4-8: Summary statistics of used variables

	min	1st quartile	median	3rd quartile	max
cab	-7.2%	-2.9%	-0.8%	4.4%	25.9%
debt	6.5%	43.5%	67.5%	91.0%	136.9%
fgdp	-37.6%	-8.1%	-0.9%	0.0%	7.6%
gdp	0.02	0.22	0.71	1.51	11.74
lnta	12.82	18.22	19.6	20.65	21.67
lr	9.4%	28.9%	51.7%	78.0%	995.9%
ned	-152.5%	3.9%	21.6%	34.6%	86.8%
nim	-0.5%	1.7%	2.7%	4.2%	24.9%
npl	0.2%	2.2%	3.0%	4.9%	19.6%
roaa	-23.8%	0.4%	0.9%	1.5%	25.7%
roae	-271.8%	4.3%	10.5%	17.4%	310.5%
share	42.0%	76.6%	100.0%	100.0%	100.0%

Source: BankScope database, Worldbank database, Fitch Sovereign data Comparator, Author

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[14] Only those subsidiaries for which all data was available are captured in the figure. The actual number of operating subsidiaries may differ.

From the fact that the average shareholding ratio stands at 89% and that the median reaches 100%, we can conclude that the foreign ownership is widespread in the region and also highly consistent. Half of the banks in the sample have a parent bank with 100% or 99% shareholding ratio and altogether more than 70% of the analysed banks are owned by a foreign bank with a share exceeding 90%. Largest value of non-performing loan ratio was reported by Slovenia in 2009 and stood at 19.6% telling us that almost 1/5 of all loans within the banking sector was in or close to default at the time. Rest of the summary of used variables is printed in Table 4-8.

4.2.4 Results and Findings

Similarly to the previous hypothesis, system GMM estimation with the orthogonal deviation transformation is applied. Standard errors are robust to heteroscedasticity and autocorrelation within cross-sections, the adjustment for small samples is employed. The model is estimated in a two-step procedure. The reported outcome performed best in terms of tested parameters, i.e. the Arellano-Bond AR(1) and AR(2) test, the Hansen test and F test.

The estimation results of the dynamic panel model described in Section 3.2.1 are summarised in Table 4-9 and Table 4-10. The model is estimated twice, the first time (Table 4-9), non-performing loans to total gross loans ratio is used as the approximation of the depth of the crisis, the second time (Table 4-10), the foregone relative GDP indicates the depth of the crisis. The double estimation also serves for the purposes of the robustness check. The description of the results and findings is provided in the following paragraphs divided into two subsections.

4.2.4.1 Non-Performing Loans as Crisis Depth Indicator

Table 4-9 summarises the estimation results when non-performing loans ratio is used as the indicator of the crisis depth. In case of ROAA and NIM as the dependent variables the F test is significant at 1% level indicating that the model fits the data well, for ROAE, the F test is significant at 5% level implying a satisfactory fit. The values of the Hansen test suggest that the model does not suffer from overidentification. Moreover, the number of instruments does not exceed the number of groups in the sample and thus the rule of thumb holds as well. The Arellano-Bond AR(1) and AR(2) tests do not suggest any serial

correlation in levels or differences, the consistency of the GMM estimator is therefore intact.

Table 4-9: Estimation results (System GMM) – Non-performing loans

Independent variables	ROAA Coefficient	ROAA t-statistics		ROAE Coefficient	ROAE t-statistics		NIM Coefficient	NIM t-statistics	
	Dependent variable								
constant	0.0078	0.11		-0.2176	-0.22		-0.0362	-0.28	
l.DV	-0.0598	-0.21		-0.2207	-0.86		-0.1960	-0.91	
npl	-0.2975	-3.01	***	-3.0866	-3.01	***	-0.1713	-2.66	***
cab	0.0950	0.90		0.7453	0.71		-0.1227	-1.34	
l.debt	0.0096	0.60		0.0529	0.25		-0.0016	-0.13	
l.gdp	0.0017	1.30		0.0033	0.17		-0.0055	-2.55	**
lnta	0.0001	0.06		0.0248	0.60		0.0062	1.38	
lr	-0.0004	-0.24		-0.0035	-0.18		0.0026	1.20	
ned	0.0118	0.55		0.1500	0.38		0.0387	1.60	
share	-0.0009	-0.02		-0.0795	-0.13		-0.0430	-0.56	
Estimation parameters									
Number of observations	990			990			990		
Number of groups	165			165			165		
Observations per group	6			6			6		
F test	3.87	***		2.3	**		3.47	***	
Arellano-Bond AR(1)	-0.87			-1.09			-0.05		
Arellano-Bond AR(2)	-0.51			0.06			-1.39		
Hansen test	19.07			12.43			8.58		

*Signif. codes: '***' 0.01 '**' 0.05 '*' 0.1 '' 1*

Source: Author's computations

Looking at the results, we notice that the only truly significant variable is the non-performing loans ratio. For all of the dependent variables, npl is negatively signed which is in line with the expected outcome. The higher the NPL ratio, the more defaults are likely to take place in the sector. High NPL ratio in the home country signals its problematic credit environment in which the parent bank operates and the negative sign of the estimated coefficient thus implies worse performance of the foreign-owned bank in the host country. This finding supports the hypothesis of adverse effect of depth of the crisis.

There are no other significant variables with the exception of lagged GDP in case of NIM being the dependent variable. The estimated coefficient is negative

hinting that larger home economy may have a negative effect on the subsidiary bank worsening its performance.

4.2.4.2 FOREGONE RELATIVE GDP AS CRISIS DEPTH INDICATOR

Table 4-10 summarises the estimation results when foregone relative GDP is used as the indicator of the crisis depth. The F test is highly significant for all of the three dependent variables, the model fits the sample well. The Hansen test is insignificant and the model should not suffer from overidentification. In case of ROAA as the performance indicator, the Hansen test is significant at 10% level. The number of instruments is lower than the number of groups in the sample and the Arellano-Bond AR(1) and AR(2) tests suggest no serial correlation.

Table 4-10: Estimation results (System GMM) – Foregone relative GDP

Dependent variable								
	ROAA			ROAE			NIM	
Independent variables	Coefficient	t-statistics		Coefficient	t-statistics		Coefficient	t-statistics
constant	-0.0067	-0.08		-0.7994	-0.81		0.0952	0.49
l.DV	0.1722	0.82		0.1793	0.70		0.3438	1.38
Fgdp	0.0500	3.17	***	0.5918	3.58	***	0.0499	2.48	**
Cab	0.2003	3.20	***	2.4561	3.84	***	-0.0930	-0.83
l.debt	0.0175	1.38		0.1075	0.59		0.0111	0.42
l.gdp	0.0028	1.99	**	0.0208	1.13		0.0001	0.02
Lnta	-0.0011	-0.34		0.0099	0.23		-0.0040	-0.37
Lr	-0.0001	-0.13		0.0136	0.79		0.0066	1.01
Ned	0.0009	0.04		0.2779	0.89		0.0170	0.55
Share	0.0224	0.47		0.6277	1.35		-0.0124	-0.24
Estimation parameters								
Number of observations	990			990			990	
Number of groups	165			165			165	
Observations per group	6			6			6	
F test	3.89		***	4.88		***	6.7		***
Arellano-Bond AR(1)	-1.51			-1.59			-1.57	
Arellano-Bond AR(2)	0.03			0.94			-0.85	
Hansen test	17.33		*	8.56			5.33	

*Signif. codes: '***' 0.01 '**' 0.05 '*' 0.1 '' 1*

Source: Author's computations

The *fgdp* estimate is significant for all performance indicators. The coefficient is positively signed which means that a lower foregone relative GDP (less negative percentage) results in increased performance. Again, this is consistent with the hypothesis that the more severe is the crisis in the home country, the worse performance of foreign owned banks operating in the host country is reported. Possibly, through the parent-subsidiary channel, the subsidiary bank is negatively affected.

For ROAA and ROAE, the *cab* coefficient is also significant suggesting a positive relationship between host-country-operating bank and home country trade balance hinting a relation to export financing.

4.3 THIRD HYPOTHESIS: SOVEREIGN DEBT AND FOREIGN OWNERSHIP

There is a correlation between foreign ownership of banks and the level of sovereign debt in the host country.

The third area of the analysis is dedicated to the relationship between foreign bank ownership and level of sovereign debt and, as opposed to the previous parts, it is performed on countries and their banking sectors rather than using data of individual banks. Hence, the methodology differs as well as the size of the dataset which naturally contains fewer cross-sections.

4.3.1 DATA AND METHODOLOGY

Due to the topic's extreme currency, previously analysed countries (with high share of foreign-owned banks) are supplemented with recently scrutinized countries in relation with sovereign debt crisis. These are Cyprus, Greece, Italy, Portugal, Slovenia, Spain, Switzerland and the United Kingdom. The panel thus consists of 24 cross-sections covering the period from 2005 to 2011 which makes it a short fixed panel. There are 1288 observations in total which implies a balanced panel.

The possible approaches suggested in literature for handling panel data of this nature are pooled ordinary least squares (OLS) estimator, fixed effects estimator

(either by means of least square dummy variable (LSDV) or within estimator), between estimator and random effects estimator (using the generalized least squares procedure) (Wooldridge, 2001).

Table 4-11: List of analysed sectors and the countries' ISO codes

Bosnia and Herzegovina : BA	Greece : GR	Luxembourg : LU	Serbia : RS
Bulgaria : BG	Hungary : HU	Malta : MT	Slovak Republic : SK
Croatia : HR	Ireland : IE	New Zealand : NZ	Slovenia : SI
Cyprus : CY	Italy : IT	Poland : PL	Spain : ES
Czech Republic : CZ	Latvia : LV	Portugal : PT	Switzerland : CH
Estonia : EE	Lithuania : LT	Romania : RO	United Kingdom : UK

Source: Author

The pooled OLS regression is characterized by

$$Y_{i,t} = \alpha + \boldsymbol{X}'_{i,t}\beta + \mu_{it},$$

where in our case $i = 1, \dots, N; N = 24$ and is the identifier of a cross-sectional unit and $t = 1, \dots, T; T = 7$ is the time identifier. $E(\mu_{it}) \sim N(0, \sigma^2)$. Pooled OLS estimation assumes all coefficients to be constant across time and individuals, i.e. that slope coefficients are the same for all of the 23 observed countries.

The fixed effects specification introduces varying intercept across individuals:

$$Y_{i,t} = \alpha_i + \boldsymbol{X}'_{i,t}\beta + \mu_{i,t}.$$

No t subscript on the intercept term suggests time invariability; slopes of the coefficients again remain the same across individuals (and time). Least-squared dummy variable model induces fixed effects by differential intercept dummies.

The between estimator averages the observations across time for each cross section and then makes use of regressing group means of the dependent variable on group means of the explanatory variables, i.e. it replaces all of the individual-specific variation with their mean behaviour. For this reason, there are only N (=23) observations used in the regression which is carried out by means of OLS.

Random effects model assumes common intercept value for all individuals with differences from the population reflected by an error term ν_i. The specification

$$Y_{i,t} = \alpha + \mathbf{X}'_{i,t}\beta + \mu_{i,t} + v_i$$

considers $\mu_{i,t} \sim IID\left(0, \sigma_\mu^2\right)$ and the error term $v_i \sim IID(0, \sigma_v^2)$ being random.

4.3.2 VARIABLES

For this hypothesis the dependent variable is *level of sovereign debt as percentage of GDP* ($debt$). The chosen explanatory variables are purely banking sector specific:

> *Banking assets as a percentage of GDP* (bas) approximates the size of a banking sector and its penetration. It is recently argued that the larger the banking sector the more it is prone to default (e.g. Stephanou, 2011).

> *Capital to total assets ratio* (cta) is a ratio of banking capital and reserves[15] to total assets of the banking sector and speaks of the capitalization within the analysed banking sector. Its reversed value reflects on the leverage in the sector.

> *Foreign ownership ratio* (fo) is measured by the assets of foreign-owned banks relative to the banking sector size. This indicator reflects what share of the banking sector is controlled by foreign entities and is in the focus of our analysis.

> *Cross border assets as a percentage of GDP* (nfa) computed as net foreign assets to GDP reflect the international operations of each sector's banks.

> *Herfindahl-Hirschman index* (hhi) captures the concentration within the analysed banking sector. In addition to this measure, the *share of three largest banks* ($c3$) on total banking assets is employed.

> *Return on average assets* ($roaa$) represents the profitability measure used in the analysis. ROAA is employed as the only indicator due to

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[15] Capital and reserves consist of funds contributed by owners, retained earnings, general and special reserves, provisions, and valuation adjustments (World Bank, 2013).

lack of available reliable data on other measures such as net interest margin and cost income ratio, especially for some of the sectors.

4.3.3 DESCRIPTIVE ANALYSIS

We start by examining the dependent variable with the help of Figure 4-14 which captures the evolution from 2005 to 2011 and minimum and maximum for each of the analysed countries. The light colour indicates an increase in the sovereign debt (as a percentage of GDP), the darker colour indicates a drop over the observed period. Three countries were actually able to lower their relative debt from 2005: Bulgaria, Serbia and Switzerland. On the other hand, the relative government debt of Greece, Portugal and the U.K. was increasing over the whole period, i.e. we observe the minimal value in 2005 and maximal value in 2011. The Greek sovereign debt has been growing at an average rate of 9% year-on-year; we obtain similar rates for the other two countries mentioned.

Figure 4-14: Evolution of the central government debt (2005-2011)[16]
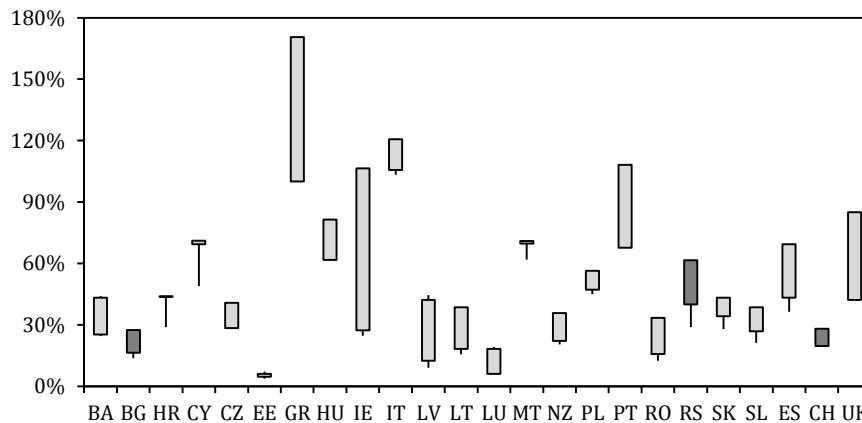
Source: Worldbank database, Author

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[16] The light colour indicates an increase in the sovereign debt (as a percentage of GDP), the darker colour indicates a drop over the observed period.

Figure 4-15: Scatter plot: Debt and ROAA (all countries, 2005-2011)
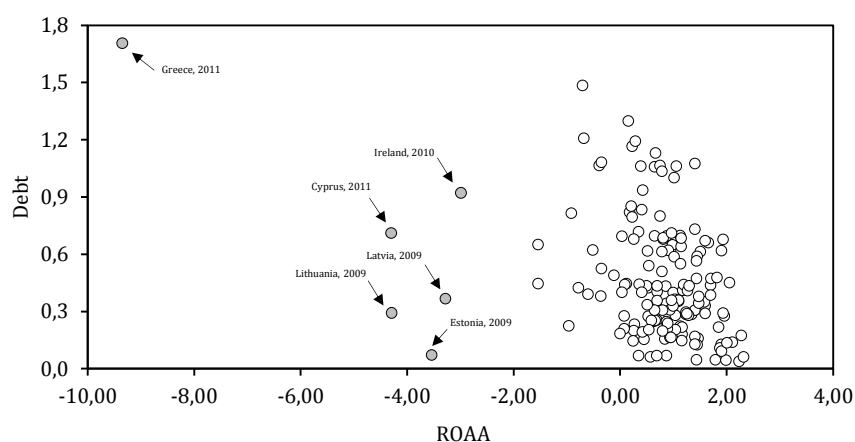
In case of Croatia and Cyprus, we notice an interesting course as these two countries were able to lower their debt significantly but experienced an upsurge back to the initial value or very close to it later on. Generally, the rate of government debt growth was downward sloping in the sample until 2007 (or 2008 in some cases), after the outbreak of the financial crisis, the rate has been moving around positive 8 to 10% per year. Between 2008 and 2009 the relative debt has significantly risen in the Baltic region as the financial crisis hit the region particularly hard.

Looking at the correlation plots (see Figure A 3 in the Appendix section) of each of the independent variables and the dependent one, we notice two interesting things. Firstly, there is a heteroscedasticity present to the data which has to be dealt with, and secondly, there are some interesting outliers worth a further scrutiny. From Figure 4-15 which captures the correlation between $debt$ and $roaa$, it is clearly visible that the banking sector of Greece was performing outstandingly bad in 2011 and it is followed by Cyprus. The above-mentioned crisis in the Baltic region is also nicely documented in this figure. Estonia, Latvia and Lithuania reported ROAA of -3.54, -3.28 and -4.29% respectively in 2009 (Bijlsma & Zwart, 2013).

In case of banking assets as well as net foreign assets, Luxembourg stays off the crowd with banking assets exceeding 25 times the GDP and net foreign assets 18 times on average (Figure 4-16).

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Figure 4-16: Scatter plot: Debt, Banking assets, Net foreign assets (all countries, 2005-2011)
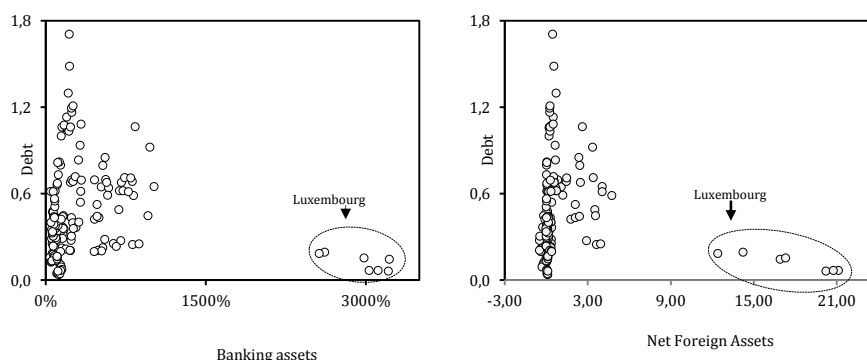
Source: Worldbank database, Author

For Figure 4-17, we formed groups of countries for an easier comparison. This set of figures plots the foreign ownership ratio (horizontal axis) on relative debt (vertical axis) for each of the countries over the 2005 to 2011 period. The central European countries can be characterized by a high foreign ownership ratio and a relatively low debt. The debt of the Czech Republic and Slovakia does not exceed 50% while the foreign ownership being higher than 80%. The outlier of the region is Hungary which is in terms of the foreign ownership and debt relationship more comparable to Ireland (foreign ownership between 40 and 60%, debt to GDP around 60%). However, other PIIGS countries report much lower foreign ownership ratio (such as 2% in case of Spain and 16% in case of Portugal) and in most cases larger debt (the debt of Greece ranges from 100 to 171% of GDP).

Balkan countries have a very similar structure within the group with the exception of Slovenia which clearly does not fit the group in terms of net foreign assets. Serbia's debt prior to 2007 was exceeding the region's average almost twice reaching up to 62%. The least indebted country in the region is Bulgaria that as opposed to Romania pushed the share under 20% in recent years. Foreign ownership ratio in the Baltic states is akin to the rest of the transition countries ranging from around 60 to 100%. Estonia stands out in terms of relative debt reaching the lowest values across the analysed countries and only exceeding 7% in 2009, the year of a deep recession.

Cypriot and Maltese relative debt is both about 60% but their foreign ownership ratio differs diametrically. The Maltese debt exceeds 60% (like in Latvia) while the Cypriot one is only slightly over 10%. Somewhere in the middle, there lies

the United Kingdom with 20 to 30% of banking assets being in the hands of foreign entities.

Figure 4-18 provides comparison of the transition[17] and 'Western countries'.[18] While capital to assets ratio is larger for transition countries, the situation is reversed in case of banking assets to GDP. The gap between the group averages seems fairly stable over time for both the indicators but the discrepancies widened in the turbulent years of 2008 and 2009.

Figure 4-17: Scatter plot: Central government debt (y-axis) and foreign ownership ratio (x-axis) (2005-2011)
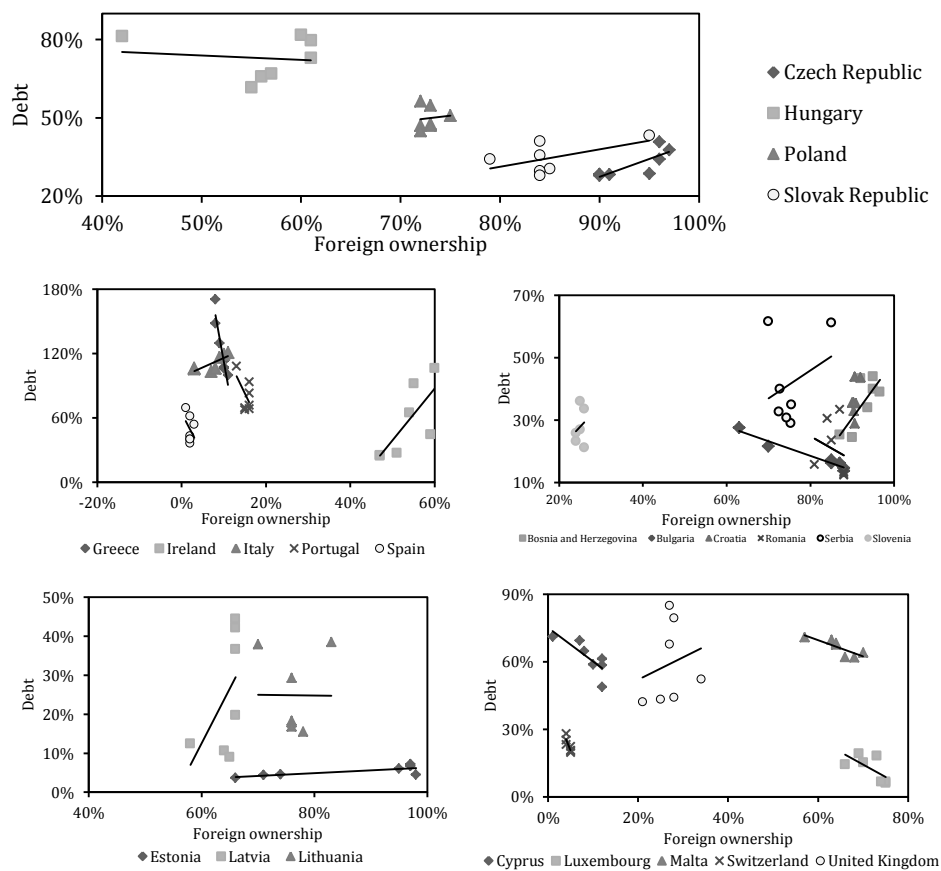
Source: BankScope database, Author's computations

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[17] Includes: Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Serbia, Slovak Republic, and Slovenia.
[18] Includes: Cyprus, Greece, Ireland, Italy, Luxembourg, Malta, New Zealand, Portugal, Spain, Switzerland, and United Kingdom.

Figure 4-18: Country groups' comparison (2005-2011)
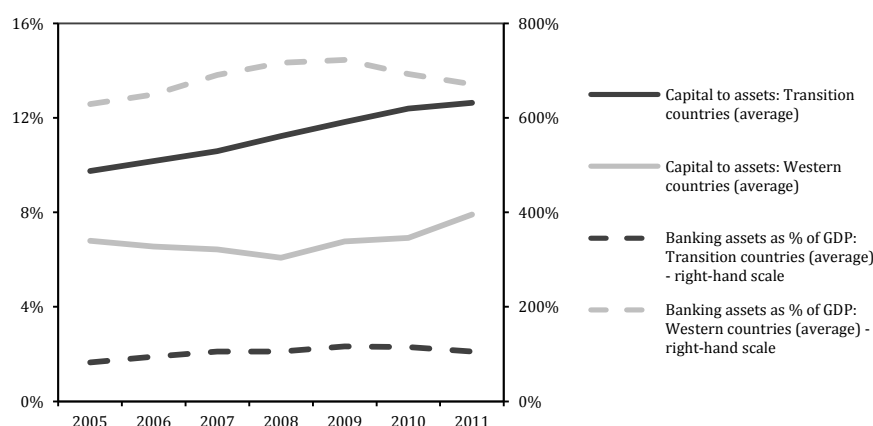
Source: BankScope database, Worldbank database, Author's computations

Table 4-12 summarises the variables comprising the used dataset providing information on the quartiles, maximum and minimum. Notice the extreme differences in some of the variables, most notably the Herfindahl-Hirschman index. The maximum value belongs to Estonia whose banking sector is highly concentrated and the three most important banks own practically the whole market.

Table 4-12: Summary of used variables

	min	1st quartile	median	3rd quartile	max
bas	44%	99%	152%	367%	3225%
c3	24%	47%	56%	67%	100%
cta	4%	7%	8%	10%	23%
fo	1%	20%	66%	84%	98%
debt	4%	23%	38%	63%	171%
hhi	410	1145	1464	1960	8822
nfa	-47%	6%	15%	53%	2116%
roaa	-9.4%	0.4%	0.9%	1.3%	2.3%

Source: Author's computations

4.3.4 RESULTS AND FINDINGS

The preliminary analysis suggests heteroscedasticity present in the data; therefore we apply logarithmic transformation and proceed with the analysis on the transformed data. One of the limitations stemming from the shortness of the panel prevents us from using the LSDV approach as it results in a substantial reduction in degrees of freedom. The following table summarises the estimation

of the full model (all variables entering the regression) which was carried out in order to choose the right model for further evaluation.

In order to pick the right specification of the model to proceed with in our analysis, we perform a series of tests. These include the test for fixed effects with the F test ($F_{(N-1,N(T-1)-K)}$ distribution) and a null hypothesis

$$H_0: \nu_i = 0, i = 1, \dots, N, \qquad \text{(Equation 4.3-1)}$$

where ν_i is the variable part of the intercept from (Equation 4.3-1; there holds $\alpha_i = \alpha + \nu_i$. The null hypothesis is strongly rejected ($p - value = 2.33e - 042$) which confirms that the intercept varies across countries.

The Hausman test is based on principle that one of two estimators in question is consistent under null as well as under the alternative, while the other one is only consistent under null. This is exactly the case of the fixed- and random-effects model where the FE estimator is consistent both in the FE and RE settings. The null is thus

$$H_0: E\left(\nu_{i,t} \middle| X_{i,t}\right) = 0$$

and the test statistics follows χ_K^2 distribution. Again, the null hypothesis is rejected ($p - value = 0.0022$), suggesting that the random effects estimator is very likely to be biased and inconsistent. Moreover, the Breusch-Pagan test for random effects also implies that random effects estimator does not perform better than pooled OLS estimator.

Table 4-13: Estimation: Model specification comparison

Model 1: Pooled OLS				Model 2: Fixed effects			
	Coefficient	t-statistics			Coefficient	t-statistics	
constant	13.6334	3.23	***	constant	-2.5147	-0.75	
ln_bas	-0.0620	-0.37		ln_bas	0.0869	0.43	
ln_c3	2.76	3.20	***	ln_c3	-0.0325	-0.06	
ln_cta	0.4075	1.23		ln_cta	0.4262	2.11	**
ln_fo	-0.2708	-2.82	***	ln_fo	0.0441	0.44	
ln_hhi	-1.7432	-3.56	***	ln_hhi	0.2973	0.68	
ln_roaa	0.5712	3.31	***	ln_roaa	0.3602	2.51	**
ln_nfa	0.0045	0.24		ln_nfa	0.0006	0.15	
Residual Sum of Squares:		52.118		Residual Sum of Squares:		8.663	
R-Squared:		0.458		R-Squared:		0.909	
Adj. R-Squared:		0.430		Adj. R-Squared:		0.890	

Model 3: Between groups				Model 4: Random effects			
	Coefficient	t-statistics			Coefficient	t-statistics	
constant	16.8562	3.00	***	constant	0.5783	0.25	
ln_bas	-0.1315	-0.61		ln_bas	0.1152	1.12	
ln_c3	3.6903	2.93	***	ln_c3	0.4383	0.95	
ln_cta	0.5684	1.4		ln_cta	0.4445	3.37	***
ln_fo	-0.2355	-1.93	*	ln_fo	-0.0879	-1.23	
ln_hhi	-2.1548	-3.32	***	ln_hhi	-0.1030	-0.38	
ln_roaa	1.4082	1.82	*	ln_roaa	0.3600	4.97	***
ln_nfa	0.0270	0.24		ln_nfa	-0.0007	-0.05	

Residual Sum of Squares:		4.976	Residual Sum of Squares:		78.418
R-Squared:		0.581			
Adj. R-Squared:		0.397			

*Signif. codes: '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1*

Source: Author's computations

The primary analysis suggests the superiority of the fixed-effects (within) model; this result is also supported by our expectations based on the data type and descriptive statistics as well as logic. We use estimation robust to heteroscedasticity and autocorrelation which deals well with outlier problem which was introduced above as it deleverages their impacts.

As we proceed with the estimation we omit ln_c3 variable which is strongly correlated with ln_hhi, and ln_nfa. We discover that the estimated coefficient of ln_fo is positive suggesting that a higher foreign ownership ratio in a host country may result in higher sovereign debt (as a percentage of GDP). The estimated coefficient is, however, statistically insignificant (robust standard error of 0.497) and thus its relationship with the sovereign debt as we assumed in our hypothesis cannot be confirmed. On the other hand, the estimate of ln_bas equals 0.089 hinting that the sovereign debt increases with the volume of banking assets which approximates the size of the banking sector. The estimate is also insignificant.

Interestingly, we obtained a significant estimation of the Herfindahl-Hirschman index (ln_hhi) coefficient of 0.280. This implies that higher concentration of the banking system increases sovereign debt level. The logic behind could lie in the correlation of concentration and competition. Less developed competition within a banking sector makes banking products relatively more expensive in the economy resulting in less efficient functioning of the banking sector which may be a reason for the companies not being able to work under minimalised costs (such as due to lower accessibility of credit). Thus, the government debt

level may be increasing as the state has lower income from taxes. Also, the significance of HHI may hint the truthfulness of 'Too big to fail' concept.

Table 4-14: Estimation results: Fixed effects model

	Dependent variable: debt		
	Coefficient	t-statistics	
constant	-2.3680	-2.12	**
ln_bas	0.0893	0.57	
ln_cta	0.4265	3.14	***
ln_fo	0.0446	0.50	
ln_hhi	0.2798	2.03	**
ln_roaa	0.3592	4.98	***
Residual Sum of Squares:		8.6643	
R-Squared:		0.9099	
Adj. R-Squared:		0.8918	

*Signif. codes: '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1*

Source: Author's computations

The coefficient of profitability measured by ROAA is highly significant but positive. *cta* coefficient standing for capital to assets ratio is also highly significant and positive. The more capitalized and so sounder banking sector as well as more profitable, the higher the sovereign debt level. This result is contra-intuitive even though we can consider the positive sign in case of the profitability measure to be rather biased due to the financial rehabilitation provided to banks during the turbulent crisis years.

4.4 SUMMARY OF RESULTS

The analysis suggests that foreign-owned banks from countries with overall high foreign ownership share tend to perform better in an environment with growing productivity and low inflation. Therefore, we conclude that the economic fundamentals do affect the performance of foreign-owned banks and we thus cannot reject the stated hypothesis. However, the analysis has also shown that these factors (macroeconomic indicators) are not sufficient in explaining the determinants of the banks' performance. We find evidence of the fact that more capitalized banks and banks with higher operating efficiency are also better performing in comparison to their peers. Moreover, keeping non-performing loans ratio low seems to be crucial for profitability, especially, when measured by return on average assets.

Further, we prove that not only the conditions in the host country matter to the performance but also those in the home country. On the other hand, macroeconomic indicators as such do not play any important role here unlike the way in which a banking crisis presents itself. Interestingly enough, current account balance is positively related to the banks' performance too which may suggest the importance of sufficient export support. These findings are in line with the hypothesis of adverse effects of the depth of a banking crisis in the home country on the foreign-owned banks in the host countries.

The impacts of high ratios of foreign ownership in a banking sector on the country's sovereign debt were not proven. Data suggest that the relationship would be positive (higher debt with higher share of foreign-owned assets), the coefficient estimated is however statistically insignificant. According to the estimation results, higher concentration of a country's banking sector increases the sovereign debt which justifies the 'Too big to fail' concept. In case of an adverse liquidity or credit shock to a banking sector largely dominated by only few banks, the country is obliged to provide emergency funds to save the sector and by doing so it increases its indebtedness.

Table 4-15: Effects of indicators on each of the dependent variables

	Dependent variables:	ROAA	ROAE	NIM		Dependent variable:	Debt
First hypothesis	Lagged dependent	+	+	+	Third hypothesis	Banking assets	0
	Cost income ratio	-	-	0		Capital to asset ratio	+
	Equity to asset ratio	+	0	+		Foreign ownership	0
	Loan loss reserves	+	0	0		HHI	+
	Impairment charges	-	-	0		ROAA	+
	Inflation	-	-	+			
	Unemployment	0	0	+			
	Interest rates	0	-	0			
	GDP growth	+	+	+			
	HHI	0	0	+			
	Number of banks	0	0	+			
	Banking assets	0	0	0			

	Dependent variables:	ROAA	ROAE	NIM		ROAA	ROAE	NIM
Second hypothesis	Lagged dependent	0	0	0	Lagged dependent	0	0	0
	Non-performing loans	-	-	-	Non-performing loans	+	+	+
	Current account balance	0	0	0	Current account balance	+	+	0
	Sovereign debt	0	0	0	Sovereign debt	0	0	0
	GDP growth	0	0	-	GDP growth	+	0	0
	Bank's total assets	0	0	0	Bank's total assets	0	0	0
	Liquidity ratio	0	0	0	Liquidity ratio	0	0	0
	Net external debt	0	0	0	Net external debt	0	0	0
	Ownership share	0	0	0	Ownership share	0	0	0

"+" … positive correlation; "-" … negative correlation; "0" … variable insignificant

Source: Author's computations

In relation to bailouts, the analysis suggests that profitability of a banking sector is positively correlated with sovereign debt. This result seems contra-intuitive

unless we bring the recent development when governments' anti-crisis measures took place.

4.5　FURTHER RESEARCH OPPORTUNITIES

The data analysis revealed further possible areas of research related to the phenomenon of increasing foreign ownership of banks.

Firstly, individual selected countries can be concentrated on more thoroughly in order to provide cross country comparison. The crucial challenge in this matter is the construction of a dataset with virtually no missing observations of any bank operating within the analysed sector. For some of the countries, this may be a difficult task, but at the same time, a precise estimation is otherwise impossible. In addition to that, new measures of bank performance (such as Economic Value Added) can be further examined and proposed, which again will require substantial data search.

Secondly, as the financial, banking and sovereign crises progress, more data will become available for analysis and thus could be incorporated into the research. With a substantially long time period, a two-way estimation of the second hypothesis[19] would be possible, which was until now prevented by the nature of the dataset.[20]

Thirdly, the fragmentation of the financial sector has recently been getting more attention. For this reason, further research could provide an analysis in which the bank type will serve as distinguishing factor even though the significance of the banking type was not proven by our up-to-now analysis.

Finally, regarding the sovereign debt and foreign ownership evaluation, the next steps could focus on the dynamics of the relationship.

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[19] Second hypothesis states: The performance of a foreign-owned bank is negatively influenced by the depth of the financial crisis in the home country.

[20] Estimation of the second hypothesis for pre-crisis and crisis period (2005 – 2007 and 2008 – 2011 respectively) was attempted, but no satisfactory results were obtained due to the extreme shortness of the panel and the use of lagged dependent variables ($T_1 = 2$; $T_2 = 3$).

5 CONCLUSION

The main motivation for our research was the phenomenon of foreign bank ownership which has been lately gaining on importance. Seventeen countries primarily from the Central and Eastern European region were selected for the analysis, namely Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hong Kong, Hungary, Ireland, Latvia, Lithuania, Luxemburg, Malta, New Zealand, Poland, Romania, Serbia and Slovakia. These countries are characterized by high share of foreign bank ownership and many of them have a largely concentrated banking sector with top three banks accounting on average for 65% of the market.

For our research, we stated three hypotheses and for each of them, a unique panel dataset was constructed making use of various sources. The data were collected for the period 2005 – 2011.

The analysis suggested that foreign-owned banks perform better in an environment with growing gross domestic product and low inflation. We can thus conclude that the economic fundamentals do affect the performance of foreign-owned banks and cannot reject the first stated hypothesis. However, the analysis also hinted that in explaining the determinants of the banks' performance the macroeconomic indicators are not sufficient. We found evidence of the fact that more capitalized and operationally efficient banks outperform their peers. Furthermore, low non-performing loans ratio is another key factor of foreign-owned banks' performance.

According to our analysis, high non-performing loans ratio in home country as well as large relative gap between real output and the country's potential reduce the performance of a foreign-owned bank operating in a host country. Also, current account balance is positively related to the banks' performance which may suggest the importance of sufficient export financing. These findings

support the second hypothesis of adverse effects of the depth of a banking crisis in the home country on the foreign-owned banks in the host countries.

The impacts of high ratios of foreign ownership in a banking sector on the country's sovereign debt remains further unclear. Data suggest positive relationship; however, the estimated coefficient is statistically insignificant. On the other hand, we found evidence on higher concentration of a country's banking sector escalating the sovereign debt which is in line with the 'Too big to fail' approach. In case of a liquidity shock to a banking sector largely dominated by only few banks, the country is obliged to provide emergency funds to save the sector and by doing so it increases its indebtedness. In relation to bailouts, the analysis further suggests that sovereign debt is positively correlated with profitability of the country's banking sector. This outcome seemed lacking logic unless we considered the turbulent environment of recent years leading the governments to set anti-crisis measures. Such measures could weaken the sovereigns and give banks certain advantage. Overall, the third hypothesis cannot be supported by our analysis but interesting results were revealed.

With the progression of the sovereign crisis, further research is encouraged. Also, new areas such as financial sectors' fragmentation can be concentrated on.

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APPENDIX

Figure A 1: Herfindahl-Hirschman Index of analyzed European countries
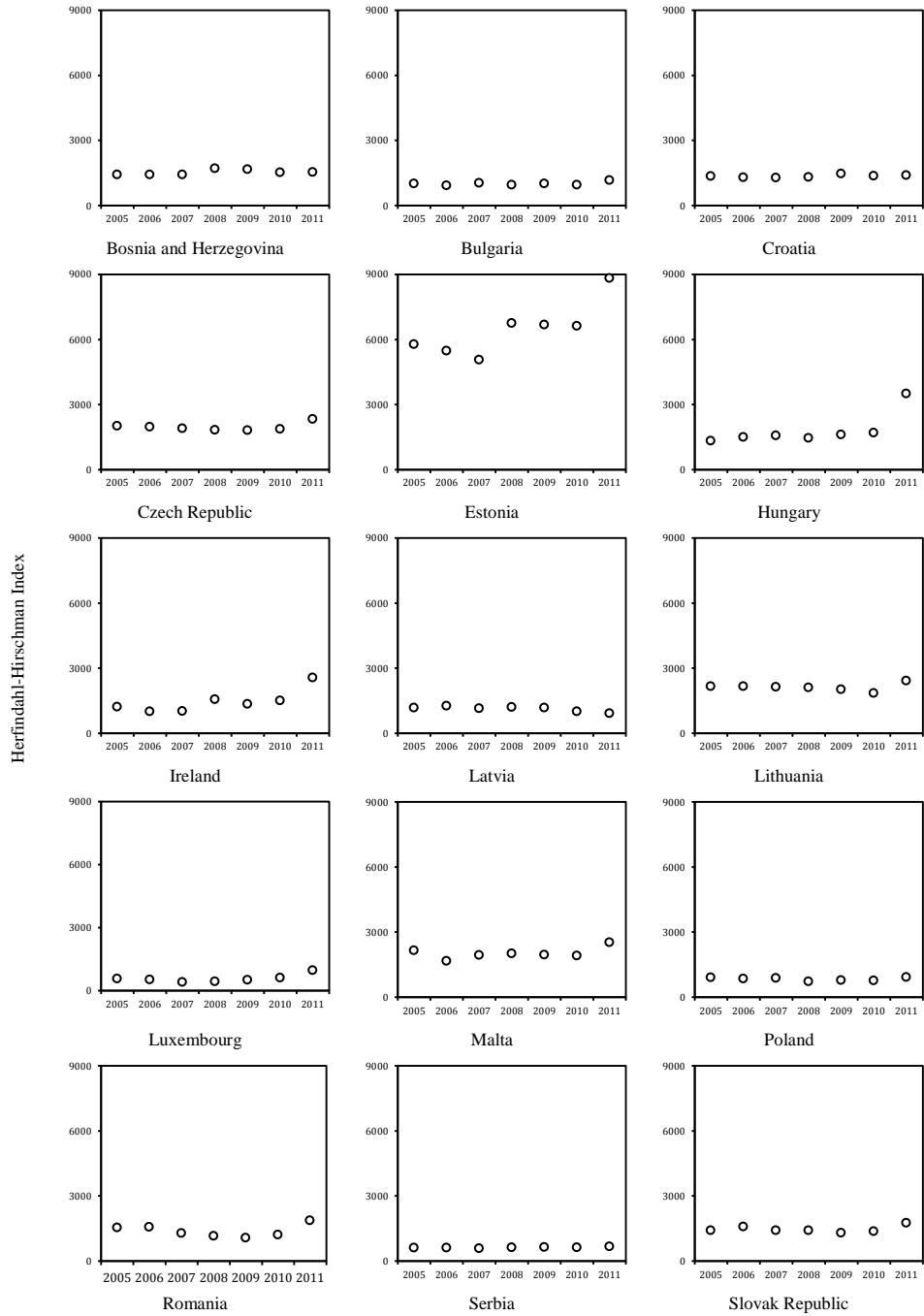
Source: (Bijlsma & Zwart, 2013), Author

Figure A 2: Non-performing loans ratio of analysed European countries

Note: the y-axis scale differs country from country

Source: (World Bank, 2012), Author

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Table A 1: Correlation matrix (first hypothesis)

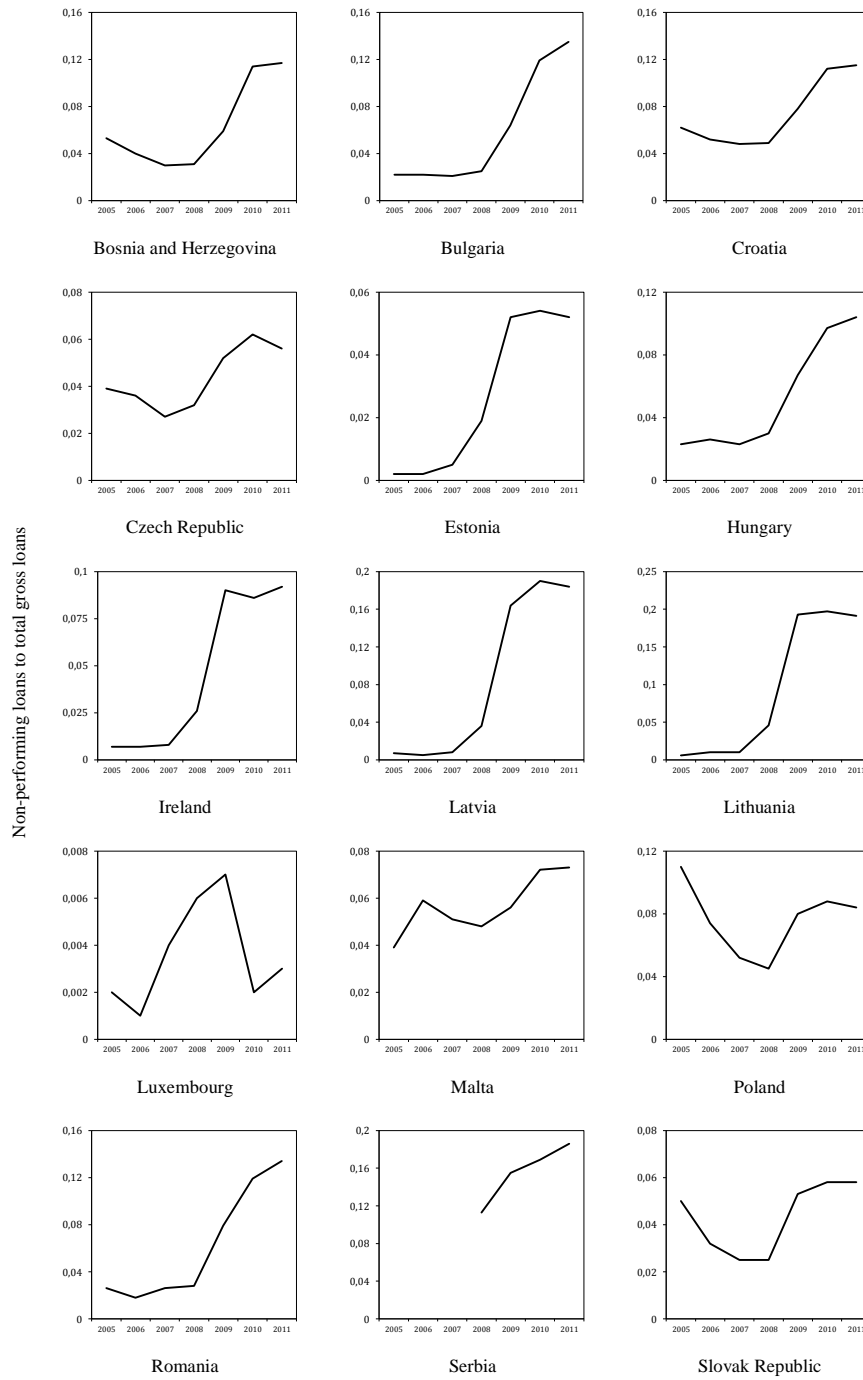|	ci	eta	lastf	llrgl	nim	nlstf	npl	roaa	roae	ln_ta	nlta	down	dlist	dcomm	dcoop	dsav	l.infl	l.bond	l.unemp	l.gdp	hhi	nobanks	bas
ci	1																						
eta	0.1640*	1																					
	0																						
lastf	0.0771*	0.3984*	1																				
	0.0147	0																					
llrgl	0.2181*	0.1747*	-0.0233*	1																			
	0	0	0.4624																				
nim	0.2475*	0.5047*	0.0982*	0.3691*	1																		
	0	0	0.0019	0																			
nlstf	0.0036	0.2391*	-0.0980*	-0.0076	0.1025*	1																	
	0.9088	0.0019	0.0012	0.8096	0																		
npl	0.0732*	0.1414*	0.0228*	0.4488*	0.3414*	-0.0074	1																
	0.0205	0	0.4716	0	0	0.814																	
roaa	-0.4270*	0.1493*	0.0503*	-0.2501*	0.1698*	0.0428*	-0.2976*	1															
	0	0.0001	0.1117	0	0	0.1762	0																
roae	-0.2806*	-0.0649*	-0.0029	-0.2295*	-0.0128	-0.0133	-0.2342*	0.5002*	1														
	0	0.0402	0.9262	0	0.685	0.675	0	0															
ln_ta	-0.4622*	-0.4457*	-0.2388*	-0.2207*	-0.4124*	-0.0799*	-0.1880*	0.1822*	0.1807*	1													
	0	0	0	0	0	0.0114	0	0	0														
nlta	0.0310*	0.0125	-0.3477*	0.0287*	0.1192*	0.4513*	0.0008	0.0128	0.0012	-0.0552*	1												
	0.3275	0.6934	0	0.3636	0.0002	0	0.9804	0.6854	0.9707	0.0811													
down	-0.0872*	-0.0726*	-0.0251*	-0.0812*	-0.0711*	0.0510*	-0.0158	0.0885*	0.1229*	0.1425*	0.0179	1											
	0.0057	0.0215	0.428	0.0102	0.0245	0.1067	0.6176	0.0051	0.0001	0	0.5706												
dlist	-0.006	-0.1224*	-0.0495*	0.0575*	-0.0516*	-0.0643*	-0.0158	-0.0138	0.0454*	0.0801*	-0.0718*	0.0184	1										
	0.8494	0.0001	0.1176	0.0692	0.103	0.0419	0.6185	0.6638	0.0112	0.0112	0.0232	0.5619											
dcomm	0.0477*	-0.0094	0.008	0.0642*	0.0914*	-0.0495*	0.0599*	-0.0267*	-0.014	-0.0289*	0.017	-0.2031*	-0.0327*	1									
	0.1319	0.7666	0.7992	0.0424	0.0038	0.1176	0.0583	0.3994	0.6583	0.3616	0.5917	0	0.3008										
dcoop	-0.0249*	-0.0594*	-0.0691*	-0.0462*	-0.0632*	0.1302*	-0.0391*	0.0253*	0.0158	-0.0067	0.0789*	0.1396*	0.0948*	-0.5560*	1								
	0.4318	0.0604	0.0288	0.144	0.0456	0	0.2164	0.4234	0.6186	0.8316	0.0126	0	0.0027	0									
dsav	0.0555*	-0.0017	-0.0586*	0.0521*	0.0562*	0.0057	-0.0051	-0.0257*	-0.0084	0.0188	0.0463*	0.1396*	0.0948*	-0.5560*	-0.0362*	1							
	0.0791	0.9567	0.0452	0.0997	0.0754	0.8579	0.8711	0.4175	0.7913	0.5528	0.1433	0	0.0027	0	0.2521								
l.infl	0.1677*	0.2092*	0.0684*	0.2698*	0.5264*	0.0482*	0.3910*	-0.1102*	-0.0744*	-0.2833*	0.1145*	-0.0851*	-0.0360*	0.1257*	-0.0477*	0.0608*	1						
	0	0	0.0452	0	0	0	0	0	0.0294	0	0.0008	0.0126	0.2922	0.0002	0.1627	0.075							
l.bond	-0.1745*	-0.3221*	-0.1818*	0.0893*	-0.2722*	-0.0122	0.0989*	-0.1497*	-0.0708*	0.2430*	0.0263*	0.0508*	0.0202	-0.0728*	0.0844*	-0.0412*	-0.0801*	1					
	0	0	0	0.0088	0	0.7202	0.0037	0	0.0381	0	0.4419	0.1369	0.5549	0.0331	0.0134	0.2284	0.019						
l.unemp	0.2594*	0.2884*	0.1140*	0.3539*	0.4487*	0.0433*	0.1783*	-0.0294*	-0.0778*	-0.4437*	0.0784*	-0.0793*	0.0328*	0.0690*	0.0136	-0.0078	0.1470*	-0.3769*	1				
	0	0	0.0008	0	0	0.2052	0	0.3901	0.0226	0	0.0216	0.0202	0.3376	0.0432	0.6913	0.8202	0	0					
l.gdp	-0.0215	-0.0062	0.0935*	-0.3277*	0.0682*	-0.0196	-0.1804*	0.2377*	0.1934*	0.0152	-0.0293*	0.0134	0.0117	-0.0726*	0.0470*	0.0182	0.1100*	-0.2615*	-0.0923*	1			
	0.5301	0.857	0.0061	0	0.0458	0.5665	0	0	0	0.6576	0.3907	0.6943	0.7332	0.0470	0.1689	0.595	0.0012	0	0.0068				
hhi	0.0721*	-0.0899*	-0.1123*	0.0564*	-0.0448*	0.0851*	-0.1616*	-0.1596*	-0.0600*	-0.1376*	-0.3156*	-0.0159	-0.0673*	0.1317*	-0.1315*	-0.0340*	-0.3441*	0.1847*	0.0243*	-0.0842*	1		
	0.0225	0.0061	0.0004	0.0746	0.1564	0.0071	0	0	0.0576	0	0	0.6155	0.0469	0	0	0.283	0	0	0.4778	0.0136			
nobanks	-0.2508*	-0.0493*	0.1338*	-0.3009*	-0.3906*	-0.2074*	-0.0043	0.0953*	0.0755*	0.3992*	-0.3099*	0.0479*	0.0469*	-0.1315*	0.1634	-0.0745*	-0.0516*	-0.0579*	-0.4361*	0.1193*	-0.4061*	1	
	0	0.1192	0	0	0	0	0.891	0.0025	0.0169	0	0	0.1299	0.1378	0		0.017	0.1307	0.0903	0	0.0005	0		
bas	-0.1857*	-0.0258*	0.2159*	-0.2395*	-0.3650*	-0.1809*	-0.1295*	0.0267*	0.0394*	0.2150*	-0.3099*	-0.1025*	0.0033	0.0420*	-0.0754*	-0.0745*	-0.2537*	-0.0356*	-0.3337*	-0.0027	-0.2199*	0.5565*	1
	0	0.4151	0	0	0	0	0	0.3979	0.213	0	0	0.0012	0.918	0.1839	0.017	0.0184	0	0.297	0	0.9372	0	0	

* represent significance on 5% level

Source: Author's computations

Table A 2: Correlation matrix (second hypothesis)

	cab	l.debt	fgdp	l.gdp	lnta	lr	ned	nim	npl	roaa	roae	share
cab	1											
l.debt	-0.5953*	1										
	0											
fgdp	-0.0828*	-0.0175	1									
	0.0048	0.5815										
l.gdp	-0.0338*	-0.1154*	-0.1004*	1								
	0.2887	0.0003	0.0016									
lnta	0.0391*	0.0523*	-0.0502*	0.3820*	1							
	0.1841	0.0997	0.0883	0								
lr	0.2195*	-0.4703*	-0.0690*	0.1448*	0.0451*	1						
	0	0	0.0189	0	0.1258							
ned	-0.4884*	0.4623*	0.0496*	-0.0303*	-0.0599*	-0.4905*	1					
	0	0	0.0918	0.303	0.0417	0						
nim	-0.2362*	0.2237*	0.0978*	-0.1096*	-0.0183	-0.1181*	0.1878*	1				
	0	0	0.0009	0.0002	0.5334	0.0001	0					
npl	-0.2671*	0.4950*	-0.3044*	-0.0290*	-0.0912*	-0.0089	0.2650*	0.1015*	1			
	0	0	0	0.3241	0.0019	0.763	0	0.0006				
roaa	0.0310*	-0.0984*	0.0628*	0.1145*	0.0245*	0.1392*	-0.0529*	-0.0261*	-0.0391*	1		
	0.2923	0.0019	0.0327	0.0001	0.4058	0	0.0726	0.3748	0.1843			
roae	0.0215*	-0.0635*	0.0732*	0.0917*	0.1026*	0.0041	-0.0114	-0.1043*	-0.1149*	0.5469*	1	
	0.4663	0.0459	0.0128	0.0018	0.0005	0.8884	0.6992	0.0004	0.0001	0		
share	-0.0321*	0.011	-0.0283*	-0.1494*	-0.0963*	-0.0878*	0.0419*	0.0139	-0.0048	-0.0876*	-0.0275*	1
	0.2754	0.7306	0.3371	0	0.0011	0.0028	0.1545	0.6376	0.8716	0.0029	0.3509	

* represents significance at 5% level

Source: Author's computations

Table A 3: Correlation matrix (third hypothesis)

	ln_bas	ln_c3	ln_cta	ln_fa	ln_debt	ln_hhi	ln_nfa	ln_roaa
ln_bas	1							
ln_c3	-0.0560*	1						
	0.4711							
ln_cta	-0.6706*	-0.1415*	1					
	0	0.0672						
ln_fa	-0.3491*	-0.0986*	0.3833*	1				
	0	0.2038	0					
ln_debt	0.0763*	-0.0095	-0.007	-0.4169*	1			
	0.3255	0.903	0.9287	0				
ln_hhi	-0.0933*	0.9227*	-0.0883*	-0.0664*	-0.1803*	1		
	0.229	0	0.2548	0.3926	0.0194			
ln_nfa	0.3593*	-0.2204*	-0.1429*	-0.1359*	0.0525*	-0.2170*	1	
	0	0.0041	0.0646	0.079	0.4994	0.0047		
ln_roaa	0.1960*	-0.1185*	-0.1518*	-0.1947*	0.3159*	-0.2196*	0.036	1
	0.0109	0.1261	0.0494	0.0114	0	0.0042	0.6436	

* represents significance at 5% level

Source: Author's computations

Figure A 3: Scatter plot: Dependent vs. Independent variables (third hypothesis)
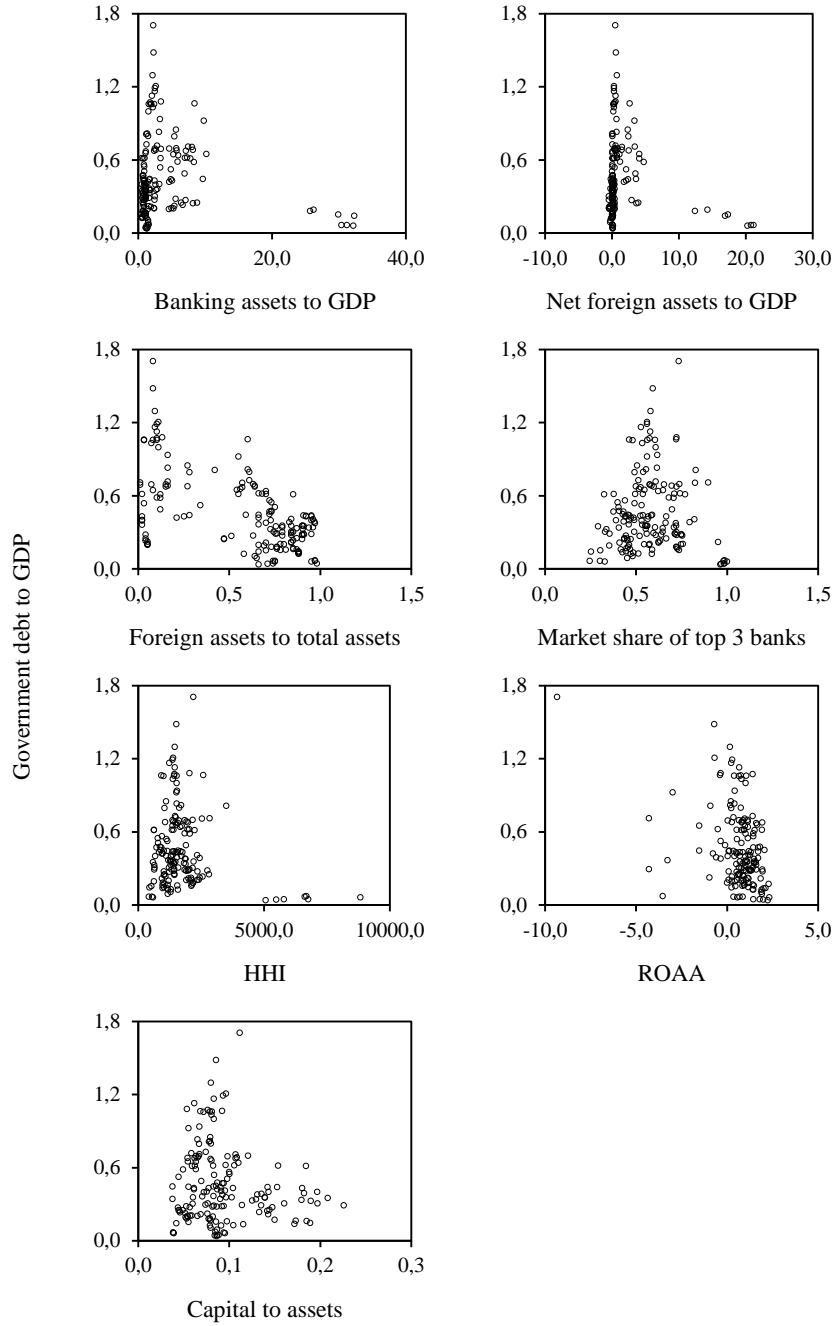
Source: Author

Table A 4: List of used data sources

- Bijlsma & Zwart (2013)
- Claessens & van Horen (2012)
- Bank of Estonia
- Bank of International Settlements
- Bank of Latvia
- Bank of Lithuania
- BankScope database (Bureau van Dijk)
- Bloomberg
- Bulgarian National Bank
- Central Bank of Bosnia and Herzegovina
- Central Bank of Ireland
- Central Bank of Malta
- Czech National Bank
- European Banking Federation
- European Central Bank database
- Eurostat
- Fitch
- Helgi Library
- Hong Kong Census and Statistics Department
- Index Mundi
- International Monetary Fund
- Laeven & Valencia (2012)
- National Bank of Poland
- National Bank of Romania
- National Bank of Serbia
- National Bank of Slovakia
- OECD iLibrary
- Raiffeisen Research
- Reserve Bank of New Zealand
- Trading Finance
- Thomson's Reuters
- WorldBank database