UNIVERSITY OF LJUBLJANA

FACULTY OF ECONOMICS

MASTER'S THESIS

DETERMINANTS OF BANK PERFORMANCE IN SELECTED CEE COUNTRIES

Ljubljana, September 2016   VLORA HETEMI

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INTRODUCTION

There were important political and economic developments that took place in the Central and Eastern Europe (hereinafter: CEE) region since the end of 80s and beginning of the 90s. These changes affected the transformation and development of the banking sectors in the region. Benczés (2008) describes the process of transformation that followed, as state owned enterprises changed hands to private investors through large scale privatization, which in turn gave the opportunity to foreign investors to be present in the region and increase significantly their share of bank assets mostly through subsidiaries (an exception is Slovenia, which continues to be one of the countries with the highest rate of state involvement in Europe).

In general, banking sectors represent the most important part of the financial sectors within CEE countries. The level of the financial depth as measured by bank assets to gross domestic product (hereinafter: GDP) has increased continuously, although it remains well below Western Europe levels. Commercial banks are the major players in financial intermediation between savers and borrowers of funds. These institutions are expected to perform their function at the lowest costs possible, hence promoting the growth of the economy through efficient channeling of the funds.

Majority of papers on the topic matter in CEE countries focus in the period of consolidation in early 2000s and the period afterwards (for example see Havrylchyk & Jurzyk, 2006; Claeys & Vennet, 2008; Schwaiger & Liebeg, 2008; Dumičić & Ridzak, 2013). Since the financial crisis, economic and financial conditions in the region have changed significantly. As the economy slowed down and credit activity dropped, bank performance has been affected too. Following the onset of the financial crisis, CEE banks experienced a sharp increase in non-performing loans (hereinafter: NPL). The situation remains worrisome as NPL ratios are well above pre-crisis period. However, on the bright side, as per data and central banks' assertions, 2014 can be characterized as the first year when NPL ratios did not increase further in the CEE region. Simultaneously, bank margins persist to be under pressure due to low interest rate environment which imposes a challenge on banks to seek potential ways of boosting income through engagement in non-interest activities. As regarding profitability, there were diverse results across countries, as some countries realized positive returns while others continued to face problems.

Considering the recent years developments across CEE countries, I try to analyze what factors affect bank performance. The thesis is a cross-country analysis that focuses in seven countries in this region: Bulgaria, Croatia, Czech Republic, Hungary, Romania, Slovakia and Slovenia. From this group of countries, the first ones to join the European Union (hereinafter: EU) were

Czech Republic, Hungary, Slovakia and Slovenia in the year 2004. Later on, in 2007, Romania and Bulgaria successfully joined EU through the so-called second-wave accession, while Croatia joined in 2013. In general, banks that operate in the above mentioned countries are highly focused in offering services in long-established operations (i.e. granting loans and taking deposits).

I make use of secondary data obtained from few sources in order to conduct empirical research. The analysis covers the period between the years 2007 to 2014 on an annual basis. Since the emphasis of the thesis is commercial banks, I exclude from the study central banks, housing and saving banks. As a result, my dataset consists of a total of 140 banks that operated in this region for the whole analyzed period or a part of it. I employ three measures of bank performance, namely net interest margin, return on average assets and return on average equity. Panel data estimation techniques will be employed to analyze how bank specific characteristics, market structure and macroeconomic environment affect the three bank measures. The model is constructed based on literature review that helps in understanding the relevant determinants employed in similar studies and additionally helps to lay down the hypotheses for the analysis.

I contribute to the existing studies on this region by including developments in the most recent years in this region and through the analysis of three different measures of bank performance simultaneously. In addition, I also perform tests in the euro area and non-euro area sub-samples. Furthermore, in order to enrich the analysis, I present different specifications and make use of different ratios in order to confirm results.

The thesis is structured as follows:

Section 1 provides a comprehensive overview about the banking sectors in the CEE region, their development and the role they play in the economy.

Section 2 offers literature review of the bank performance determinants. The determinants are divided into three main groups, specifically into bank characteristics, banking sector structure and macroeconomic conditions. Through each group, the most significant drivers are identified, as based on literature.

Section 3 offers a description of data, model specification and methodology used.

Section 4 presents summary statistics, main regression results and their interpretation.

Section 5 provides concluding remarks about the main findings.

1 CEE COUNTRIES BANKING SECTORS OVERVIEW

In general, countries in my sample experienced major events during the period of 1980s and 90s. These changes affected the transformation and development of the banking sectors in the region. All countries under the study had planned economy systems in place and at a certain point the change of ideology happened; countries entered transition periods, among the rest also in banking systems. Challenges included establishing of two tier systems, privatization of state owned banks, foreign entry allowance and structural and supervisory reforms initiation.

A comparison of net interest margins across countries is presented in Figure 1.

Figure 1. Median NIM by Country
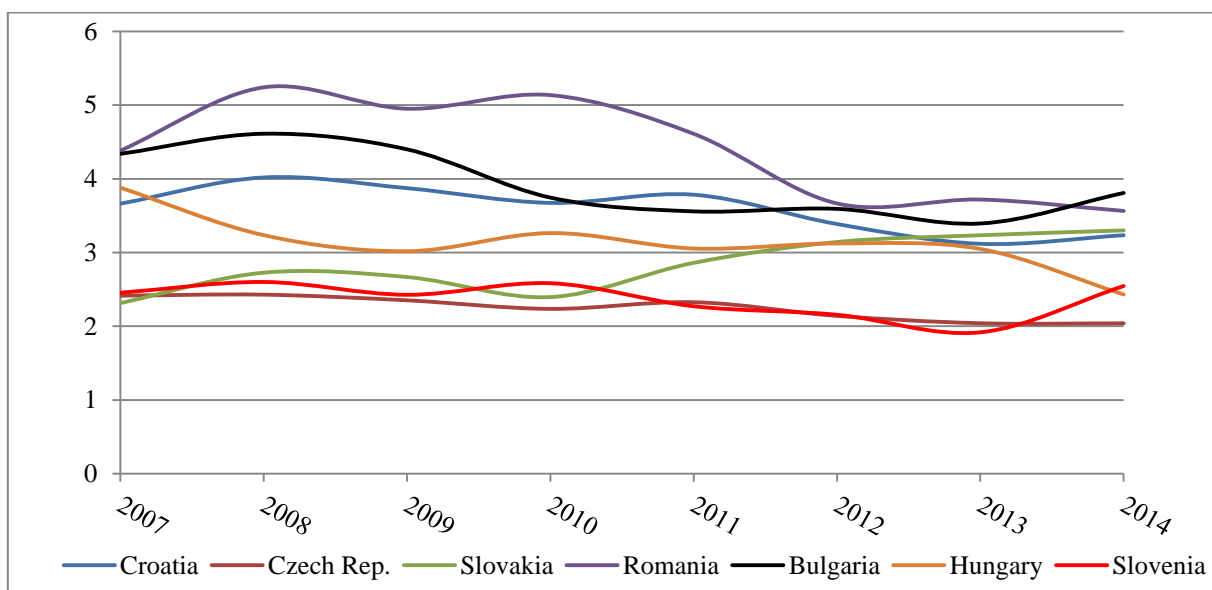
Practically, Romania has been characterized as the country with the highest net interest margin (hereinafter: NIM) for the period between 2007 and 2014, while Czech Republic and Slovenia have had the lowest margins across the years. Overall, there is no clear trend pattern; in 2007 NIM has generally increased and then again there were ups and downs observable.

Turning to profitability indicators, there were diverse results across countries, as some countries realized positive returns while others continued to face problems. Because of large differences in return on average assets (hereinafter: ROAA) and return on average equity (hereinafter: ROAE) between Slovenia and the rest of the countries, I present Slovenia on the right hand side (RHS) axis, so developments across countries can be analysed in a more comprehensible sense. The overall situation is considered to be disappointing as profitability is

at historical low levels. In the case of ROAA, Slovenia (as presented on the right hand side axis) recorded the highest negative median value of the indicator in the year 2013.

Figure 2. Median ROAA by Country
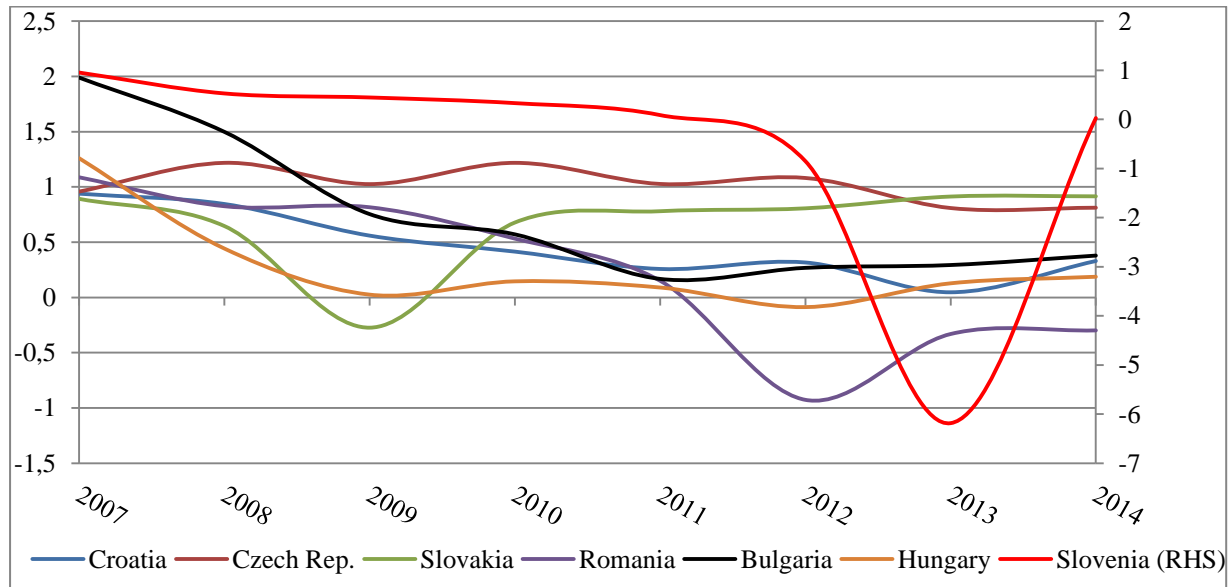
On the other hand, differences are larger in the case of ROAE. Again, Slovenia (on the right hand side axis) experienced the highest negative return recorded in 2013. The best performer in both profitability indicators was Czech Republic, which managed to keep satisfactorily and positive returns throughout the whole analysed period.

Figure 3. Median ROAE by Country

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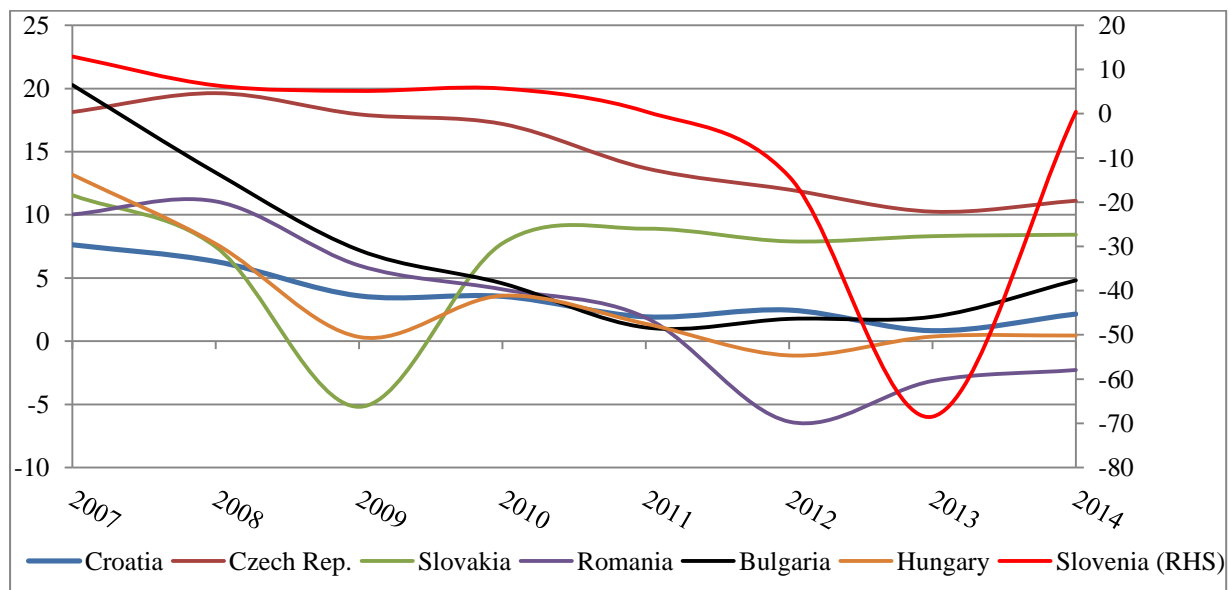
The most important developments and characteristics of the sectors in each country are discussed as below.

1.1 Bulgaria

1.1.1 A brief history of the Bulgarian banking sector

Until the beginning of the 1990s, Bulgaria had one tier banking system. In 1991, the government passed the Law on the Bulgarian National Bank, marking a new era as Bulgarian banking sector moved to a two tier system. Although there were major developments taking place, there were high entry barriers for foreign banks as the government did not allow branches of foreign banks in Bulgaria. It was the year 1994 when the government decided to remove the ban. Nevertheless, the foreign presence continued to be low, at less than 5 percent of total bank assets (Koford & Tschoegl, 2003).

Later on, as Balyzov (1999) describes it, due to delays in structural reforms and loose supervision, the country entered a banking and currency crisis in the mid 1990s while one third of banks faced problems with liquidity and solvency, thus entered bankruptcy procedures. Following the major problems, the Bulgarian National Bank (hereinafter: BNB) started to inject liquidity into the banking system which created problems with hyperinflation and worsened already weak confidence in the system and government. As BNB lost control of money supply and inflation, a currency board was established in 1997 with the aim of mitigating problems and helping the transition process.

In the following years the sector was characterized by a rising trend in the volume of banking operations. The confidence in the banking system strengthened, so the deposit base continued to grow which was immediately reflected in aggressive lending and activity expansion on the asset side of the banking sector balance sheet. Expansion continued even during 2007 when financial conditions started to show signs of weaknesses. However, in 2008 there was a significant decline in lending activity, reflecting tighter credit policies following the global financial problems. Nonetheless, BNB estimated that the sector is stable as shown by main financial indicators related to profitability, liquidity and capital buffers and there was no need for government intervention in the banking system; Bulgaria's banking sector was ranked among the best in European Union (hereinafter: EU) (BNB, Annual Report, 2009). The main source of risk in the following years was credit quality deterioration, which as per World Bank database reached around 16.7 percent of gross loans in 2014.

1.1.2 Structure of the Bulgarian banking sector

The sector is primarily dominated by foreign banks which hold around 76 percent of banking sectors assets. As per country of origin, subsidiaries of banks from Austria, Italy and Greece

predominate. Based on BNB data, the sector has 28 licensed banks, of which 90 percent are foreign-owned, while 5 of them operate as foreign bank branches. The largest banks have always controlled a large share of the market and although there were ups and downs in sector market shares throughout the years, there have not been significant changes in shares of five largest banks in total assets in the last 10 years. As per European Central Bank database, the share of top five banks in 2014 for Bulgaria was 55 percent, which is lower than the EU average.

1.1.3 Bulgarian banking sector balance sheet

At the end of 2014, the level of financial intermediation as measured by total bank assets to GDP was over 100 percent, which is relatively around 2.5 times less than the EU average.

Total bank assets stood at 85.1 billion Bulgarian lev (hereinafter: BGN) at the end of 2014, a decrease of 0.5 percent compared to 2013. The main reason behind the fall was the elimination of KTB assets. As regarding asset composition, the portfolios of securities and claims in credit institutions both increased by 12.9 percent, while loans went down by 5 percent. The decrease in loan portfolio was driven by a fall in both corporate and individual loans. As per currency segregation, loans in lev had a share of 38.2 percent while those in Euros stood at 55.5 percent share in total loans (BNB, Annual report, 2014).

On the liabilities side, attracted funds were BGN 73.5 billion, a decrease of 0.5 percent compared to the previous year. On this matter, there was an increase in household and individual deposits by 4.5 percent (BGN 1.8 billion), while funds from non-credit institutions decreased by 1.8 percent (BGN 420 million). Retail deposits make up around 56 percent of all attracted funds, followed by non-credit institutions (31.5 percent). Banking sector equity fell to BGN 10.8 billion by the year end of 2014 (1.7 percent compared to 2013), and the main reason behind were takeover of Unionbank and KTB elimination from the market (BNB, Annual report, 2014).

1.2 Croatia

1.2.1 A brief history of the Croatian banking sector

Croatia declared its independence in 1991 when it cut its ties with the former SFR Yugoslavia. The country already had two tier banking system and it had to transit from socialism to capitalism. As a result, during this period new standards in the banking sector made it possible to move toward a market-based industry.

Foreign entry of banks in Croatia started in 1995, which somewhat increased the competition in the market and changed the ownership structure (Jemrić & Vujčić, 2002). In the meantime,

the Croatian National Bank (hereinafter: CNB) had low regulations on bank entry, capital requirements and supervision, which was in turn reflected in the increasing number of banks that were operating in Croatia, reaching 60 banks in 1997 (Reininger & Walko, 2005).

Following the credit growth, banks had weak control and risk assessment practices. In many cases, banks had a concentration of exposure on single clients, poor provisioning of loans and competed for deposits in a reckless way. Additionally, the country was following a tightened monetary policy which affected domestic demand to slow down. Interest rates rose significantly due to problems in the banking sector and the risk of kuna depreciation. Due to bad credit practices banking sector experienced a growth of arrears (CNB, Annual report, 1998). Moreover, bank difficulties worsened due to events outside Croatia, such as the Asian financial crisis in 1997, Russian crisis in 1998 and Kosovo war in 1998. In this context, Croatia experienced a banking crisis during the years 1998-1999. Significant changes happened in the industry; 12 banks left the market, 2 banks got merged with other banks and 2 banks got restructured (Reininger & Walko, 2005).

In the following years, credit to the private sector expanded and it was characterized by changes in the type of users. While before 2003, corporate loans had the highest share in total net loans, the trend somewhat reversed. In 2003 and onwards, as by type of user, loans to households increased the most.

Years 2007 and 2008 showed signs of a slowdown. The outbreak of the global financial crisis and the worsening of the economic situation impacted Croatia too. The failure of companies and individuals to meet loan repayments made for the provisioning expenses to rise. There was a significant slowdown in lending activity; loans grew on average by 3.4 percent during 2009 and 2010 and were primarily granted to government units (CNB, Banks Bulletin, 2010). As the economic uncertainty continued in the succeeding years, banks persisted to be highly cautious in lending. At the same time, NPL ratios were characterized by an upward trend. The year 2014 recorded the lowest level of profitability since 1998. The primary reason for the weak profitability results were the high level of loan loss provision expenses (CNB, Banks Bulletin, 2015).

1.2.2 Structure of the Croatian banking sector

The number of banks has been falling for five consecutive years. By the end of 2014, there were 27 banks operating in Croatia. The sector is dominated by foreign owned banks, counting 16 banks in total. The biggest foreign shareholders' group by country comes from Austria, who hold nearly 60 percent of the sector's assets, followed by Italian shareholders who hold more than 18% of the assets (CNB, Banks Bulletin, 2015).

In the end of the year 2014, the share of assets of four largest banks was 66.5%. Reininger and Walko (2005) argue that on this matter, the financial soundness of the sector is highly affected by the stability of these banks and that risks in the banking sector are lowered by foreign strategic ownership.

1.2.3 Croatian banking sector balance sheet

At the end of 2014, the level of financial intermediation as measured by total banks' assets to GDP remained at 120.3 percent, with only slight changes in the past five years.

Banking sector assets stood at 395.2 billion Croatian kuna (hereinafter: HRK), a decrease of 0.7 percent compared to 2013. The third consecutive year of asset shrinkage was largely driven by the negative events in the credit portfolio. The credit activity lessened toward all sectors, but it was more pronounced in the case of corporate segment (CNB, Banks Bulletin, 2015).

Similarly, liabilities have decreased by 0.8 percent compared to the previous year, mainly due to reductions on sources received by majority foreign owners through instruments such as received deposits and loans, subordinated and hybrid instruments. The main sources of funds are domestic sources (81 percent) which have increased their share as the foreign sources have declined. Households remain the main depositors within banks (51.4 percent) although their growth rate has slowed down at 1.9 percent, which is the lowest growth rate recorded since 2002 (CNB, Banks Bulletin, 2015).

1.3 Czech Republic

1.3.1 A brief history of the Czech banking sector

Czech Republic passed to a two-level banking system in the year 1990. At the same time, a consolidation process started, whose objective was to write-off inherited bad loans from banks' balance sheets and establishment of suitable conditions for bank activity. Shortly after, in 1992, a privatization process took place. In addition, with the aim of increasing market competition in the sector, in early 1990s the central bank became liberal in giving licenses to banks. Soon, foreign investors entered the market (Tuma, 2002).

During the following years, the country experienced a high credit growth which contributed to the latter problems in small banks. Subsequently, in 1995 the central bank started another consolidation program. As a result, 15 banks were part of the program and 9 of them had their licenses revoked, were put into conservatorship or bought by other banks. Due to such developments, the public confidence on small banks was affected as people started to withdraw their deposits, which in turn required the government to act with the Stabilization

Program that would buy poor quality assets at nominal value and in turn increase liquidity up to 110 percent of capital of every bank that was part of the program (Tuma, 2002).

Starting 1997, the economy entered a recession period. As the economic activity was rather weak, incomes of households increased moderately which in turn affected deposits levels to be insufficient for bank funding. Problems were not only related to the macroeconomic state but also to structural and institutional deficiencies. Correspondingly, banks had an increasing share of liquid assets while loans' share fell to below 50 percent (Dedek, 2001).

Privatization of state-owned shares in large commercial banks was completed in 2002, while at the same time the macroeconomic state improved which helped stabilization of the banking system (CNB, Annual report, 2001).

The year 2005 and 2006 marked a significant increase in credit activity to households and corporate segments. Same trend was also present in 2007, when household sector recorded a 35 percent increase compared to previous year, while the corporate loans increased by over 17 percent. As per Czech National Bank (2008) report, even though the year 2008 marked the beginning of the global financial crisis, its effect on the Czech banking sector was insignificant as banks were not directly exposed to risky assets. On the following periods, the sector experienced an increase in non-performing loans due to adverse economic events. Nonetheless, the sector continued to be resilient to external shocks as the Czech economy remained relatively calmed compared to developments in other countries; there were no major changes year to year in sector's balance sheet.

In the last quarter of 2011 the Czech economy contracted and continued to do so also in 2012 and 2013, which in turn posed a challenge for the growth of banking sector balance sheet. Despite a relatively low level of non-performing loans (5.5 percent at the end of 2013) compared to other countries in the region, the central bank assessed that credit risk may be underrated as banks have loans that might be at risk of default but have not been classified as problematic (CNB, Financial Stability Report 2013/2014, 2014, p.57).

As per central bank data, in 2014 the profit of the sector increased (by 4 percent) after two years of a declining trend, being predominantly pushed by higher interest income and lower levels of provisions.

1.3.2 Structure of the Czech banking sector

Banking sector is the major player in the Czech financial sector, holding around 80 percent of total financial sector's assets. The structure of the banking sector has been somewhat stable throughout the years. As at the end of 2014 the sector had 45 banks and foreign branches, with

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foreign shareholders (mostly from EU countries) controlling directly or indirectly over 90 percent of the sector.

In relation to the concentration of the market, there were no major changes as regarding the share of assets of five largest banks since mid 1990s. The market concentration ratio fell to 65.75 percent in 2002, and then modestly rose and fell again throughout years, reaching 61.34 percent at the end of 2014, which is very close to EU average level.

1.3.3 Czech banking sector balance sheet

The level of financial intermediation as measured by total banks' assets to GDP stood at over 124 percent at the end of 2014.

As at the year ended in 2014, the total bank assets were 5,309.4 billion Czech koruna (hereinafter: CZK). On the assets side, loans reached an amount of CZK 2,635.1 billion, an increase of 4.8 percent compared to the previous year. As per segment, the household loans had a major stake, mainly driven by mortgage loans. Unlike many other countries in the region, Czech banks are not exposed much to lending in foreign currencies, as retail segment has almost all loans denominated in domestic currency, while only a moderate part of corporate segment has foreign denominated loans (CNB, Financial Stability Report 2014/2015, 2015).

On the liabilities side, deposits increased at a slower pace, 2.9 percent compared to 2013, thus reaching CZK 3,435.3 billion at the end of 2014 (CNB, Financial Stability Report 2014/2015, 2015). In general, the Czech banking sector has been characterized by stable deposits through years and as at end of 2014 it has a loan to deposit ratio of around 77 percent. The main sources of deposits are households, making the system self-sufficient and independent from non-resident funding sources.

1.4 Hungary

1.4.1 A brief history of the Hungarian banking sector

Hungary passed to a two tier banking system in 1987. During this time, the credit was mostly focused toward corporate sector and credit decisions were based in particular corporate shareholder interests, while loans to households and government were almost inexistent. Such a credit concentration strategy was risky and could potentially lead to a bank crisis. In the upcoming years (1991-1993) the economy contracted; 60 percent of companies defaulted while their debt accounted for 13 percent of country's GDP. Faced with problems that threatened the failure of the whole system, the government bailed out banks and strategic companies through purchasing bad debt in exchange of floating rate government securities (Szikszai & Raffai, 2013). In addition, the government chose to recapitalize troubled banks

whose capital adequacy ratios were under 8 percent. As such, the main objective of the state was to prepare banks for a privatization process (Kovacs, 1997).

After privatization phase completition, the main characteristic of the sector was competition for retail clients. The main driver of growth was the surge of household loans; the government supported by legislation the interest-subsidized loans that were denominated in the domestic currency (Szikszai & Raffai, 2013).

The central bank of Hungary (hereinafter: CBH) assessed that there was an unprecedented growth of housing loans while housing income growth was lower, which in turn increased the household indebtness levels. In 2004, the government eliminated the subsidy scheme. In addition, interest rates on forint denominated loans increased due to macroeconomic developments. The related events gave rise to promotion of foreign denominated loans (predominantly in Swiss francs) in the retail segment. As such, by the end of 2007 foreign denominated loans had the biggest share in total loans. As per European Economic Advisory Group (2012) report, Hungary had a high presence of international companies which had access in foreign capital markets, especially commercial banks that were able to fund themselves through parent banks. In turn, banks offered foreign denominated loans to households and companies with rates lower than domestic ones, which contributed to high growth of these particular loans. Households and companies did not hedge themselves against the exchange rate risk. In the upcoming period between September 2008 to March 2009 the domestic currency depreciated 24 percent against euro and 34 percent to Swiss franc. Depreciation of Hungarian currency increased the debt burden for borrowers and increased loan defaults. On the other hand, banks also faced problems with currency mismatches, as they were holding funds in Euros while there was a higher demand for financing in Swiss francs. In return this increased the rollover risk for banks which found it harder to enter in longer maturities swap contracts. Simultaneously, the Hungarian government was facing difficulties in issuing sovereign bonds. In such circumstances, the government could not bail out the private sector, and even if it would do so, it would soon fail due to both problems with high levels of external debt and sovereign debt. The pile of problems made Hungary to ask for a 20 billion Euros financial aid from International Monetary Fund (hereinafter: IMF) and EU Commission.

In the following years due to loose credit activity in the past years, banks were now facing significant uprises in NPLs and credit losses. In 2013, the central bank assessed that domestic banking system is not supporting the economy as it is aggravating the economic slump through tight credit policies. At the same year, the central bank established Funding for Growth Scheme that was directed toward improving financing access to small and medium enterprises (hereinafter: SMEs), thus affecting the long term growth of the economy. Under this program, the central bank would offer refinancing credits with zero percent interest rate to

commercial banks that in turn would use the funds to make loans to SMEs with a maximum bank margin of 2.5 percent and a maturity of 10 years (CBH, Annual report, 2013, p.7).

The year 2014 was characterized by the settlement program of foreign debt through the transition to "fair banking system" that will impact 2.1 million contracts in the future and the conversion of 500,000 foreign denominated mortgage credits to domestic currency with the aim of reducing risks, fastening the balance sheet clean up and increasing the competition. The conversion will take place at the beginning of 2015 (CBH, Annual report, 2014).

1.4.2 Structure of the Hungarian banking sector

As at the end of 2014 there were 38 banks operating in Hungary, of which 22 are wholly owned by foreign shareholders. The biggest lending institution in the market is the Hungarian bank OTP. Its largest competitors are foreign-owned banks which as per country of origin come from Austria, Italy and Belgium.

The sector has a moderate level of concentration as measured by the share of five largest banks assets. As at the end of 2014 the share of five largest banks in total assets stood at around 53 percent.

1.4.3 Hungarian banking sector balance sheet

As per Hungarian Banking Association (2014) report, the country's banking sector assets increase by 5.4 percent at the end of 2014 was mainly driven by the volume increasing effect (revaluation of foreign currency stock) due to depreciation of forint against other currencies.

In general, bank lending policies were characterized as tight during 2014, which in turn affected the volume of loans disbursed. For the first time since the beginning of the financial turmoil, lending to corporate segment rose by 1.9 percent and the main reason behind the growth was the existence of the Funding for Growth Scheme, rather than improved market conditions (CBH, Financial Stability Report, 2015). The loan to deposit ratio fell by 7 percent compared to 2013, standing at 100 percent as at the end of 2014. Main reasons behind the fall were an increase in deposits base by 7.8 percent and contraction of household loans at the same time. However, most of the rise observed in deposits was due to an increase in short-term deposits and corporate current accounts, which may be problematic for banks in terms of refinancing risks in the longer run (Hungarian Banking Association, 2014).

1.5 Romania

1.5.1 A brief history of the Romanian banking sector

As Barisitz (2004) describes it, the Romanian banking sector was largely controlled by state-owned banks until the year 1998. Banks gave loans to inefficient large factories that were controlled by the state and were continuously refinanced by the central bank through the application of an accommodative monetary policy. At the end of 1996, political changes brought a process of macroeconomic and structural reform, bringing an end to the past practice of loose refinancing. Thus, a number of state-controlled banks experienced serious financial difficulties and the only way for them to not fail was through financial state aid.

The Romanian economy experienced difficulties as economic activity dropped significantly during the period 1997-1998. Moreover, there were adverse external events related to Russian crisis which worsened the situation. As a result, in 1999 and 2000 the sector experienced financial distress which led a large bank and some smaller ones to default. In other cases, the authorities had to intervene in order to recapitalize and reorganize problematic banks, which cost to the country 10 percent of the GDP (Baristiz, 2004).

The economy started to pick up in the following years, meanwhile structural reforms continued to progress and there were important developments in the exports area. The positive developments were reflected in credit activity expansion. The share of foreign currency denominated loans reached 70 percent of the loan volume by 2003, mainly denominated in Euros and US dollars. Due to potential credit risk rising from exchange rates movements and mismatch of assets to liabilities, the central bank intervened in foreign exchange market to support the national currency and also announced measures in the beginning of 2004 in order to limit credit expansion (Baristiz, 2004).

In the following years, household incomes increased steadily while credit criteria eased which was reflected in loans to household segment to grow the fastest. Although there were tighter monetary policy measures applied, banks were actively competing among themselves for clients. During the period of financial crisis onset banks continued to actively compete for customers through promoting lower interest rates on loans and offering different products. Toward the end of 2008, there was a slack in credit activity and deposit attraction, following the financial turmoil (NBR, Financial stability report, 2008).

Data on the sector show that the overall performance of the sector deteriorated in 2009-2011 following adverse developments in macroeconomic conditions and global markets. Due to volatility of domestic interest rates, foreign currency loans continued to expand reaching more than 63 percent share. Moreover, considering the aggressive lending policies that were present

in the past, there was a worsening of credit quality. The following years continued to be challenging for the sector. Profitability indicators continued to worsen due to write-offs of financial assets and collateral revaluations. On the other hand, banks tried to control their costs by closing units and cutting back staff.

In 2014 banking sector went through balance sheet asset cleaning. This was the first year after the onset of the financial crisis when non-performing loans did not increase further (a reason is also the change in the methodology of calculation of NPL). The sector further enjoyed comfortable liquidity and capital levels above requirements.

1.5.2 Structure of the Romanian banking sector

By the end of 2014, the Romanian banking system had 40 credit institutions, of which 9 were foreign branches. As regarding controlling shares 25 banks are majority foreign-owned, 4 majority domestic-owned and 2 are state-controlled. Regarding the country of origin of investors, Austria had 27.2 share in invested capital, followed by Greece with 17.5 percent and Netherlands with 10.2 percent (NBR, Annual Report, 2014).

The system is characterized by average concentration levels. As at the end of 2014 the concentration ratio was around 54 percent.

1.5.3 Romanian banking sector balance sheet

Romania had a very low level of financial intermediation throughout the years not only compared to EU standards but also to CEE region. As at the end of 2014, the ratio of total bank assets to GDP was 60.8 percent (2004: 37.7 percent of GDP). The low level of financial depth can be seen as an opportunity for banks to expand their activities.

The sector's net assets at the end of 2014 stood at 363.2 billion Romanian leu (hereinafter: RON). On assets side, loans contracted by 3.3 percent compared to the previous year. Main reasons for the decline were the reduction in foreign denominated loans, cleaning of balance sheets and lower credit demand. At the same time, the investment to government sector stood at 21.1 percent, but the central bank expects for the exposure to go down in the near term due to capital requirement implementation in progress for this category of investment (NBR, Annual Report, 2014).

On liabilities side, there was somehow a reverse of trend on main sources of funding compared to previous years. Non-financial institutions deposits increased significantly from RON 18.4 billion to RON 247.3 billion by the end of 2014, while foreign sources provided by parent banks declined by 16 percent compared to 2013. At the same time, depositors' and

investors' weaker confidence in the system made them less inclined to extend maturities of their investments (NBR, Annual Report, 2014).

1.6 Slovakia

1.6.1 A brief history of the Slovak banking sector

Slovakia was part of the Czech-Slovak Federation in the beginning of the 90s, so the transformation to a dual banking system emerged during this period. On the 1st of January 1993, Slovakia and Czech Republic became two separate independent states, so the central bank of Slovakia was created with the pass of the Act on National Bank of Slovakia.

Following the macroeconomic developments, banks' balance sheets grew considerably in the period 1993-1996, at rates higher than the nominal GDP. Bearing in mind that credit risk was on rise, banks increased steadily their investment in government securities, while loan portfolio decreased to less than 44 percent at the end of 1996 (Kominkova & Mučkova, 1997).

Considering that the sector had bad debts inherited from the former federation era, the government had to intervene with a 15 billion crowns financial package toward companies in order to improve the situation. Nonetheless, the problem of bad debts was not wholly solved; there were weaknesses during the project life. The next step was the establishment of the Consolidation Bank with the aim of managing the problem of companies' indebtness that were part of restructuring process; bad loans in banks balance sheets were restructured and moved to Consolidation Bank. In exchange, banks received sovereign bonds and loans in order to increase their capital, and the rest of the amount to clean up bad loans. As the problems were persisting, the government decided to restructure the banking sector before privatizing the state-owned banks (Kominkova & Mučkova, 1997).

In the next years, the sector continued to have low levels of long term funds. On the asset side, banks continued to invest in lower risk operations like interbank activities and securities, while credit risk continued to be high as a result of the past bad debts and unrecoveries of investments in this segment. During the period 1997-1999 there was a significant rise in classified assets, as the restructuring process was on hold. The classified assets at the end of 1997 were 16.3 percent of total outstanding principal, while at the mid of 1999 the amount of classified loans jumped to more than double of those at the end of 1999 (Tkáčová, 2001).

After the finalization of the restructuring process, banks were sold to strategic foreign shareholders, who by 2002 held more than 90 percent of the banking sector. Foreign shareholders turned around the strategy of business; retail and mortgage segments were important for growth of the sector.

In the upcoming years, Slovakia showed to be among the best performers in the CEE region. The real economy growth continued to be dynamic; the average growth of the economy for the period 2003-2007 was 7.23 percent, peaking in 2007 at more than 10 percent. Simultaneously, inflation dropped to 2.5 percent, while unemployment fell to 11 percent. Favorable macroeconomic developments affected credit activity to grow fast, largely driven by the private segment. Unlike many other countries, Slovak banking sector was predominantly financed by domestic stable sources, with deposits in domestic currency accounting for 80 percent of all deposits. Although, there was strong demand for credit, in the second part of 2007 due to financial turmoil, banks tightened their credit activity towards corporate segment. On the other hand, the upward household credit demand was substantially driven by rising real estate prices. As financial turmoil affected banking sectors over the world, Slovak banking sector remained relatively stable in 2008. As per National Bank of Slovakia (hereinafter: NBS) (2009) report, in the year 2009, banks tightened their credit activity mostly toward export and trade companies which in turn shrank the portfolio by 3.3 percent. Correspondingly, banks moved their investment toward less risky assets such as government securities.

In 2011 sovereign debt crisis surged. As a result of financial and economical uncertainties in euro area, during the period 2011-2012 there were no major changes in lending dynamics and growth due to tighter corporate lending standards and demand effects, while bank competition in household loans segment continued to be intense.

In the following years, the central bank assessed that the banking sector continued to be sound, with stable liquidity ratios and capital ratios recording highest levels since 2005. Due to low interest rate environment, household loans continued the upward growth trend, representing one of the highest growth rates of the segment in the EU. Additionally, investment in domestic government securities as percent of total assets continued to be important, being the second highest ratio in EU after Romania (NBS, Financial Stability Report, 2014, p.26). Profitability indicators remained satisfactorily, surpassing other EU countries banking sectors ratios, although pressures continue to be present, considering the low interest rate environment and the importance of interest income in total income for the Slovak banking sector.

1.6.2 Structure of the Slovak banking sector

Slovak banking sector is the most important part of the country's financial sector, although it remains small compared to EU standards. A characteristic of the Slovak banking sector continues to be the high dependence in interest income, which represents more than 80 percent of all generated income, compared to the average of over 50 percent share in the EU.

There are 27 institutions with banking licenses that operate in the market, of which 13 are branches of foreign banks. More than 90 percent of banking sector assets are held by foreign shareholders.

Slovakia is characterized by a higher level of concentration compared to other countries in my sample. As at the end of 2014, the share of five largest banks stood at around 71 percent of total banking sector assets.

1.6.3 Slovak banking sector balance sheet

The main driver of growth for the sector is household loans, which rose by 12 percent toward the end of 2014 compared to the same period last year. As the Slovak central bank assessed, the growth rates of this segment's loans are high not only compared to previous years, but also compared to other EU countries. As regarding the corporate segment, there were no changes in terms of bank credit standards and weak demand remained on the other side; the main driver of growth for this segment were loans to state-controlled companies. At the same time, Slovakia continued to have interest rates on corporate loans among the lowest compared to other countries (NBS, Financial Stability Report, 2015).

On liabilities side, domestic deposits continued to be stable and the main source of funding, with retail deposits increasing by 4.2 percent compared to 2013, and non-financial corporate deposits also rising steadily. Further on, banks continued to issue securities, mainly compromising mortgage bonds with fixed coupons (NBS, Financial Stability Report, 2015).

1.7 Slovenia

1.7.1 A brief history of the Slovenian banking sector

Slovenia as part of the former Yugoslavia passed to a two-tier banking system in the end of 1950s while banks were in ownership of companies. Due to dissolution of the SFR Yugoslavia in the beginning of the 90s, a large number of Slovenian companies endured difficulties as they lost important markets. Additionally, companies began to suffer indebtness as a result of losses and inefficiencies due to beyond optimal number of staff. As a further matter, the Slovenian central bank followed tight monetary policy to tackle inflation, which in turn increased real interest rate. Banks reacted by rising credit interest rates to cover loan losses and writing offs. By the end of 1992, 800 companies were having solvency problems and were on the edge of bankruptcy, while on the other hand banks experienced high levels of non-performing loans (Simoneti, Rojec, & Gregorič, 2004).

As banks experienced large losses, liquidity and solvency problems, the government decided to intervene by a rehabilitation process that started in 1993 when the two biggest banks and a

year later a third one got a rehabilitation status. Banks' "contaminated" assets were replaced with government bonds by the Bank Rehabilitation Agency (hereinafter: BRA), who became a partial owner of banks and was responsible for supervision of these banks, management of problematic assets and of public debt related to sovereign securities exchanged for non-performing assets. The process of rehabilitation was successfully completed in 1997 and cost to the country around 10 percent of GDP (Štiblar & Voljč, 2004).

Before the year 1999, the legal framework allowed foreign investors to be present in the Slovenian banking market only through subsidiaries, while in 1999 they were also allowed to open branches. Nonetheless, by the beginning of 2004 when Slovenia was preparing for EU accession, there were only four banks with majority foreign ownership structure, out of the total of 15 independent banks in Slovenia. As Green & Patrick (2002) comment it the sector has been defended from foreign competition and this in turn represented an obstacle toward further improvement of competitiveness and efficiency of the sector. During this time, commercial banks were well capitalized and profitable. On the other hand, the credit portfolio quality moderately worsened, but provisioning was kept at adequate levels. At the same time, there was a significant uprise in foreign denominated loans to companies, but banks stated that majority of these loans were issued to exporting companies who were hedged on their balance sheets (IMF, Republic of Slovenia: 2003 Article IV Consultation - Staff Report, 2003).

After the EU accession of the country, the share of foreign banks rose to 25 percent of total sector assets from 15 percent in 2000, while Nova Ljubljanska Banka alone had one third share of total assets in 2004 (Spendzharova, 2014).

Data provided by the Bank of Slovenia (hereinafter: BS), in the period 2003-2006, lending to non-financial institutions was the most significant item of banks' growth, with an average year-on-year growth of around 22 percent. Due to growth rates of credit that could not be supported by domestic deposits growth trends (year-on-year average growth of above 7 percent), banks searched for alternative financing sources abroad. Additionally, the mismatch between assets and liabilities was expanding, as the average loan maturities increased while those of deposits were of shorter term. Moreover, foreign currency lending was uprising as the country was expected to adopt Euro. Nonetheless, the percentage of lending to non-financial sector was still lower than in similar banks of other EU member countries. Further on, the percentage of investment in securities was higher in Slovenia when compared to the EU average. The reason behind, was mainly due to the active role that Bank of Slovenia had in the past years in sterilizing the excessive liquidity in the system.

As based on Bank of Slovenia (2008) report, in 2007 the Slovenian banking sector experienced the highest growth in total assets since 1995 (24.7 percent), mainly driven by high growth in lending to non-financial sector. Moreover, as per currency breakdown, growth of

loans denominated in foreign currency surpassed growth of those denominated in domestic currency.

Data for the sector show that in the period 2008 to 2010, bank lending fell sharply; the growth rate of loans to non-financial sector was 18.5 percent in 2008 and 1.1 and 1.6 percent in 2009 and 2010 respectively (compared to 38.6 percent in 2007). Main reasons were the tightening of credit supply and higher collateral requirements, uprise of real rates and premiums over reference rate, and corporate indebtness levels. Because of market uncertainty, the share of securities investment rose. On the liabilities side, banks increased long term interest rates on deposits attributable to growing volatility in financial markets, while also increasing fund sources at the European Central Bank (hereinafter: ECB) and issuing debt securities. The sector's profit continued shrinking starting 2008, while as per Bank of Slovenia's Financial stability report (2011) the sector recorded a pre–tax loss of over 101 million Euros in 2011. The central bank assessed that the main reasons for the loss were net interest income shrinkage and uprising provisioning costs.

In the following years, banks in Slovenia experienced an average contraction of 6.2 percent of their assets predominantly due to shrinkage of loans in both non-financial corporations and household segment. Moreover, banks had liabilities which matured, mainly debt repayments on wholesale markets abroad. As per Bank of Slovenia (2014) report on financial stability, in the year 2013, due to high losses a number of banks experienced equity shrinkage, which in turn required the state intervention to stabilize the system; three big banks and two smaller ones needed to be recapitalized, had to be written down their subordinated instruments and transfer the non-performing assets of two banks to Bank Asset Management Company (BAMC). Due to such actions, the state ownership on banking sector increased significantly, reaching 58.7 percent in 2013 compared to 22.8 percent a year before. State aid increased the portfolio of securities held by banks, thus improving liquidity position, while on the other hand recapitalization helped convergence of the capital adequacy ratio near to EU average, reaching 14 percent at the end-year of 2013 (2012: 11.9 percent).

During the year 2014, Slovenia introduced the so called GLTDF ratio, a minimum requirement measured as the ratio in changes of the amount of loans to the non-financial sector relative to changes in amount of deposits by the non-financial sector with the aim of stabilizing the fund structure of the banking system and avoidance of potential sector-wide liquidity shocks (BS, 2014).

1.7.2 Structure of the Slovenian banking sector

Slovenian banking sector is the most developed segment of the financial sector, managing more than 70 percent of sector's financial assets.

As at the end of 2014, there were 17 active banks operating in the Slovenian banking sector, of which seven are subsidiaries of the Euro-system, three savings banks and four foreign branches. Slovenia is the only country in my sample that has a significant state stake in banking sector, standing at 63.6 percent, while other domestic private investors hold 6.7 percent of capital and foreign investors 29.7. As at the end of 2014, the market concentration stood at 55.61 percent.

1.7.3 Slovenian banking sector balance sheet

The level of financial intermediation stood at above 101 percent of GDP at the end of 2014, meaning that the Slovenian banking sector is relatively small compared to EU average.

Data provided by the Slovenian central bank show that total commercial bank assets continued to shrink for the fifth consecutive year, reaching EUR 37.8 billion at the end of 2014, 4.8 percent less than in 2013. On assets side, loans stood at EUR 26.85 billion, a contraction of 9.1 percent compared to 2013. Based on credit standards, banks are keener in lending to households, while standards for enterprises continue to be higher than before the crisis. On the other hand, banks increased their investment in securities, standing at 23 percent of total assets at the year-end (BS, Financial stability review, 2015).

On liabilities side, the most stable fund sources remain deposits of non-banking sector at 64 percent (20 percentage points higher than before the crisis), while banks have started to increase again the share of wholesale funds from markets abroad. The largest factor for the liabilities shrinkage in 2014 was the repayment of debt that banks had to ECB (BS, Financial stability review, 2015).

2 LITERATURE REVIEW

Commercial banks play an important role in the economy by pursuing the intermediation role. Banking intermediation involves receiving funds from the public in the form of savings and using those funds to grant loans to those that have a need for investment and consumption. The difference between the interest rate charged on loans and interest rate paid on deposits generates a spread known as the net interest margin. In this sense, NIM is "the fee" that bank requires for pursuing the role of the intermediary. Banks are expected to perform their functions at the lowest costs possible, hence promoting the growth of the economy through efficient channeling of the funds. In other words, a more efficient banking sector is expected to have a lower NIM.

There is no consensus among scholars whether high margins are bad or good from the social point of view. From one point of view, low margins may imply an aggressive competition in

the market and low regulatory requirements. On the contrary, high margins may lead to a higher stability of the banking sector, since higher profitability and capitalization of banks may serve as a cushion against adverse shocks. Moreover, when there is no good operation of equity markets, profits and margins may be the only way to increase the bank capital (Saunders & Schumacher, 2000). Alternatively, if there is bank failure, economic disruption happens, which reflects also social costs (Diamond & Dybvig, 1983).

The net interest margin represents the difference between the generated interest income and the interest expense relative to the interest earning assets. The margin is set by the intermediaries at a level that covers all the costs and risks that are related to financial intermediation. An optimal margin should generate enough income to expand the capital base as the bank exposes itself to more risk (Angbazo, 1997, p.56).

A popular and widely cited paper on bank interest margins determinants is the one from Ho and Saunders (1981). The authors proposed an empirical model that would test which variables could drive bank margins. In the basic model, the bank is seen as "a risk averse dealer" that seeks to maximize the expected utility of wealth for its shareholders. The bank serves as an intermediary between the providers and users of funds and offers only one type of product, i.e one type of loans and one type of deposits. Moreover, the deposit supplies and loan demands tend to arrive at different times. As such, the bank exposes itself to uncertainty that arises because its position is either too long or too short. As a result, as long as there is transaction uncertainty, pure spreads will be realized.

Ho and Saunders (1981) use quarterly data for major U.S banks for the period 1976 to 1979 in order to perform their empirical tests. A two-step approach is employed for the analysis. In the first stage, the estimation includes regressing individual bank's interest margin against bank specific variables. The resulting constant term reflects the banks' "pure spread" component. In the second step, the pure spread derived from the first step is regressed against another set of explanatory variables such as interest rate volatility. The obtained constant term expresses the positive and significant effect of interest rate risk on the realized net interest margin. The authors note that there are variables outside their theoretical pure spread model which impact the net interest margin.

In the basic model of Ho and Saunders (1981), the spread margin was found to be affected by four factors: the degree of managerial risk aversion, the structure of the market where the bank operates, the average size of bank transactions and the variance of interest rates. All of the above mentioned variables affect the behavior of net interest margin: the more risk averse the bank is, the more market power it has, the larger the transactions and the more volatile the interest rates are, the higher will be the spread charged by the bank.

The basic model of Ho and Saunders got later extended by different authors through including new explanatory variables. For example, McShane and Sharpe (1985) considered the volatility of money market interest rates instead of deposit and lending rates as in basic model of Ho and Saunders. Allen (1988) extended the basic model by considering the multi-product mix, i.e different types of loans and deposits and included cross-elasticities of demand between bank products as a way of reducing pure spreads. Angbazo (1997) included interest rate risk, credit risk and interaction between the two into the basic model of Ho and Saunders. The author applied it empirically to the case of U.S banks in the period between years 1989-1993. The paper shows that banks can diversify their revenues, thus reduce their risks when they consider off-balance sheet activities. Maudos and de Guevara (2004) extended the model by considering operating costs as a determinant of net interest income. Moreover, to measure directly the market power of banks, they use Lerner index instead of market concentration indicators. They test it empirically to the case of the European countries banking sectors between the period 1992-2000.Maudos and Solisa (2009) applied the Ho and Saunders model to the case of Mexican banking sector. Authors include all individual variables that were previously discussed by other authors in one integrated model with the aim of accounting for variables outside the basic model that influence net interest margins. The other variables include: operating costs, credit risk, and interaction between credit and market risk, non interest income, income from fees and commissions and trading income.

One of the most extensive and cited papers in this matter is that from Demirguc-Kunt and Huiziniga (1999) which includes 80 developed and developing countries in the analysis of bank margins and profitability for the period 1988 to 1995. The authors employ in their model bank characteristics, macroeconomic environment, explicit and implicit bank taxes, deposit insurance regulation, financial structure and legal and institutional measures.

Further on, there is also a vast body of literature that measures bank performance through profitability indicators, namely through return on assets (hereinafter: ROA) and return on equity (hereinafter: ROE). In addition, the most recent papers on bank performance determinants all include a broader range of bank-specific, banking sector and macroeconomic variables that could better explain the behavior of bank margins and profitability.

In order to study the effect of various factors throughout the years on bank performance, authors employ panel data techniques. Majority of papers I encountered apply static models for the analysis (for example see Demirguc-Kunt & Huizinga, 1998; Claeys & Vennet, 2008; Schwaiger & Liebeg, 2008; Gunter, Krenn, & Sigmund, 2013).

On the other hand, a number of papers use dynamic panel techniques that include the use of lagged variables (for example see Goddard, Molyneux, & Wilson, 2004; Valverde & Fernandez, 2007; Dumičić & Ridzak, 2013). Other authors employ both methodologies in order to test for robustness of results (for example see Maudos & Solisa, 2009).

The following section presents groups of variables that impact NIM, ROA and ROE. The review of these variables will also serve as a foundation for the empirical part analysis of this thesis.

2.1 Bank specific variables

Bank specific variables reflect internal factors which are among the most important drivers of bank performance because they reflect differences among individual banks that arise due to bank managerial decisions and objectives. Variables that are usually employed for this purpose are different ratios and items obtained from banks' financial reports.

2.1.1 Operational efficiency

Operational efficiency measures how costly it is for the bank to make a unit of operating income in terms of costs that are not related to interest expenses. Banks that are more efficient should be able to generate higher income by exploiting the same amount of resources. Efficiency improvement is an important factor for banks to remain competitive in the market. Possible ways to raise efficiency are bank consolidation and technology advancements. Bank consolidation improves efficiency through economies of scale exploitation. Technology innovations reduce transaction costs and information asymmetries that rise in the process of credit activity (Mishkin & Strahan, 1999). For example, nowadays majority of loan approvals depend on credit scores that are based on borrower's credit history and personal characteristics. These techniques reduce information asymmetries and the time it takes to approve a loan. Similarly, the use of electronic technology for fund transfers and payments has increased the efficiency over the years (Jonas & King, 2008).

As pointed by Albertazzi and Gambacorta (2006) differences across countries persist, while it holds true that the 1990s era was characterized by remarkable improvements in technology and communication, which in turn allowed banks to offer a lot of their traditional services in a much more efficient way, thus operating expenses have had a declining tendency since.

Based on literature and empirical evidence, banks with high costs per unit have lower profitability and demand for higher margins as they need to cover the higher operating costs that they have. As such, even in the lack of market power and of any risk, positive margins will be necessary to cover banks' operating costs (Maudos & de Gueavara, 2004, p.7). On the contrary, when banks are characterized by a higher efficiency in their operations, they will request lower interest margins through offering lower rates on loans or higher rates on deposits, which in turn reflects a better management quality (Claeys & Vennet, 2008).

Baszynski (2014) carries a study on twenty Central, Eastern and South-Eastern Europe countries. The author uses the cost to income ratio as a measure of efficiency and finds that

banks in this region are relatively inefficient. Furthermore, the author concludes that based on the value of cost to income ratio, banks in this region operate in a market that is far from the definition of the perfect competition. In this regard, because of the lack of the competition pressures, banks can be inefficient and not risk own survival.

Jemrić and Vujčić (2002) carry on an empirical study on Croatian banking sector efficiency and find that being efficient in the market in 1995 was an uncommon behaviour as there were only a few small and privately owned banks that were efficient. However, the results show that things changed during the years 1999 and 2000 as a number of banks converged fast to the "normal" efficiency levels. This improvement in efficiency came as a result of higher market competition and the exit of problematic banks from the market during the bank crisis of 1998.

Jonas and King (2008) find that efficient banks have a larger loan reaction to policy than less efficient banks of similar size. In other words, a bank that is more efficient is capable to respond better to market conditions and control its costs by decreasing the exposure to riskier clients when the rates on loans increase.

Refering to the commonness of empirical findings in association to efficiency, a positive relationship between operational costs and net interest margin is to be expected, while profitabilty would be expected to go down when costs increase.

2.1.2 Bank size

Most of studies related to the banking size emphasize that banks which are larger in size are better able to exploit economies of scale, thus have lower costs per unit of income. There are a number of studies that test empirically the relationship of the bank size to performance. Findings suggest that the exploitation of economies of scale is an important factor in lowering net interest margins (Kasman, Tunc, Vardar, & Okan, 2010; Fungáčová & Poghosyan, 2011; Hamadi & Awdeh, 2012).

Košak and Čok (2008) do not find supporting evidence for the effect of size in bank performance in the case of Southern and Eastern Europe (hereinafter: SEE) countries; positive relationship is confirmed only in the case of size and ROAE for all sample banks, while a negative relationship holds true for the case of foreign owned banks in ROAA and profit before tax over total assets as dependent variables. Authors conclude that different market positioning of foreign banks in contrary to domestic banks could explain the results.

Ayaydin and Karaaslan (2014) find a positive relationship between bank size and performance for the case of the Turkish banks. The results indicate that bigger banks are more likely to be

diversified in terms of products and loans than smaller banks are and at the same time are also more likely to exploit economies of scale.

A study on South Eastern Europe countries finds that there are efficiency gains when banks go from small size to medium. At the same time, banks lose some efficiency when they go from medium to big (Staikouras, Mamatzakis, & Koutsomanoli-Filippaki, 2008). In a similar manner, Eichengreen and Gibson (2001) find a negative relationship between bank size and profits. Small banks exploit economies of scale and boost profits when they grow bigger, but at the same time big banks have already "consumed" scale economies and will need to scale down if they want to cut back costs.

Dumičić and Ridzak (2013) paper on CEE countries finds the relationship between size and margins to be significant. However, they report that bank size has a small coefficient which makes it irrelevant in economic impact terms.

Kundid, Škrabić and Ercegovac (2011) state that it has been already argumented that a negative relationship to margin is to be expected, but the true challenge remains in the determination of the optimal size of a bank. In any case, it holds true that more powerful reputation and "too big to fail" protection are characteristics of large banks.

We should bear in mind that bank size is different from market share as banks can grow in size without an expansion on their market share, if we assume that other banks experience a growth of assets at the same rate and the other way around (International Monetary Fund, 2004).

2.1.3 Credit risk

Credit risk presents the probability of experiencing a loss because of the borrower's failure to perform on an obligation. For the majority of banks the most obvious source of credit risk are loans. On this matter, banks are expected to mitigate credit risk through understanding the capital of the bank and loan loss reserves at any time because any change in credit risk will affect the general health of the financial institution, meaning its efficiency and profitability.

The risk-return theory implies that there is a positive relationship between risk and earnings. There is a general consensus among scholars that a higher loan ratio is related to higher interest margins. This means that risk averse investors request larger premia to compensate for the higher level of risk exposure. During economic slowdown periods, the loan default risk is normally higher. In such cases, the optimal level of margins needs to be large enough to cover the cost of rising capital buffers as risk exposure of the bank rises (Ayaydin & Karaaslan, 2014).

Angbazo (1997) denotes that a bank that holds riskier loans on its balance sheet will require higher margins in order to compensate for the higher probability of default. He also finds evidence for differences in credit risk related to bank size; for the larger money center banks the relationship is positive and significant, super regional and regional banks do not have a significant relationship between credit risk and interest margin, while small banks are also sensitive. He suggests that differences in findings might be related to the small level of cross-sectional variation in loan portfolio risk measures.

Barjas, Steiner and Salazar (1999) suggest that although higher spreads impact negatively the economy, they also demonstrate that banks create a buffer for the loan portfolio risk through generating profit. The authors find support in the case of Colombia about the importance of credit risk in driving bank interest spreads. They denote that banks became more sensitive to the changes in non-performing loans after the financial liberalization period by increasing the resources for bad loans. Such changes related to credit risk might have been driven either by a growing concern of the banks for the importance of credit risk or because of better reporting of non-performing loans.

Maudos and de Gueavara (2004) study a sample of European countries and find that credit risk has been characterized by a downward trend since the middle of the 1990s. Results show the default risk to be an important driver of bank margins. The authors argue that as banks face the risk of loan non-repayment, they will require a premium that is charged on interest rates; the bank will seek to cover losses from non-performing loans by charging higher rates on loans or lower rates on deposits or a combination of both.

The study of Athanasoglou, Delis and Staikouras (2006) on profitability determinants in SEE region concluded that banks in this region have had serious problems arisen because they were not focused as much as they should have been on credit management. In essence, banks have failed to recognize loan losses and to create reserves for writing them off from their balance sheets.

Based on the above findings, banks that hold riskier loans need to hold higher level of provisions for loan losses, which in turn leads to a positive relationship between margins and credit risk, thus decreasing bank profits.

2.1.4 Liquidity risk

Liquidity risk presents the risk that arises because the bank might encounter problems in meeting its short-term financial needs. In such cases, bank's borrowing capacity goes down, which forces it to borrow urgently money at a higher cost. During the last financial crisis, banks that had better liquidity positions were able to have more control on the spread rising trend due to secure deposit base and strong reputation (Männasoo, 2014). Since the occurrence

of the last financial turmoil, more attention has been paid to liquidity risk from both regulators and banks.

High liquidity ratios may be as a result of regulatory requirements in the form of reserve requirements with the central bank and/or as a result of bank's policy for protection reasons. Whatever the case, a high ratio reflects an opportunity cost to the bank as the institution has to give up from holding higher return assets. If the bank can transmit this cost to customers, the bank margin increases as liquidity rises (Brock & Suarez, 2000; Peria & Mody, 2004; Ayaydin & Karaaslan, 2014).

Conversely, the more the short-term liabilities are supported by liquid assets, smaller the liquidity risk and margins. In this context, a bank can improve its liquidity position by attracting more deposits through better rate offers, which at the same time drive the margins down (if one assumes that loan rates do not change). In this sense, the relationship between liquidity and margins is expected to be negative (Angbazo, 1997; Demirgüç-Kunt & Huizinga, 1998; Drakos, 2002).

Košak and Čok (2008) emphasize that liquidity is a prerequisite for a normal functioning of banks as any severe liquidity disruption can make a bank default. In contrary, liquidity ratios above optimal levels lead the sector to underperform. Nevertheless, their empirical results do not find evidence about a significant relationship between liquidity ratios and bank performance indicators for the SEE region.

Fungáčová and Poghosyan (2011) investigate the Russian banking sector over the period 1999-2007 upon intention to analyze the determinants of NIM along with a particular emphasis on differences across bank ownership groups. The study finds that liquidity risk is an important determinant for domestic private banks and foreign owned banks, whereas for state owned banks liquidity risk seems to not be a significant determinant of margins as these banks have better access to interbank funds and more importantly, can rely on government bailout in case of liquidity problems.

Dabla-Norris and Floerkemeier (2007) find that banks in Armenia have high liquidity ratios which in turn impacts significantly margins. They also check for differences across bank sizes and conclude that bigger banks with larger deposit bases have smaller liquidity ratios than smaller banks do. Seemingly, banks that have a concentration of deposits in a small number of large depositors have to maintain high reserves in case of unanticipated massive withdrawals of deposits.

2.1.5 Diversification

In the recent years, banks around the world have expanded into non-traditional operations that have changed their income composition by lessening the significance of traditional activities (Stiroh, 2004; Lepetit, Rous, Nys, & Tarazi, 2008).

Lepetit, Rous, Nys and Tarazi (2008) investigate more than 600 European banks through the period 1996-2002 and concentrate on the explanation of how banks' growth into fee based operations impact loan prices. The authors imply that cross-selling may motivate banks to decrease loan rates in order to attract customers. In such cases, banks underestimate credit risk and the overall risk exposure goes up. These practices may increase in the long term the probability of selling fee based products and services to the same customer. In this regard, banks can depend in non-interest revenue to serve as a buffer against the risk exposure. The empirical tests find support for the hypothesis that the substitute effect of non-interest income underprices credit risk and affects margins to decrease.

Likewise, Maudos and Solisa (2009) confirm that diversification has increased in the past years in the case of Mexico. The authors argue that a bank which diversifies its operations will try to attract customers by providing traditional services with small or even negative margins, while on the other hand it will seek to make up the foregone profit by charging higher fees and commissions. They find that in the case of Mexican banks, non-interest income has increased its share in total income, but its economic effect is low as other factors prevail.

As according to Saunders and Walter (1994) diversification of bank revenue is desirable as it allows bank profits to be more sustainable. Lown, Osler, Strahan, Philip and Sufi (2000) discuss how the important changes in the financial industry over the last decades have encouraged bank diversification both in geographic and products terms. The authors comment bank performance in European countries which was observed to be better when banks engage in selling and underwriting insurance products.

Similarly, other papers discuss the effect of diversification and its relationship to margins. In any case, banks that have a higher share of income from non-traditional activities can reduce rates on loans or increase rates on deposits, thus reduce NIM (Maudos & de Gueavara, 2004; Gunter, Krenn, & Sigmund, 2013).

2.1.6 Capital

Berger (1995) was the first author who studied more closely the relationship between capital and earnings. He finds a significant positive relationship between the two variables for the case of U.S banks during the 1980s. His findings suggest that well capitalized banks experience lower bankruptcy costs, which consecutively reduces funding costs and increases

bank profitability over the next few years. On the other hand, for the period 1990-1992, the relationship comes as negative and it is argued that banks may have surpassed the level of optimal capital ratios as a result of higher profitability, regulatory changes or lower bank risk.

Conversely, Brock and Suarez (2000) argue that in the case of Latin America, banks that have lower capital ratios tend to decrease loan rates or increase deposit rates with the aim to gain greater market share. Such a behaviour makes for these banks to operate with low margins. In this matter, the relationship as predicted by the scholars may not hold true. Correspondingly, in cases of countries where financial sectors are not adequately regulated and supervised, capital ratios do not have any meaning.

Schwaiger and Liebeg (2008) argue that banks that have lower capital ratios are more likely to engage in moral hazard behaviour. They find empirical support between poorly capitalized banks and their risk behaviour. Margins of such banks are less likely to respond to changes in interest and credit risk than those of banks with higher capital ratios.

Authors note that not always a higher capitalization is related to more risk averse banks, because banks are required to keep certain levels of capital for regulatory purposes, but at the same time it is true in many cases that banks choose to have capital ratios above the regulatory minimum. In such situations, banks can increase their portfolio of assets by making more loans. All else equal, the margin will rise due to further perceived credit risk. Additionally, banks choose to have higher capital ratios as to signal their creditworthiness. By doing this, banks are in essence using more expensive funds, as debt financing is generally cheaper than equity (considering tax and other reasons). In essence, banks will pass some of costs related to higher capital ratios to customers through higher margins (Saunders & Schumacher, 2000; Claeys & Vennet, 2008).

Conversely, some authors argue that well-capitalised banks have a lower demand for external funding needs, which in turn may improve their profitability (Pasiouras & Kosmidou, 2007; Košak & Čok, 2008).

2.2 Banking sector variables

2.2.1 Concentration and market power

Porter (1979) published a paper in which he explains how specific factors can affect the attractiveness of any industry and its competitive positioning. On this matter, different authors have been using Porter's Five Forces in the analysis of banking sectors' profitability too. Based on this model, banks that operate in concentrated markets may increase market power and profitability. Intuitively, one expects the relationship between concentration and bank margins

to be positive, and most of empirical evidence finds such a link. However, there are contrasting views on what is behind the outcomes.

The traditional theory known as **structure-conduct-performance hypothesis** explains that a more concentrated banking system impacts positively the profitability of banks. Based on this perspective, banks can charge higher rates on loans and offer lower rates on deposits, consequently broadening the bank margin. In this sense, banking sector will behave more like an oligopol. Empirical studies use bank sector indicators like concentration ratios in order to measure the market competition. Conversely, the second theory known as **efficient-structure theory** underlines that the positive relationship between the degree of concentration and profitability is not as a result of market power but it is more as a result of better efficiency and size. This theory emphasizes that better managed banks may have a growth of the market share, which in turn increases the concentration in the market. On this matter, scholars analyze efficiency and economies of scale and scope. The increase of efficiency would impact negatively the spread.

Demirgüç-Kunt and Huizinga (1998) find a positive relationship between concentration ratio and margins. They explain that concentration in U.S is low, around 16 percent, while in Europe the ratio goes to 50 percent for countries such as Germany and France.

Martinez Peria and Moody (2004) focus their study on the effect of market concentration on spreads in the case of Latin America countries. They find a significant positive relationship between concentration levels and NIM. Further on, they associate the concentration effects to three groups of determinants: rates that foreign banks demand relative to those of domestic banks, the level of presence of foreign banks as a spillover effect, and foreign bank entry through takeovers that increases concentration. Moreover, studies of Claeys and Vennet (2008), Maudos and de Guevara (2004), Demirgüç-Kunt et al., (2004) obtain results that support the positive relationship of concentration to margins.

Conversely, there are cases of a paradoxal relationship between market concentration and margins. As NIM shrank among many developed countries during the 1980s and 90s, banks needed to find new strategies to keep their profitability up. In essence, they concentrated on product diversification, takeovers and business expansion (Santomero & Eckles, 2000; Hughes, Pagano, Lang, Mester and Moon, 2003). Likewise, Valverde and Fernandez (2007) explain that banks which diversify their businesses are able to boost their revenues from non-traditional operations and increase their market power. Banks that diversify may be in a better position to challenge the competitor because they increase revenues from non-traditional products while at the same time can reduce rates on loans or increase rates on deposits in an effort to eliminate the other bank from the market. Their findings explain why European banking industries have low margins and increasing power in the market.

2.3 Macroeconomic variables

The impact of macroeconomic environment in bank performance has been acknowledged by many scholars in both developed and developing countries. In this regard, it is important to understand the impact of business cycle and monetary policy in the performance of banking sectors as interest margins and profitability have been shown to be sensitive to such particular conditions.

Poor macroeconomic management of a country can have an impact in banks, as uncertainties about economic policies make it harder for the banks to properly estimate the credit and market risk, which in turn force banks to increase the margin (Brock & Suarez, 2000).

Although it is known that macroeconomic conditions impact the behavior of bank margins, there are different results obtained about the relationship between macroeconomic indicators and margins. On this matter, the main findings will be discussed in the following section.

2.3.1 Inflation

In most occasions, it has been empirically proven that inflation has a significant, positive influence on net interest margins of banks. That is because banks will seek to maintain the real value of profit margins as rising inflation entails higher costs (Demirgüç-Kunt & Huizinga, 1998; Drakos, 2002; Dietrich, Wanzenried, & Cole, 2010).

Huybens and Smith (1999) underline that inflation exacerbates information asymmetries that makes for the banks to increase their margins in order to compensate for the risks. The authors discuss a theoretical model in which interest margins are shown to have a tendency to rise when there is inflation.

Brock and Suarez (2000) study in Latin America countries in the 1990s finds that inflation impacts margins. The authors argue that macroeconomic mismanagement in these countries was followed by hyperinflation and a huge loss of real value of wealth for savers. In most cases, they find inflation to be positively related to the spread. However, they find negative correlation in the case of Argentina. Comparably, on this matter, Gunter, Krenn and Sigmund (2013) find a negative link between NIM and inflation in the case of Austria. They suggest that the results could be explained by the fact that Austria is characterized with a low level of inflation and a high percentage of floating rate loans, which as such works as a natural hedge against inflation.

As according to Perry (1992), the effect of inflation on bank margins depends whether inflation is anticipated or not. If inflation is expected, banks will consequently adjust their interest rates, thus increasing the net interest margin in order to boost revenues faster than

costs. On the other side, if inflation is not anticipated, banks will most likely be sluggish in adjusting their rates which might make the link of inflation to margins to come as negative.

Boyd, Levine and Smith (2001) analyze the relationship between sustained inflation and the functioning of the financial sector by including in their study one hundred countries over the period 1960-1995. Their findings show that at inflation rates that are low to moderate, there is a negative link between inflation and a) lending to the private sector, b) the quantity of bank assets and c) the amount of liabilities issued by the banks. As a result, countries that face higher rates of inflation have in turn underdeveloped financial sectors and banks.

Majority of studies use consumer price index (hereinafter: CPI) as a proxy for inflation (Claeys & Vennet, 2008; Maudos & Solisa, 2009; Dietrich, Wanzenried, & Cole, 2010). On the other hand, there are authors who prefer use of Gross Domestic Product (hereinafter: GDP) deflator as a proxy, because it reflects the change on prices of all goods and services, while CPI only reflects the changes on a basket of goods and services (Demirgüç-Kunt & Huizinga, 1998; Mendes & Abreu, 2003; Gunter, Krenn, & Sigmund, 2013).

2.3.2 GDP growth

When macroeconomic indicators are discussed, a vast number of studies underline that the real GDP growth is an important variable as it reflects the direction of demand for credit. When economy performs well and expands, there is more intense credit activity, shifting the credit demand outward which causes rates to rise. Alternatively, low or negative rates of the economy growth might weaken the debt service ability of borrowers, which in turn creates credit losses and increases bank provisions, thus calling for an increase of bank margins and likely affecting profitability too.

The majority of studies on bank performance determinants find that GDP growth is significant and has a positive relationship with bank margins. In this sense, higher growth rates of the economy are reflected positively in the demand for credit which in turn makes the banks to increase the interest rates on loans or decrease interest rates on deposits and/or alter rates in both loans and deposits, thus increasing the spread (Drakos, 2002; Košak & Čok, 2008; Dumičić & Ridzak, 2013; Gunter, Krenn, & Sigmund, 2013).

At the same time, it holds true that there are studies where it has been evidenced that GDP growth does not have a significant effect on net interest margins. Those studies usually belong to the cases of countries in transition. The comparison of Western and Eastern countries' net interest margins by Claeys and Vennet (2008) finds different evidence across countries. A positive relationship between the NIM and business cycle is more of a characteristic of Western countries, while for Eastern countries such a relationship does not hold as the coefficient of the growth of the economy is insignificant. Authors explain that the high

volatility of the business cycle in developing countries could be a good explanation for the differences in results. Similarly, Schwaiger and Liebeg (2008) study finds real GDP growth to be insignificant in the case of banks in CEE countries.

2.3.3 Government debt

Government debt is an important factor in the process of sovereign credit rating. A number of papers show that public debt management affects companies' ratings through sovereign ceilings even if company fundamentals are healthy. In general, companies cannot have credit ratings that are higher than those of their home country. However, ceiling rules are not anymore rigorously applied and there have been cases when credit agencies have given companies ratings above the rating of the sovereign. Nonetheless, it is still hard to convince a credit rating agency that a company's credit quality is better than its home country (Borensztein, Cowan, & Valenzuela, 2013, Adelino & Ferreira, 2016).

Adelino and Ferreira (2016) find that a government downgrade has an asymmetric effect on bank ratings and behavior. When a government is downgraded by a credit agency, even sound banks from that country will get penalized following the deterioration of the sovereign credit ranking. At the same time, banks that have a rating that is equal to the sovereign tend to lower lending more than banks that have a rating lower than the sovereign. Moreover, as determined by the regulator, a bank is not allowed to invest in government securities below a certain sovereign rating level which in turn limits the bank's access to funding and it also affects its capital requirements for holding lower rated securities as underlined by Basel rules. Following the penalization by the sovereign downgrade, a bank's access to funding, its cost of debt and collateral requirements are all affected, although not related to fundamentals of the bank.

Due to such developments, banks would be expected to charge higher premiums in order to cover the rising costs. From the policy perspective, a government should aim at keeping its debt to GDP ratio stable in order to assure macroeconomic stability, which in turn would also help decrease the interest spread and stabilize bank profitability.

Dumičić and Ridzak (2013) study on CEE banking systems finds a significant positive relationship evidence for the importance of debt to GDP ratio only in the pre-crisis period, while there is no significant support found in the period after.

2.3.4 Foreign exchange rate

It is not uncommon for households and firms to have deposits and loans in currencies other than the domestic one. On the other hand, banks that engage in foreign exchange transactions have a higher risk exposure due to the volatility of exchange rates. Many banks in transition countries are subsidiaries of international banks, which means that they have access to funding

from parent banks. In return, these banks are able to offer loans denominated in foreign currencies that have lower interest rates than domestic denominated loans without necessarily increasing the foreign currency deposit side. As a result, in an attempt to gain market shares, banks in transition countries have found a way to induce fast credit growth while being very profitable (Basso, Calvo-Gonzalez, & Jurgilas, 2011). International Relations Committee Task Force on Enlargement (2006) warned on its report that borrowers (mostly households) in countries like Bulgaria, Croatia and Romania are not hedged against the exchange rate risk when they enter in foreign currency transactions. The group stated that in cases of depreciation of domestic currencies, borrowers would face problems in servicing their debts, which in turn would deteriorate credit quality.

3 DATA AND METHODOLOGY

3.1 Data and definition of variables

The empirical analysis is based on annual data obtained from few sources. Since the emphasis of the thesis is commercial banks, I eliminate the central bank, savings banks and housing savings banks from the analysis. In addition, the thesis takes into consideration only unconsolidated bank level data.

The bank-specific data have been obtained from Bankscope database. Data on banking sector are also constructed based on balance sheet data from Bankscope. Data on macroeconomic indicators are those provided to the public on the website of International Monetary Fund and European Central Bank.

The main constraint as regarding data availability is the short period of years available in the Bankscope database. As a result, this thesis covers the period from 2007-2014 on annual basis. Having quarterly data for the whole covered period would increase the number of observations and confidence in the obtained results. Data are available for 140 banks that operated for the whole period of study or a part of it.

The choice of variables is influenced by theoretical relevance and empirical contributions in the literature.

3.1.1 Dependent variables

The thesis takes into account three different measures of bank performance as dependent variables. The measure of bank efficiency is net interest margin which equals total interest income minus total interest expense divided by total earning assets. While NIM is considered to be a good measure of efficiency, it does not necessarily mean that a decrease in NIM

reflects an improvement in bank efficiency. A NIM decrease can come as a result of reduction of bank taxation or conversely a higher NIM can reflect an increase in non-performing loans (Demirguc-Kunt & Huizinga, 1998). Moreover, the variation across banks may be as a result of differences in risk exposure, asset allocation and activities that bank engage in rather than variation in bank efficiency (Dabla-Norris & Floerkemeier, 2007).

Further on, I also employ two other measures of bank performance which are frequently used to measure bank profitability, namely return on average assets (ROAA), calculated as net income divided by average assets and return on average equity (ROAE), and calculated as the ratio of net income to average equity. As Košak and Čok (2008) emphasize, the use of the latter two indicators has shortcomings; ROA does not take into consideration off-balance sheet items and ROE ignores the effect of risk related to different leverage levels that together with ROA affect the size of ROE.

3.1.2 Independent variables

In order to explain variation among banks, the bank specific variables are employed. To capture operational efficiency I use the cost to income ratio. A better efficiency of operations should contribute to a decrease of NIM, thus a positive relationship between the ratio and NIM is intuitive, while it is expected to negatively affect profitability when the ratio goes up. Size may also be an important determinant of NIM when economies of scale exist. To capture differences based on size, I follow Claeys and Vennet (2008) in using the share of bank's assets to the country's median bank assets. I expect that banks that exploit economies of scale to have lower margins and higher returns. Credit risk is proxied by the loan loss provisions. A higher level of provisions calls for margin uprise while profits go down. Alternatively, the share of non-performing loans to total loans can be employed. A higher ratio of bad loans calls for an increase of interest spread and affects negatively profitability. Liquidity management is measured by the ratio of net loans to total assets. The more a bank invests its funds in loans, the higher its risk and the lower the additional liquidity is as the bank shifts funds from investing in less risky and liquid assets to higher risk investments i.e. loans. At the same time, based on risk-return theory, expected profits are higher when investing in riskier assets.

Diversification is measured by the ratio of other operating income to average assets. Other operating income include bank income generated from non-interest activities such as fees and commissions. A negative relationship between diversification and NIM is to be expected, as banks that have higher share of fee and commissions income can lower bank spreads when they compensate interest income with non-interest income, thus also boost their profits. Capitalization is commonly proxied by the ratio of shareholder equity to total assets. Based on literature, I expect a positive relationship between bank capital and net interest margins, since more risk averse banks set higher margins. In addition, as Berger (1995) argues, higher equity

levels also reduce the cost of financial distress and default, which in turn leads the relationship between capitalization and profitability to be positive.

For market structure, I focus on the impact of concentration. Specifically, I use as a proxy the Herfindahl-Hirschman Index (hereinafter: HHI), which is calculated by squaring the asset market shares of each bank in the market. A higher concentration ratio is expected to give power to banks in pricing policies which in turn increases net interest margins and profitability. At this matter, authors differentiate between structure-conduct performance and efficient-structure (ES) hypotheses, which state that the relationship of the proxy with margins can be as a result of market power or bank efficiency. However, in my case I make no attempt to differentiate between the two.

As for macroeconomic variables, it is important to understand the impact of business cycle and monetary policy in the bank performance. As regarding the direction of their effect empirical results are a mixed bag. Most studies find a positive relationship between GDP growth and bank performance measures. On the other side, in cases of transition countries, GDP growth might be insignificant due to volatility of business cycle (Claeys & Vennet, 2004). At the same time, most studies find a positive relationship between interest spreads and inflation. Simultaneously, profitability of banks increases with inflation as banks have higher float income. In other cases, inflation does not seem to be significant. As according to Perry (1992), the relationship depends on whether the inflation is anticipated or not.

Debt to GDP ratio is expected to have a negative relationship to bank profitability and impact positively the bank spread (Dumičić & Ridzak, 2013). That is because debt to GDP ratio is an important factor that determines a country's rating and macroeconomic stability. When a government is downgraded by a credit agency, even sound banks from that country will get penalized following the deterioration of the sovereign credit ranking. As a result, a bank's access to funding, its cost of debt and collateral requirements are all affected (Adelino & Ferreira, 2016)

Further on, I consider the impact of foreign exchange rate on bank performance. Considering that all countries in my sample are part of EU and a considerable number of CEE banks are subsidiaries of international European banks, they have easier access to external funding. As such, these banks are able to offer loans denominated in currencies other than the domestic one. If the annual change in forex increases, the domestic currency depreciates, borrowers have higher risk of defaulting on loan payments. Such developments in forex affect negatively profitability and increase bank spread.

Table 1. Description of Variables

Abbreviation	Unit	Description
Dependent variables		
NIM	%	Net interest income divided by average earning assets
ROAA	%	Net income divided by average assets
ROAE	%	Net income divided by average equity
Independent variables		
CIR	%	Cost to income ratio
BS	Ratio	Bank's assets to the country's median assets
LLP	%	The ratio of loan loss provisions to total loans
NPL	%	Non-performing loans to total loans
NLTA	%	Net loans to total assets
NONINT	%	Non-operating income to avg. assets ratio
EQTA	%	Equity to total assets ratio
HHI	%	HHI index
SA	%	Share of assets of individual bank to total sector assets
GDP	%	Real GDP growth rate
INF	%	CPI index
FX	%	Change in average annual domestic exchange rate to euro
DEBT	%	Debt to GDP ratio

3.2 Methodology

In this section, I shortly outline the general model applied presented as below:

$$\pi_{it} = c + \sum_{j=1}^{J} \beta_j X_{it}^j + \sum_{s=1}^{S} \beta_s X_{it}^s + \sum_{m=1}^{M} \beta_m X_{it}^m + \varepsilon_{it} \tag{1}$$

where i denotes a specific bank and t refers to time period. The dependent variable π_{it} stands for one of the three bank performance measures for the specific bank i in time t, c is the constant term, X_{it}^J refers to J bank-specific variables, X_{it}^S refers to S banking sector indicators that vary across time and different banking systems, but not across specific banks within the same country, X_{it}^m refers to M macroeconomic variables that are different across countries, but do not vary across individual banks of a country and lastly, ε refers to the error term.

In order to control for year specific effects, I extend the general model by also including time dummies:

$$\pi_{it} = c + \sum_{j=1}^{J} \beta_j X_{it}^j + \sum_{s=1}^{S} \beta_s X_{it}^s + \sum_{m=1}^{M} \beta_m X_{it}^m + \gamma_t T_t + \varepsilon_{it} \tag{2}$$

where γ_t symbolizes the coefficient for time regressors and T_t is the dummy time variable.

To capture the differences of banks across time, panel data estimation techniques will be used. As not all banks were active during the entire study period, I deal with an unbalanced panel. I apply the ordinary least squares, fixed effects (FE) and random effects (RE) models.

Every entity has own specific time invariant characteristics that may be observed or unobserved and which are constant over the period of time. In case that these individual characteristics are observable for each entity across time, then ordinary least squares model can be used. In case that the individual characteristics are unobservable but correlated with independent variables, then fixed effects model should be used. On the other hand, if the unobserved individual characteristics are assumed to be uncorrelated with the independent variables, random effects modeling should be employed (Greene, 2002).

Due to the presence of heteroskedasticity in the error variance identified through the modified Wald test for groupwise heteroskedasticity, I apply robust standard errors in all of my specifications. Moreover, I follow Gunter, Krenn and Sigmund (2013) in applying Hansen's overidentification of restrictions test in order to decide whether fixed or random effect model should be taken into consideration. Based on results, the null hypothesis is rejected at 1 percent and 5 percent significance levels, meaning that the fixed effects estimation better explains the data. The results of Hansen's test can be found under each table of specification separately.

4 EMPIRICAL RESULTS

Descriptive statistics are reported in table 1 in the appendix part. Mean NIM is equal to 3.66 percent, with the minimum value standing at 0.74 percent and the maximum at 15.01 percent. The median NIM is 3.48 which indicates the presence of distribution skewness. ROAA has a mean value of 0.53, while it ranges between -6.92 percent to 3.95 percent. Further on, ROAE stands on average at 5.41 percent. Considering the covered period of analysis, ROAE has a higher variance than the two other dependent variables, thus ranging from -71.8 percent to a positive return of 37.09 percent.

Among the bank-specific variables, the average value of cost to income ratio is 61.44 percent, bank size average score is 431.3, loan loss provisions 5.99 percent and non-performing loans 11.77 percent. Further on, net loans to total assets mean score is 61.35, non-interest income to average assets stands at 1.46 percent, equity measure is on average 11.06 percent, while the share of assets mean value is 6.58 percent.

The mean value of HHI as a measure of market concentration has an average score of 16.27 percent and it ranges between 10.99 percent to 28.83 percent. The mean score indicates that generally speaking, the CEE banking sector has a moderate level of concentration.

Considering the macroeconomic variables, annual GDP growth for the covered period is on average 0.58 while the median is 0.834. Inflation's average score stands at 3.04 percent. Foreign exchange's average score is -0.89 percent and debt to GDP level score is on average 37.32. In addition, I also present the correlations between variables in tables 5 to 7 in the appendix part. Due to some of explanatory variables being highly correlated to one another, I avoid using simultaneously such variables within the same specification in order to lower the chances of dealing with collinearity problem. On this matter, I also employ the Variance Inflation Factor (hereinafter: VIF) in order to detect potential multicollinearity. As a rule of thumb, VIF values above 10 are a cause for concern and require further investigation. Results of the test show that the mean VIF for my estimations is 1.55, while at the same time there are no VIF values of explanatory variables that surpass 2.5. VIF values are presented in tables 2-4 in the appendix part.

The estimation results for each dependent variable are presented separately in tables below. The results are stable as they do not vary much across different models, which strengthens the confidence in the power of the econometric model applied. I try to present different specifications in order to enrich the analysis. However, it should be mentioned that for some of the variables, the change of the set of the explanatory variables that enter a regression impacts their sign and/or significance. Due to such sensitivity, one should be cautious when interpreting results. In addition, due to small sample size I do not apply lags of independent variables. In the case of net interest margin, majority of explanatory variables are significant and have the expected signs. On the other hand, contrary to literature based beliefs, output results in the case of profitability indicators are mainly insignificant.

Cost to income ratio (CIR) is highly significant in all three bank performance measure specifications. However, contrary to the expectation, the ratio has a negative sign in NIM specification, meaning that as cost to income ratio rises by one unit, the net interest margin goes down by 0.021 percentage points. The negative relationship is in line with paper results of Dumičić and Ridzak (2013) and Schwaiger and Liebeg (2008) studies on CEE region. On the other hand, the relationship of the ratio with profitability indicators is negative, as expected. In this sense, an increase of one unit in the cost ratio reduces ROAA by 0.035 percentage points and ROAE by 0.371 percentage points. As results indicate, the cost to income ratio has the largest impact on ROAE.

Bank size (BS) does not seem to have any effect on profitability, while it is significant only in the case of net interest margins. Nonetheless, the coefficient is rather small, so the size of the bank does not have any major impact in driving NIM.

Loan loss provisions (LLP) serve as a measure of banks' credit risk. Considering that CEE banks are mainly focused on traditional activities (i.e. granting loans), interest income plays a major role in banks operations and profitability. As expected, credit risk measure is significant in all specifications and has the expected signs accordingly. The credit risk relationship to NIM is positive; all else equal, one unit increase in the level of provisioning for credit losses calls for an increase in bank margins by 0.064 percentage points (by increasing loan rates, decreasing deposit rates or affecting both at the same time) in order to create cushion for the uprising credit risk. On the contrary, higher loan loss provisions shrink bank profits, thus the negative relationship with profitability indicators is proven. As based on regression coefficients, loan loss provision has the highest impact on ROAE case; one unit increase in provisions decreases the return on average equity by 0.879 percentage points.

The measure of liquidity management, net loans to total assets (NLTA) is significant only in the specification of net interest margin, while it has the expected sign in all specifications. A high ratio of loans in total assets is related to higher liquidity risk as loans are the most risky asset, but at the same time with the highest expected return. On the other hand, there are also costs related to it as loans need to be issued, serviced and monitored (Clayes & Vennet, 2008). Moreover, when the balance sheet structure of the bank is such that loans ratio uprises continuously, there is less proportion left to invest in more liquid assets, which in turn increases the bank risk of not being able to respond to unexpected events, thus borrow at a higher cost that increases the margin. The effect of this variable on bank margin is moderate compared to some of the other factors; an increase of one unit in the ratio affects the bank margins to rise by 0.028 percentage points.

Non-interest income to average assets (NONINT) as a measure of diversification has the expected signs, while it is not significant in the case of NIM. A potential reason for its insignificance may be the high dependence of banks on interest income, as CEE banks are still highly traditional in their operations and interest income constitutes a large share in total revenues. As a result, income generated from activities other than long-established one does not seem to be a substitute of interest income. On the other hand, the variable is significant both in the case of ROAA and ROAE, meaning that an increase of non-interest income affects positively profitability; one unit increase in non-interest income rises return on average assets by 0.245 percentage points, while return on average equity rises by 2.2 percentage points.

The capital measure (EQTA) is significant only in the case of NIM; one unit of measure increase in equity to total assets causes an uprise in bank margins by 0.069 percentage points.

The finding is in line with the assumption that equity levels signals bank reputation; banks may choose to keep capital levels above requirements, thus in turn signal solvency and gain depositor confidence. As a result, banks have a levy to lower their deposit costs, thus increase the margin (Clayes & Vennet, 2008). In general, CEE countries had on average capital ratios well above requirements, especially foreign banks that had access in parent funds. On the other hand, in the case of ROAA and ROAE, EQTA is insignificant.

As regarding market concentration, I find significant evidence only in the case of NIM; the positive relationship of bank margins and Heirfindahl index suggests that a rise in the concentration of the market assets by one unit increases the bank margin by 0.148 percentage points. The positive relationship may indicate that there might a lower competition might be present in pricing policies among banks, indicating that CEE banking sectors operate far from perfect competition.

The evidence for the importance of the macroeconomic environment on bank performance is found only in the case of NIM, while in the case of ROAA and ROAE all macroeconomic indicators are insignificant. Contrary to the expectation, the measure of economic activity and expansion, namely GDP growth has a negative sign in relation to bank margins, which means that an increase of one unit in the growth rate reduces the margin by 0.094 percentage points. A potential explanation could be related to the European Banking Coordination "Vienna Initiative" (2012) report, which argues that deterioration in quality of the credit portfolios of CEE countries has not been transparent, which in turn contributed to the latter problems in relation to asset quality worsening levels. A negative relationship between GDP growth and margins is also found in Dietrich, Wanzenried and Cole (2010) panel study of 96 countries for the period 1994-2008.

Further on, inflation as measured by consumer price index is also significant and the positive sign supports the hypothesis that banks will seek to maintain the real value of profit margins as rising inflation entails higher costs. Quantitatively expressed, all else equal, one unit increase in inflation increases bank margins by 0.216 percentage points.

In relation to sovereign debt, I do not find significant support for the effect of debt to GDP ratio neither in bank margins nor in profitability indicators. The results are rather surprising, as all countries in my sample have experienced an increase in their debt levels in the wake of the financial and economic crisis.

As regarding the foreign exchange effect, in the case of CEE region, some of the countries had a high share of loans denominated in foreign currencies. With the depreciation of domestic currencies, borrowers (SMEs and households were largely unhedged against the exchange rate risk) faced problems in servicing their debts, which in turn affected credit quality to

deteriorate and non-performing loans to increase significantly. In such cases, one would expect the bank margin to rise when depreciation of domestic currency happens. However, as regarding the impact of foreign exchange measured as the annual change of domestic currency towards euro, I obtain a negative relationship to NIM. Same sign of the coefficient is also confirmed by Dumičić and Ridzak (2013) study in CEE region both in pre-crisis and post-crisis period, although insignificant in their case. On the other hand, the forex is not found to be significant in cases of profitability specifications.

Table 2. Regression Results for the NIM Reference Specification

	Fixed effects		Random effects		OLS	
NIM	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.021	**(0.005)***	-0.014	**(0.004)***	0.003	(0.004)
BS	-0.001	**(0.000)***	0.000	**(0.000)***	0.000	**(0.000)**
LLP	0.064	**(0.033)***	0.066	**(0.028)**	0.065	**(0.024)***
NLTA	0.028	**(0.011)**	0.025	**(0.009)***	0.011	**(0.006)***
NONINT	-0.195	(0.222)	-0.060	(0.201)	0.371	**(0.124)***
EQTA	0.069	**(0.026)***	0.086	**(0.026)***	0.089	**(0.020)***
HHI	0.148	**(0.041)***	0.146	**(0.042)***	0.066	(0.045)
GDPG	-0.094	**(0.043)**	-0.081	**(0.046)***	-0.051	(0.067)
INFL	0.216	**(0.066)***	0.225	**(0.061)***	0.243	**(0.070)***
DEBTGDP	-0.006	(0.008)	0.000	0.006	0.005	(0.008)
FX	-0.029	**(0.010)***	-0.031	**(0.009)***	-0.017	(0.022)
Constant	0.574	(1.297)	-0.535	(1.103)	-1.016	(1.083)
Time dummies	Yes		Yes		Yes	
No. of observations	336		336		336	
R-sq within	0.4872		0.4751			
R-sq between	0.1316		0.2565			
Overall	0.2176		0.3498		0.4628	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Table 3. Regression Results for the ROAA Reference Specification

ROAA	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.035	**(0.008)***	-0.035	**(0.008)***	-0.035	**(0.003)***
BS	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
LLP	-0.102	**(0.022)***	-0.102	**(0.022)***	-0.110	**(0.023)***
NLTA	0.008	(0.009)	0.008	(0.009)	-0.004	(0.004)
NONINT	0.245	**(0.107)**	0.245	**(0.107)***	0.400	**(0.069)***
EQTA	0.071	**(0.027)**	0.071	**(0.027)***	0.052	**(0.013)***
HHI	0.010	(0.033)	0.010	(0.033)	0.011	(0.029)
GDPG	0.049	(0.040)	0.049	(0.040)	-0.021	(0.039)
INFL	0.014	(0.045)	0.014	(0.045)	-0.109	**(0.046)**
DEBTGDP	-0.006	(0.011)	-0.006	(0.011)	0.004	(0.007)
FX	0.010	(0.014)	0.010	(0.014)	0.013	(0.012)
Constant	1.818	(1.264)	2.148	(0.831)	2.074	(0.772)
Time dummies	Yes		Yes		Yes	
No. of observations	336		336		336	
R-sq within	0.4423		0.4241			
R-sq between	0.5257		0.6358			
Overall	0.4577		0.5288		0.5332	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Table 4. Regression Results for the ROAE Reference Specification

ROAE	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.371	**(0.104)***	-0.353	**(0.040)***	-0.345	**(0.034)***
BS	0.000	(0.003)	-0.001	**(0.001)**	-0.001	**(0.000)**
LLP	-0.879	**(0.296)***	-1.087	**(0.292)***	-1.104	**(0.240)***
NLTA	0.017	(0.114)	-0.087	(0.059)	-0.101	**(0.044)**

(table continues)

(continued)

Table 4. Regression results for the ROAE reference specification

NONINT	2.202	**(1.229)***	2.706	**(0.862)***	2.925	**(0.700)***
EQTA	0.159	(0.306)	-0.079	(0.183)	-0.085	(0.156)
HHI	-0.084	(0.360)	0.076	(0.368)	0.103	(0.288)
GDPG	0.428	(0.331)	0.129	(0.311)	0.055	(0.359)
INFL	0.063	(0.426)	-0.468	(0.426)	-0.668	(0.409)
DEBTGDP	0.144	(0.139)	0.083	(0.068)	0.074	(0.062)
FX	0.088	(0.150)	0.177	(0.130)	0.212	(0.131)
Constant	19.364	(14.156)	30.479	(8.142)	31.257	(7.465)
Time dummies	Yes		Yes		Yes	
No. of observations	336		336		336	
R-sq within	0.4033		0.3878			
R-sq between	0.5436		0.7028			
Overall	0.4739		0.5465		0.5477	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

A potential scenario could be also the split up of the sample into euro area countries and non euro area. However, only Slovenia and Slovakia from the sample use euro as a local currency. Moreover, these two countries' banking sectors are rather small and in some occasions, observations are missing for some of the banks.

As a result, I have a small sample size for this particular group and do not have much levy left to enrich the analysis. Although faced with the above mentioned limitations, I present the results in the following tables. I do not find satisfactorily evidence; in the case of NIM specification, strong evidence is found only for the effect of cost to income, which has the same coefficient sign as in the reference specification. Moreover, its economic impact is also similar as in the total sample; expressed quantitatively, one unit increase in the cost to income ratio causes a decrease in the bank margin by 0.024 percentage points.

Table 5. Regression Results for the NIM Specification of Euro Area Countries Sub-sample

NIM	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.024	**(0.011)****	-0.012	(0.008)	-0.012	(0.011)
BS	-0.016	(0.011)	0.005	**(0.002)*****	0.007	**(0.002)*****
LLP	0.041	(0.046)	0.046	(0.039)	0.027	(0.024)
NLTA	0.011	(0.022)	-0.023	(0.020)	-0.032	**(0.014)****
NONINT	0.311	(0.417)	0.503	(0.626)	0.386	(0.488)
EQTA	0.101	(0.066)	0.055	(0.042)	0.024	(0.041)
HHI	0.059	(0.119)	0.027	(0.049)	0.047	(0.136)
GDPG	-0.474	(0.328)	-0.047	(0.197)	-0.078	(0.401)
INFL	-0.329	(0.246)	-0.135	(0.192)	-0.159	(0.241)
DEBTGDP	-0.092	(0.070)	-0.024	(0.024)	-0.007	(0.037)
Constant	0.2180	(2.941)	3.619	(1.820)	3.699	(1.551)
Time dummies	Yes		Yes		Yes	
No. of observations	124		147		147	
R-sq within	0.2917		0.1127			
R-sq between	0.3833		0.4871			
Overall	0.2140		0.4028		0.4235	
Hansen J test	0.0015					

Note: Robust standard errors in brackets;

*indicates significance at 10%, ** at 5% and *** at 1%

On the other hand, in ROAA specification besides the evidence for the impact of cost to income ratio, equity to total assets ratio and also non-interest income are significant and have the expected signs. Moreover, GDP growth and inflation have positive signs, thus their rise affects positively profitability of the Slovenian and Slovak banks. It should be emphasized that the debt to GDP ratio is found to be significant in this specification and it is shown to have a negative impact on profitability. One unit increase in debt to GDP ratio is reflected in a decrease of the ROAA by 0.125 percentage points. On this matter, both Slovenia's and Slovakia's debt ratios rose sharply during the analyzed period.

Table 6. Regression Results for the ROAA Specification of Euro Area Countries Sub-sample

ROAA	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.067	**(0.012)***	-0.050	**(0.011)***	-0.038	**(0.010)***
BS	0.006	(0.005)	-0.000	(0.001)	-0.000	**(0.000)***
LLP	-0.039	(0.035)	-0.100	**(0.037)***	-0.127	**(0.033)***
NLTA	0.001	(0.020)	-0.004	(0.015)	-0.007	(0.010)
NONINT	0.397	**(0.221)***	0.442	(0.291)	0.538	**(0.236)***
EQTA	0.112	**(0.065)***	0.009	(0.054)	-0.029	(0.048)
HHI	-0.014	(0.088)	-0.045	(0.065)	-0.085	(0.070)
GDPG	0.596	**(0.224)***	0.482	**(0.159)***	0.535	**(0.199)***
INFL	0.263	**(0.099)***	0.222	**(0.085)***	0.271	**(0.137)***
DEBTGDP	-0.125	**(0.046)***	-0.115	**(0.038)***	-0.131	**(0.045)***
Constant	0.218	(2.941)	2.826	(2.401)	3.370	(1.884)
Time dummies	Yes		Yes		Yes	
No. of observations	124		124		124	
R-sq within	0.7583		0.7178			
R-sq between	0.1966		0.3949			
Overall	0.3308		0.5850		0.6149	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

In ROAE specification, all macro variables are significant and with the expected signs, while also three bank-specific variables are shown to affect the dependent variable, namely, cost to income ratio, loan loss provisions and equity to total assets. Expressed quantitatively, cost to income ratio has an important economic impact on the return; one unit increase of the cost ratio decreases the profitability as measured by ROAE by 0.687 percentage points. Loan loss provisions are also a factor that highly affect profitability; one unit increase of the provisions reduces the ROAE by 1.222 percentage points. It is also to be noted that GDP growth has the highest impact among the variables; one unit increase of the economic activity as measured by GDP growth improves the return on average equity by 6.533.

Table 7. Regression Results for the ROAE Specification of Euro Area Countries Sub-sample

ROAE	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.687	**(0.104)***	-0.525	**(0.105)***	-0.333	**(0.101)***
BS	-0.054	(0.050)	-0.005	(0.008)	-0.011	**(0.005)**
LLP	-1.222	**(0.378)***	-1.648	**(0.373)***	-1.872	**(0.351)***
NLTA	-0.106	(0.192)	-0.208	(0.181)	-0.307	**(0.113)***
NONINT	-0.219	(2.600)	0.033	(2.562)	1.446	(2.323)
EQTA	1.719	**(0.977)***	0.835	(0.799)	0.413	(0.473)
HHI	0.613	(0.808)	0.631	(0.729)	1.327	**(0.798)***
GDPG	6.533	**(2.660)**	4.426	**(1.736)**	5.200	**(2.392)**
INFL	3.070	**(1.292)**	2.810	**(1.233)**	3.420	**(1.493)**
DEBTGDP	-1.024	**(0.475)**	-0.904	**(0.390)**	-1.147	**(0.489)**
Constant	-1.025	(0.475)	0.904	(0.390)	58.286	(23.945)
Time dummies	Yes		Yes		Yes	
No. of observations	124		124		124	
R-sq within	0.7814		0.7577			
R-sq between	0.2553		0.3809			
Overall	0.3758		0.5875		0.6223	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

As regarding non euro area sub-sample, the remaining 5 countries are included. Considering the number of countries, the sample size is larger in this specification. In addition, with the aim of comparing euro zone and non euro zone countries, I do not include foreign exchange variable in this specification. Doing so increases the number of observations. However, to see what happens to the non euro area sample estimation when the foreign exchange is taken into consideration, will be presented in the robustness tests part.

The obtained results are stronger in this specification compared to euro zone sample countries. In the NIM specification, cost to income ratio is highly significant at the 1 percent level. It should be underlined that this ratio does not change its sign even with the split of the sample and in any of the NIM specifications applied, which confirms the existence of the paradox of the negative relationship between the two variables; lower margins when operational costs rise. Bank size is also significant, but it has only a marginal effect on NIM. Further on, one

unit increase in the equity to total assets rises the bank margin by 0.09 percentage points, while one unit increase in the inflation rate is translated into 0.133 percentage points rise of bank margin.

Table 8. Regression Results for the NIM Specification of Non Euro Area Sub-sample

NIM	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.023	**(0.009)***	-0.013	**(0.006)**	-0.001	(0.004)
BS	-0.001	**(0.000)**	-0.000	**(0.000)***	-0.000	**(0.000)***
LLP	-0.016	(0.064)	0.009	(0.045)	0.067	**(0.021)***
NLTA	0.006	(0.023)	0.010	(0.012)	0.014	**(0.005)***
NONINT	0.174	(0.275)	0.337	**(0.197)***	0.429	**(0.102)***
EQTA	0.090	**(0.034)***	0.101	**(0.029)***	0.091	**(0.120)***
HHI	0.026	(0.069)	0.050	**(0.053)***	0.032	(0.031)
GDPG	-0.071	(0.046)	-0.072	(0.047)	-0.081	(0.061)
INFL	0.133	**(0.066)**	0.157	**(0.050)***	0.206	**(0.042)***
DEBTGDP	-0.008	(0.009)	-0.007	(0.058)	-0.008	(0.006)
Constant	3.622	(2.108)	1.044	(1.324)	0.2305	0.8344
Time dummies	Yes		Yes		Yes	
No. of observations	434		434		434	
R-sq within	0.3119		0.2949			
R-sq between	0.1142		0.3262			
Overall	0.2032		0.3635		0.4102	
Hansen J test	0.0001					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

As regarding performance measured by profitability indicators, I obtain better results compared to the euro area and to the reference model. Cost to income ratio, loan loss provisions, noninterest income and GDP growth impact both ROAA and ROAE. Additionally, equity to total assets is significant in ROAA specification, while debt to GDP ratio is significant in ROAE case.

Table 9. Regression Results for the ROAA Specification of Non Euro Area Sub-sample

ROAA	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.037	(0.007)***	-0.037	(0.004)***	-0.037	(0.003)***
BS	-0.000	(0.000)	-0.000	(0.000)	-0.000	(0.000)
LLP	-0.160	(0.042)***	-0.171	(0.031)***	-0.160	(0.024)***
NLTA	-0.005	(0.010)	-0.010	(0.005)**	-0.011	(0.004)***
NONINT	0.365	(0.128)***	0.485	(0.085)***	0.529	(0.072)***
EQTA	0.120	(0.042)***	0.069	(0.027)***	0.058	(0.016)***
HHI	-0.029	(0.048)	-0.038	(0.036)	-0.044	(0.029)
GDPG	0.093	(0.039)**	0.066	(0.035)**	0.034	0.044
INFL	0.008	(0.041)	-0.005	(0.026)	-0.029	(0.028)
DEBTGDP	0.017	(0.013)	0.013	(0.006)**	0.010	(0.005)**
Constant	1.986	(1.300)	3.069	(0.712)	3.641	(0.664)
Time dummies	Yes		Yes		Yes	
No. of observations	434		434		434	
R-sq within	0.5300		0.5170			
R-sq between	0.4812		0.6606			
Overall	0.4900		0.5565		0.5604	
Hansen J test	0.0105					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Table 10. Regression Results for the ROAE Specification of Non Euro Area Sub-sample

ROAE	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.458	(0.102)***	-0.463	(0.068)***	-0.434	(0.052)***
BS	-0.010	(0.007)	-0.004	(0.002)**	-0.003	(0.002)**
LLP	-1.347	(0.392)***	-1.542	(0.319)***	-1.525	(0.239)***
NLTA	-0.133	(0.118)	-0.244	(0.089)***	-0.231	(0.052)***
NONINT	3.803	(1.687)**	5.441	(1.582)***	5.518	(1.251)***

(table continues)

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(continued)

Table 10. Regression Results for the ROAE Specification of Non Euro Area Sub-sample

EQTA	0.405	(0.367)	-0.019	(0.238)	-0.703	(0.548)
HHI	-0.380	(0.452)	-0.690	(0.572)	0.293	(0.496)
GDPG	0.718	**(0.363)****	0.583	**(0.334)***	-0.626	**(0.322)***
INFL	-0.412	(0.476)	-0.414	(0.333)	0.107	**(0.062)***
DEBTGDP	0.273	**(0.127)****	0.151	**(0.061)****	0.107	**(0.062)***
Constant	45.72	15.52	60.338	(14.153)	62.228	(11.674)
Time dummies	Yes		Yes		Yes	
No. of observations	0.4798		0.4574			
R-sq within	0.3708		0.6614			
R-sq between	0.3941		0.5407		0.5451	
Overall						
Hansen J test	0.0283					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

4.1 Robustness check

I use alternative measures to confirm regression results. In the first case, as reported in tables 8 to 10 in the appendix part, I use non-performing loans (NPL) instead of loan loss provisions (LLP) to measure for credit risk. In the case of NIM as a dependent variable, most variables remain still significant, while there are a couple of changes that need to be mentioned. Now, GDP growth becomes insignificant, and non-interest income (NONINT) becomes significant at the 5 percent level. On this matter, one unit increase in non-interest income decreases the interest margin by 0.308 percentage points. In addition, non-performing loans is insignificant, while it still has the expected positive sign. A potential explanation for the obtained result can be found on the European Banking Coordination "Vienna Initiative" (2012) report, which emphasizes that there is no international standard on how to measure non-performing loans, while national authorities use different categorizations for loan classification. The report states that the issue is persistent in Central, Eastern and South-Eastern Europe countries. On the topic matter, most countries apply the 90 days overdue rule, but there are wide differences as highlighted by Barisitz (2013) on the following issues: collateral treatment, loan restructuring, non-performing amount, the issue of multiple loans classification in the case of the same debtor and so on. Moreover, there are practices from banks' side in a number of countries that might affect in underreporting of non-performing loans. Considering the above mentioned issues, the lack of quality of non-performing loans data might not present a good measure of credit risk, thus not making it possible to perform an adequate cross-country comparison on

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the underlined matter. In ROAA specification, debt to GDP ratio becomes significant; one unit increase in the debt to GDP ratio decreases return on average assets by 0.025 percentage points. Other explanatory variables perform the same in terms of being significant as in the reference model. In the case of ROAE specification, I do not find evidence for the impact of non-performing loans, while only costs to income ratio and non-interest income are significant.

In second scenario, I employ share of assets (SA) as a measure of market power, while I remove bank size (BS) due to the high correlation between the two. The obtained results are shown in tables 11 to 13 in the appendix part. Share of assets (SA) is significant for NIM and ROAE, while not for ROAA. Its sign on NIM specification suggests that one unit increase in the share of assets of a bank decreases the margin by 0.142 percentage points. As a result, efficiency as measured by bank margin improves. On the other hand, one unit increase of the share of assets causes an uprise in ROAE 1.115 percentage points.

The third scenario is related to the non euro area sub-sample; I include foreign exchange variable in order to compare the results with the total sample and the non euro area sub-sample specification without the presence of the above mentioned variable. Estimation results can be found in tables 14 to 16 in the appendix part. The results are similar to the reference specification, while on the other hand they are better than the sub-sample specification without the inclusion of the foreign exchange variable. It should be noted that cost to income ratio has a similar size effect as in the reference model; one unit increase in the cost to income ratio decreases the bank margin by 0.025 percentage points. Further on, same as in the reference model and in the sub-sample of non euro area, the bank size has only a marginal effect on margins, while net loans to total assets, equity to total assets, market concentration, GDP growth and inflation are all important factors that affect the NIM. Moreover, foreign exchange variable is also significant and again it has a negative sign; one unit increase in the annual change of the domestic currency towards euro is reflected into a decrease of the margin by 0.028 percentage points.

It is worth to be mentioned that the division of the sample makes the loan loss provisions insignificant in all cases of NIM sub-samples. On the other hand, as regarding profitability indicators, cost to income ratio, loan loss provisions and non-interest income are significant in both ROAA and ROAE specifications. Moreover, equity to total assets and debt to GDP ratio are significant in ROAA, while bank size is significant in ROAE.

Lastly, on the fourth specification, I exclude time dummies from the reference model. Differences in results include the following: loan loss provisions and foreign exchange measure become insignificant, while debt to GDP ratio becomes significant at 1 percent level for the NIM estimation. As regarding profitability indicators, there is only one variable that is affected by the omission of time dummies from the regression; GDP growth is significant at 1

percent level for the ROAA specification and at 10 percent significance level for the ROAA respectively. Estimation results for the last specification are presented in tables 17 to 19 in the appendix part.

CONCLUSION

The purpose of the thesis was to explore the bank performance determinants in a set of seven countries, namely: Bulgaria, Croatia, Czech Republic, Hungary, Romania, Slovakia and Slovenia. After the theoretical review, the analysis was concentrated in the empirical estimation of the bank performance. I employed static panel data techniques such as fixed and random effects and also ordinary least squares.

The empirical analysis was based on annual data for the period 2007-2014 obtained from few sources. The covered period was somehow short, limited by the Bankscope subscription. Having access to quarterly data for the above mentioned period would increase the number of observations.

The analysis employed three group of explanatory variables; a) the bank-specific data, which were obtained from Bankscope database, b) banking sector data were also constructed based on balance sheet data from Bankscope, and thirdly macroeconomic indicators obtained from the website of International Monetary Fund and European Central Bank. In order to test bank performance determinants I employed three dependent variables, namely, net interest margin, return on average assets and return on average equity.

The results are fairly stable as they do not vary much across different models, which strengthens the confidence in the power of the econometric model applied. However, it should be mentioned that for some of the variables, the change of the set of the explanatory variables that enter a regression impacts their signs and/or significance levels. Thus, due to such sensitivity, one should be cautious when interpreting results. As a result, I tried to present different specifications in order to enrich the analysis. NIM specification performs much better, as majority of explanatory variables are significant, while only limited evidence is found in profitability indicators.

Operational efficiency measured by cost to income ratio is found to be significant in all reference specifications. On this matter, results are similar to those obtained by Schwaiger and Liebeg (2008) and Dumičić and Ridzak (2013) studies on CEE region. Further on, loan loss provisions as one of alternatives in measuring credit risk is also found to be significant in all reference specifications. On the other hand, non-performing loans was not found to be a variable that could explain variation in any of the reference estimations applied. A potential reason for its insignificance could be the lack of universal standards in non-performing claim

classifications. Along, results indicate that there are some economies of scale as larger banks apply lower bank margins. Nonetheless, the coefficient is rather small, so the size of the bank does not have any major impact in driving NIM.

Likewise, I find support for the impact of liquidity risk and capitalization only in the NIM specification, while on the other hand the measure of diversification, namely the non-interest income to average assets is found to be significant only in the case of profitability indicators. A likely reason for the insignificance of the variable in NIM specification could be that, in general, CEE banks are still considered to be highly traditional in their operations, meaning that non-interest income does not serve as a substitute of interest income, while on the other hand it boosts profitability.

As regarding the macroeconomic factors, I find evidence for their impact only in the case of NIM. In contrast to commonness found in literature, GDP growth has a negative effect on net interest margin. A potential explanation could be related to the European Banking Coordination "Vienna Initiative" (2012) report, which states that deterioration in quality of the credit portfolios of CEE countries has not been transparent, which in turn contributed to the accumulation of problems in relation to asset quality deterioration levels. A negative relationship between GDP growth and margins is also confirmed by Dietrich, Wanzenried and Cole (2010) in their panel study of 96 countries for the period 1994-2008. Inflation is also an important determinant and has the expected sign in all specifications; banks charge a larger premia when inflation is higher. Similar results are confirmed by Clayes and Vennet (2008) and Demirguc-Kunt and Huizinga (1998) studies that include a broader range of countries in their studies. On the other hand, debt to GDP ratio is not found to be significant and has a negative sign. The result is rather surprising, as all countries in the analyzed sample have experienced an increase in their debt levels in the wake of the financial and economic crisis. Further on, foreign exchange is also found to be a driver of NIM while it has a negative sign; same relationship between the two is also confirmed by Dumičić and Ridzak (2013). On the other hand, I find no significant support for the effect of foreign exchange on profitability indicators.

In addition I also split the sample into two subsamples, namely into euro zone sub-sample which includes Slovenia and Slovakia that use euro as a domestic currency and non euro area sub-sample that includes the rest of the countries that have their own currencies in use. The non euro area sub-sample largely confirms the initial results obtained in the reference specification, while the euro area sub-sample is rather small and the estimations are weak. It should be emphasized that debt to GDP ratio is significant in the euro area sub-sample for the profitability specifications. Both Slovenia and Slovakia experienced sharp increases on their debt levels during the analyzed period.

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APPENDIXES

TABLE OF APPENDIXES

Appendix A: List of commonly used abbreviations

BGN	Bulgarian lev
BNB	Bulgarian National Bank
BS	Bank of Slovenia
CBH	Central Bank of Hungary
CEE	Central and Eastern Europe
CNB	Croatian National Bank
CPI	Consumer price index
CZK	Czech koruna
ECB	European Central Bank
EU	European Union
GDP	Gross domestic product
HRK	Croatian kuna
IMF	International Monetary Fund
NBR	National Bank of Romania
NBS	National Bank of Slovakia
NIM	Net interest margin
NPL	Non-performing loans
ROAA	Return on average assets
ROAE	Return on average equity
RON	Romanian leu
SEE	Southern and Eastern Europe
SMEs	Small and Medium Enterprises
VIF	Variance inflation factor

Appendix B: Summary statistics

Table 1. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Dependent variables					
NIM	608	3.66	1.60	0.74	15.01
ROAA	608	0.53	1.22	-6.92	3.95
ROAE	608	5.41	12.00	-71.80	37.09
Independent variables					
CIR	608	61.44	17.19	18.41	100.00
BS	608	431.30	767.67	5.49	4736.02
LLP	547	5.99	4.52	0.29	29.46
NPL	422	11.77	10.91	0.19	70.96
NLTA	606	61.35	12.47	19.77	89.06
NONINT	606	1.46	0.87	-0.43	5.92
EQTA	605	11.06	4.53	3.00	30.44
SA	604	6.58	7.57	0.06	36.72
HHI	608	16.27	3.83	10.99	28.83
GDPG	608	0.58	3.69	-7.80	8.46
INFL	608	3.04	2.51	-1.96	11.58
FX	391	-0.89	4.20	-13.21	11.32
DEBT	589	37.32	18.74	12.65	80.93

Appendix C: Variance inflation factor for the reference specification

Table 2. Variance Inflation Factor for the Reference Specification

Variable	VIF	1/VIF
DEBT	2.46	0.41
INFL	1.80	0.56
NONINT	1.65	0.61
EQTA	1.57	0.64
HHI	1.51	0.66
GDPG	1.50	0.67
LLP	1.48	0.68
NLTA	1.32	0.76
BS	1.26	0.80
CIR	1.24	0.81
FX	1.23	0.81
Mean VIF	**1.55**	

Appendix D: Variance inflation factor for the first robustness test specification

Table 3. Variance Inflation Factor for the First Robustness Test Specification

Variable	VIF	1/VIF
DEBT	2.62	0.38
EQTA	1.87	0.53
INFL	1.85	0.54
NLTA	1.59	0.62
NONINT	1.56	0.64
GDPG	1.50	0.67
HHI	1.48	0.68
BS	1.39	0.72
CIR	1.33	0.75
FX	1.29	0.78
NPL	1.24	0.81
Mean VIF	**1.61**	

Appendix E: Variance inflation factor for the second robustness test specification

Table 4. Variance Inflation Factor for the Second Robustness Test Specification

Variable	VIF	1/VIF
DEBT	2.31	0.43
INFL	1.79	0.56
NONINT	1.66	0.60
EQTA	1.62	0.62
HHI	1.51	0.66
GDPG	1.50	0.67
LLP	1.48	0.68
CIR	1.43	0.70
SA	1.38	0.73
NLTA	1.29	0.78
FX	1.23	0.81
Mean VIF	**1.56**	

Table 5. Correlation Matrix and Significance Levels for the NIM as a Dependent Variable

	NIM	CIR	BS	LLP	NPL	NLTA	NONINT	EQTA	SA	HHI	GDPG	INFL	FX	DEBT
NIM	1.0000													
CIR	-0.0475	1.0000												
	0.2418													
BS	-0.0425	-0.1843	1.0000											
	0.2952	0.0000												
LLP	0.2167	-0.0149	0.0089	1.0000										
	0.0000	0.7274	0.8350											
NPL	0.2461	0.1360	-0.0425	0.6885	1.0000									
	0.0000	0.0051	0.3843	0.0000										
NLTA	0.1316	-0.0775	0.0712	0.0095	0.0564	1.0000								
	0.0012	0.0566	0.0798	0.8249	0.2485									
NONINT	0.3300	0.1138	0.0369	0.1793	0.0699	-0.0788	1.0000							
	0.0000	0.0051	0.3652	0.0000	0.1516	0.0530								
EQTA	0.3789	-0.1364	0.0394	0.3478	0.2348	0.2024	0.1966	1.0000						
	0.0000	0.0008	0.3334	0.0000	0.0000	0.0000	0.0000							
SA	0.0797	-0.3961	0.5875	0.0081	-0.1150	0.0707	0.0198	-0.0739	1.0000					
	0.0502	0.0000	0.0000	0.8507	0.0186	0.0829	0.6276	0.0703						
HHI	-0.2140	0.0936	0.0500	-0.1764	-0.2485	-0.1758	0.0862	-0.2610	0.0687	1.0000				
	0.0000	0.0210	0.2183	0.0000	0.0000	0.0000	0.0339	0.0000	0.0915					
GDPG	0.0178	-0.0245	-0.1010	-0.1041	-0.1175	-0.0926	0.0695	-0.0817	0.0228	0.1042	1.0000			
	0.6617	0.5470	0.0127	0.0148	0.0157	0.0226	0.0872	0.0445	0.5753	0.0101				

(table continues)

Table 5. Correlation Matrix and Significance Levels for the NIM as a Dependent Variable

	NIM	CIR	BS	LLP	NPL	NLTA	NONINT	EQTA	SA	HHI	GDPG	INFL	FX	DEBT
INFL	0.2081	-0.0024	0.0244	-0.2022	-0.2018	-0.0274	0.2198	-0.0445	-0.0405	0.0575	0.3299	1.0000		
	0.0000	0.9525	0.5481	0.0000	0.0000	0.5005	0.0000	0.2743	0.3203	0.1564	0.0000			
FX	-0.0654	-0.0226	0.0244	-0.0876	-0.0873	-0.0485	-0.1847	-0.0193	-0.0097	-0.0721	0.3777	0.0254	1.0000	
	0.1966	0.6553	0.6299	0.1079	0.1698	0.3400	0.0002	0.7042	0.8480	0.1546	0.0000	0.6170		
DEBT	-0.0957	0.0357	0.0845	0.3040	0.1554	0.0544	-0.2447	0.1468	-0.0372	-0.1570	-0.2566	-0.4746	0.0376	1.0000
	0.0202	0.3866	0.0404	0.0000	0.0017	0.1884	0.0000	0.0004	0.3690	0.0001	0.0000	0.0000	0.4590	

Appendix G: Correlation matrix and significance levels for the ROAA as a dependent variable

Table 6. Correlation Matrix and Significance Levels for the ROAA as a Dependent Variable

	ROAA	CIR	BS	LLP	NPL	NLTA	NONINT	EQTA	SA	HHI	GDPG	INFL	FX	DEBT
ROAA	1.0000													
CIR	-0.4046	1.0000												
	0.0000													
BS	0.1166	-0.1843	1.0000											
	0.0040	0.0000												
LLP	-0.4332	-0.0149	0.0089	1.0000										
	0.0000	0.7274	0.8350											
NPL	-0.5058	0.1360	-0.0425	0.6885	1.0000									
	0.0000	0.0051	0.3843	0.0000										
NLTA	-0.0756	-0.0775	0.0712	0.0095	0.0564	1.0000								
	0.0629	0.0566	0.0798	0.8249	0.2485									
NONINT	0.1886	0.1138	0.0369	0.1793	0.0699	-0.0788	1.0000							
	0.0000	0.0051	0.3652	0.0000	0.1516	0.0530								
EQTA	0.1110	-0.1364	0.0394	0.3478	0.2348	0.2024	0.1966	1.0000						
	0.0063	0.0008	0.3334	0.0000	0.0000	0.0000	0.0000							
SA	0.1584	-0.3961	0.5875	0.0081	-0.1150	0.0707	0.0198	-0.0739	1.0000					
	0.0001	0.0000	0.0000	0.8507	0.0186	0.0829	0.6276	0.0703						
HHI	0.0505	0.0936	0.0500	-0.1764	-0.2485	-0.1758	0.0862	-0.2610	0.0687	1.0000				
	0.2139	0.0210	0.2183	0.0000	0.0000	0.0000	0.0339	0.0000	0.0915					
GDPG	0.1818	-0.0245	-0.1010	-0.1041	-0.1175	-0.0926	0.0695	-0.0817	0.0228	0.1042	1.0000			
	0.0000	0.5470	0.0127	0.0148	0.0157	0.0226	0.0872	0.0445	0.5753	0.0101				

(table continues)

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Table 6. Correlation Matrix and Significance Levels for the ROAA as a Dependent Variable

	ROAA	CIR	BS	LLP	NPL	NLTA	NONINT	EQTA	SA	HHI	GDPG	INFL	FX	DEBT
INFL	0.2018	-0.0024	0.0244	-0.2022	-0.2018	-0.0274	0.2198	-0.0445	-0.0405	0.0575	0.3299	1.0000		
	0.0000	0.9525	0.5481	0.0000	0.0000	0.5005	0.0000	0.2743	0.3203	0.1564	0.0000			
FX	0.1242	-0.0226	0.0244	-0.0876	-0.0873	-0.0485	-0.1847	-0.0193	-0.0097	-0.0721	0.3777	0.0254	1.0000	
	0.0140	0.6553	0.6299	0.1079	0.1698	0.3400	0.0002	0.7042	0.8480	0.1546	0.0000	0.6170		
DEBT	-0.1893	0.0357	0.0845	0.3040	0.1554	0.0544	-0.2447	0.1468	-0.0372	-0.1570	-0.2566	-0.4746	0.0376	1.0000
	0.0000	0.3866	0.0404	0.0000	0.0017	0.1884	0.0000	0.0004	0.3690	0.0001	0.0000	0.0000	0.4590	

Appendix H: Correlation matrix and significance levels for the ROAE as a dependent variable

Table 7. Correlation Matrix and Significance Levels for the ROAE as a Dependent Variable

	ROAE	CIR	BS	LLP	NPL	NLTA	NONINT	EQTA	SA	HHI	GDPG	INFL	FX	DEBT
ROAE	1.0000													
CIR	-0.3840	1.0000												
	0.0000													
BS	0.1030	-0.1843	1.0000											
	0.0110	0.0000												
LLP	-0.5030	-0.0149	0.0089	1.0000										
	0.0000	0.7274	0.8350											
NPL	-0.5239	0.1360	-0.0425	0.6885	1.0000									
	0.0000	0.0051	0.3843	0.0000										
NLTA	-0.1735	-0.0775	0.0712	0.0095	0.0564	1.0000								
	0.0000	0.0566	0.0798	0.8249	0.2485									
NONINT	0.0968	0.1138	0.0369	0.1793	0.0699	-0.0788	1.0000							
	0.0171	0.0051	0.3652	0.0000	0.1516	0.0530								
EQTA	-0.0761	-0.1364	0.0394	0.3478	0.2348	0.2024	0.1966	1.0000						
	0.0615	0.0008	0.3334	0.0000	0.0000	0.0000	0.0000							
SA	0.1329	-0.3961	0.5875	0.0081	-0.1150	0.0707	0.0198	-0.0739	1.0000					
	0.0011	0.0000	0.0000	0.8507	0.0186	0.0829	0.6276	0.0703						
HHI	0.0810	0.0936	0.0500	-0.1764	-0.2485	-0.1758	0.0862	-0.2610	0.0687	1.0000				
	0.0458	0.0210	0.2183	0.0000	0.0000	0.0000	0.0339	0.0000	0.0915					
GDPG	0.2170	-0.0245	-0.1010	-0.1041	-0.1175	-0.0926	0.0695	-0.0817	0.0228	0.1042	1.0000			
	0.0000	0.5470	0.0127	0.0148	0.0157	0.0226	0.0872	0.0445	0.5753	0.0101				

(table continues)

Table 7. Correlation Matrix and Significance Levels for the ROAE as a Dependent Variable

	ROAE	CIR	BS	LLP	NPL	NLTA	NONINT	EQTA	SA	HHI	GDPG	INFL	FX	DEBT
INFL	0.2300	-0.0024	0.0244	-0.2022	-0.2018	-0.0274	0.2198	-0.0445	-0.0405	0.0575	0.3299	1.0000		
	0.0000	0.9525	0.5481	0.0000	0.0000	0.5005	0.0000	0.2743	0.3203	0.1564	0.0000			
FX	0.1717	-0.0226	0.0244	-0.0876	-0.0873	-0.0485	-0.1847	-0.0193	-0.0097	-0.0721	0.3777	0.0254	1.0000	
	0.0007	0.6553	0.6299	0.1079	0.1698	0.3400	0.0002	0.7042	0.8480	0.1546	0.0000	0.6170		
DEBT	-0.2383	0.0357	0.0845	0.3040	0.1554	0.0544	-0.2447	0.1468	-0.0372	-0.1570	-0.2566	-0.4746	0.0376	1.0000
	0.0000	0.3866	0.0404	0.0000	0.0017	0.1884	0.0000	0.0004	0.3690	0.0001	0.0000	0.0000	0.4590	

Appendix I: Regression results for the non-performing loans inclusion specification

Table 8. Regression Results for the NIM Specification

NIM	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.021	**(0.006)***	-0.014	**(0.005)***	-0.007	**(0.004)***
BS	-0.001	**(0.000)***	0.000	**(0.000)****	0.000	**(0.000)***
NPL	0.000	(0.011)	0.018	(0.013)	0.050	**(0.008)***
NLTA	0.027	**(0.010)****	0.025	**(0.011)****	0.007	(0.007)
NONINT	-0.308	**(0.152)****	-0.089	(0.142)	0.233	**(0.105)****
EQTA	0.075	**(0.041)***	0.112	**(0.036)***	0.148	**(0.025)***
HHI	0.107	**(0.045)****	0.129	(0.047)	0.116	**(0.033)***
GDPG	-0.019	(0.043)	-0.003	(0.051)	-0.008	0.058
INFL	0.184	**(0.062)***	0.216	**(0.060)***	0.218	**(0.054)***
DEBTGDP	0.006	(0.012)	0.005	(0.006)	0.007	(0.007)
FX	-0.026	**(0.015)***	-0.030	**(0.013)****	-0.029	(0.018)
Constant	1.003	(1.471)	-1.296	(1.342)	-1.220	(0.740)
Time dummies	Yes		Yes		Yes	
No. of banks	140		140		140	
No. of observations	248		248		248	
R-sq within	0.435		0.4753			
R-sq between	0.0055		0.4546			
Overall	0.0428		0.5094		0.6381	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Table 9. Regression Results for the ROAA Specification

ROAA	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.037	**(0.011)*****	-0.037	**(0.007)*****	-0.036	**(0.005)*****
BS	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
NPL	-0.016	(0.014)	-0.033	**(0.015)****	-0.026	**(0.012)****
NLTA	0.015	(0.014)	0.006	(0.009)	-0.001	(0.006)
NONINT	0.313	**(0.181)***	0.239	**(0.123)***	0.269	**(0.084)*****
EQTA	0.059	**(0.033)***	0.060	**(0.028)****	0.051	**(0.021)****
HHI	0.039	(0.044)	0.015	(0.029)	0.030	(0.036)
GDPG	0.062	(0.065)	0.030	(0.050)	-0.028	(0.046)
INFL	0.021	(0.055)	-0.052	(0.057)	-0.131	**(0.059)****
DEBTGDP	-0.025	**(0.013)***	-0.005	(0.008)	-0.003	(0.008)
FX	0.014	(0.022)	0.006	(0.016)	0.003	(0.016)
Constant	1.041	(1.668)	1.643	(0.923)	1.807	(0.825)
Time dummies	Yes		Yes		Yes	
No. of banks	140		140		140	
No. of observations	248		248		248	
R-sq within	0.3969		0.3771			
R-sq between	0.3020		0.5484			
Overall	0.3160		0.4843		0.5048	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Table 10. Regression Results for the ROAE Specification

ROAE	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.360	**(0.128)*****	-0.389	**(0.081)*****	-0.378	**(0.054)*****
BS	0.001	(0.005)	-0.001	(0.000)	-0.001	(0.000)
NPL	-0.158	(0.157)	-0.329	**(0.180)***	-0.273	**(0.124)****
NLTA	0.069	(0.146)	-0.028	(0.086)	-0.099	(0.061)
NONINT	3.411	**(2.010)***	2.128	**(1.208)***	1.698	**(0.858)****
EQTA	0.131	(0.370)	0.009	(0.309)	-0.031	(0.249)
HHI	0.137	(0.434)	0.093	(0.327)	0.199	(0.393)
GDPG	0.556	(0.587)	0.255	(0.447)	-0.023	(0.429)
INFL	0.068	(0.492)	-0.582	(0.509)	-0.936	**(0.504)***
DEBTGDP	-0.051	(0.152)	0.034	(0.089)	0.018	(0.081)
FX	0.033	(0.227)	0.029	(0.183)	0.027	(0.174)
Constant	20.072	(17.584)	25.851	(9.086)	32.819	(9.215)
Time dummies	Yes		Yes		Yes	
No. of banks	140		140		140	
No. of observations	248		248		248	
R-sq within	0.3519		0.3355			
R-sq between	0.4232		0.6182			
Overall	0.3785		0.5068			
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Appendix J: Regression results for the market share inclusion specification

Table 11. Regression Results for the NIM Specification

NIM	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.023	**(0.005)***	-0.146	**(0.004)***	0.007	(0.004)
LLP	0.063	**(0.032)***	0.066	**(0.028)***	0.064	**(0.024)***
NLTA	0.027	**(0.010)***	0.024	**(0.009)***	0.008	(0.006)
NONINT	-0.204	(0.207)	-0.052	(0.200)	0.366	**(0.126)***
EQTA	0.067	**(0.030)***	0.085	**(0.027)***	0.092	**(0.019)***
SA	-0.142	**(0.839)***	-0.041	**(0.024)***	0.005	(0.008)
HHI	0.185	**(0.042)***	0.157	**(0.044)***	0.059	(0.046)
GDPG	-0.079	**(0.042)***	-0.073	(0.463)	-0.041	(0.066)
INFL	0.220	**(0.064)***	0.231	**(0.061)***	0.244	**(0.698)***
DEBTGDP	-0.004	(0.009)	-0.002	(0.006)	0.002	(0.008)
FX	-0.035	**(0.010)***	-0.032	**(0.009)***	-0.015	(0.021)
Constant	0.547	(1.251)	-1.097	(1.040)	-0.860	(0.910)
Time dummies	Yes		Yes		Yes	
No. of banks	140		140		140	
No. of observations	336		336		336	
R-sq within	0.4911		0.4727			
R-sq between	0.0707		0.2276			
Overall	0.1284		0.3241		0.4574	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Table 12. Regression Results for the ROAA Specification

ROAA	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.033	**(0.008)*****	-0.034	**(0.005)*****	-0.034	**(0.003)*****
LLP	-0.100	**(0.021)*****	-0.115	**(0.022)*****	-0.111	**(0.023)*****
NLTA	0.008	(0.009)	-0.003	(0.005)	-0.004	(0.004)
NONINT	0.260	**(0.107)***	0.346	**(0.073)*****	0.402	**(0.070)*****
EQTA	0.078	**(0.027)*****	0.058	**(0.018)*****	0.052	**(0.013)*****
SA	0.068	(0.041)	-0.003	(0.009)	-0.002	(0.008)
HHI	-0.002	(0.034)	0.001	(0.036)	0.008	(0.029)
GDPG	0.045	(0.039)	0.006	(0.034)	-0.018	(0.039)
INFL	0.014	(0.044)	-0.069	(0.048)	-0.109	**(0.046)***
DEBTGDP	-0.006	(0.011)	0.003	(0.006)	0.003	(0.006)
FX	0.011	(0.014)	0.010	**(0.011)**	0.013	**(0.012)**
Constant	1.105	(1.068)	2.248	(0.796)	2.137	(0.639)
Time dummies	Yes		Yes		Yes	
No. of banks	140		140		140	
No. of observations	336		336		336	
R-sq within	0.4462		0.4241			
R-sq between	0.3771		0.6351			
Overall	0.3596		0.5278		0.5323	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Table 13. Regression Results for the ROAE Specification

ROAE	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.338	**(0.099)*****	-0.350	**(0.045)*****	-0.340	**(0.037)*****
LLP	-0.854	**(0.281)*****	-1.091	**(0.290)*****	-1.110	**(0.241)*****
NLTA	0.018	(0.111)	-0.098	**(0.059)***	-0.114	**(0.044)*****
NONINT	2.453	**(1.196)****	2.761	**(0.854)*****	2.991	**(0.720)*****
EQTA	0.285	(0.308)	-0.092	(0.183)	-0.096	(0.155)
SA	1.115	**(0.434)****	-0.083	(0.097)	-0.074	(0.081)
HHI	-0.279	(0.359)	0.022	(0.365)	0.036	(0.286)
GDPG	0.366	(0.320)	0.191	(0.307)	0.111	(0.362)
INFL	0.060	(0.416)	-0.437	(0.430)	-0.667	(0.413)
DEBTGDP	0.159	(0.139)	0.064	(0.062)	0.049	(0.056)
FX	0.104	(0.147)	0.187	(0.130)	0.228	**(0.131)***
Constant	18.077	(12.079)	33.054	(7.511)	36.137	(6.495)
Time dummies	Yes		Yes		Yes	
No. of banks	140		140		140	
No. of observations	336		336		336	
R-sq within	0.4138		0.3854			
R-sq between	0.2528		0.6991			
Overall	0.2625		0.5427		0.5442	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Appendix K: Regression results for the non euro area sub-sample specification

Table 14. Regression Results for the NIM Specification for the Non Euro Area Sub-Sample

NIM	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.025	**(0.007)*****	-0.014	**(0.005)*****	0.003	(0.004)
BS	-0.000	(0.000)***	-0.000	**(0.000)*****	-0.000	**(0.000)****
LLP	0.061	(0.038)	0.064	(0.032)	0.073	**(0.025)*****
NLTA	0.026	**(0.012)****	0.020	**(0.010)****	0.006	(0.005)
NONINT	-0.045	(0.250)	0.131	(0.216)	0.445	**(0.127)*****
EQTA	0.073	**(0.034)****	0.089	**(0.031)*****	0.090	**(0.022)*****
HHI	0.096	**(0.043)****	0.103	**(0.045)****	0.079	(0.050)
GDPG	-0.098	**(0.045)****	-0.093	**(0.049)***	-0.076	(0.065)
INFL	0.178	**(0.064)*****	0.190	**(0.060)*****	0.221	**(0.074)*****
DEBTGDP	-0.016	(0.012)	-0.007	(0.007)	0.004	(0.010)
FX	-0.028	**(0.010)*****	-0.031	**(0.010)*****	-0.019	(0.021)
Constant	1.842	(1.525)	0.434	(1.224)	-0.887	(1.168)
Time dummies	Yes		Yes		Yes	
No. of observations	339		339			
R-sq within	0.4388		0.4174			
R-sq between	0.0965		0.2894			
Overall	0.2219		0.3828		0.4692	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Table 15. Regression Results for the ROAA Specification for the Non Euro Area Sub-sample

ROAA	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.040	**(0.008)***	-0.038	**(0.005)***	-0.037	**(0.004)***
BS	-0.000	(0.000)	-0.000	(0.000)	-0.000	(0.000)
LLP	-0.112	**(0.022)***	-0.122	**(0.023)***	-0.111	**(0.024)***
NLTA	0.002	(0.010)	-0.006	(0.006)	-0.008	**(0.004)**
NONINT	0.311	(0.124)	0.387	**(0.074)***	0.421	**(0.072)***
EQTA	0.097	**(0.046)**	0.075	**(0.022)***	0.064	**(0.015)***
HHI	0.003	(0.037)	-0.025	(0.049)	-0.016	(0.042)
GDPG	0.053	(0.039)	0.007	(0.036)	-0.018	(0.041)
INFL	-0.047	(0.046)	-0.117	**(0.046)**	-0.146	**(0.050)***
DEBTGDP	-0.025	**(0.012)**	-0.004	(0.008)	-0.002	(0.009)
FX	0.010	(0.012)	0.006	(0.012)	0.007	(0.012)
Constant	3.064	(1.227)	3.989	(0.841)	4.138	(0.915)
Time dummies	Yes		Yes		Yes	
No. of observations	339		339			
R-sq within	0.4694		0.4512			
R-sq between	0.4180		0.5943			
Overall	0.3856		0.5123		0.5162	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Table 16. Regression Results for the ROAE Specification for the Non Euro Area Sub-Sample

ROAE	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.513	**(0.134)***	-0.441	**(0.076)***	-0.410	**(0.061)***
BS	-0.119	**(0.006)***	-0.004	**(0.002)***	-0.003	**(0.002)***
LLP	-0.981	**(0.308)***	-1.138	**(0.294)***	-1.090	**(0.246)***
NLTA	-0.041	(0.141)	-0.123	**(0.069)***	-0.141	**(0.047)***
NONINT	3.587	**(1.936)***	3.682	**(1.044)***	3.547	**(0.874)***
EQTA	0.137	(0.431)	0.007	(0.222)	-0.028	(0.168)
HHI	-0.156	(0.409)	-0.266	(0.618)	-0.201	(0.657)
GDPG	0.364	(0.370)	0.093	(0.465)	-0.028	(0.525)
INFL	-0.853	(0.579)	-1.214	**(0.611)**	-1.360	**(0.592)**
DEBTGDP	-0.075	(0.184)	0.034	(0.103)	0.021	(0.088)
FX	0.137	(0.153)	0.083	(0.144)	0.093	(0.149)
Constant	54.886	(17.168)	55.641	(10.819)	55.957	(12.482)
Time dummies	Yes		Yes		Yes	
No. of observations	339		339		339	
R-sq within	0.4172		0.4001			
R-sq between	0.2991		0.5491			
Overall	0.3160		0.4834		0.4860	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Appendix L: Regression results without time dummies

Table 17. Regression Results for NIM Specification without Time Dummies

NIM	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.026	**(0.005)*****	-0.016	**(0.004)*****	0.003	(0.004)
BS	-0.001	**(0.000)*****	-0.000	**(0.000)*****	-0.000	**(0.000)****
LLP	0.031	(0.038)	0.033	(0.033)	0.050	**(0.023)****
NLTA	0.028	**(0.011)*****	0.0265	**(0.009)*****	0.014	**(0.006)****
NONINT	-0.140	(0.217)	0.045	(0.189)	0.426	**(0.120)*****
EQTA	0.057	**(0.030)***	0.082	**(0.027)*****	0.092	**(0.020)*****
HHI	0.083	**(0.031)*****	0.078	**(0.036)****	0.022	(0.036)
GDPG	-0.039	**(0.015)****	-0.035	**(0.016)****	-0.039	**(0.022)***
INFL	0.130	**(0.042)*****	0.138	**(0.039)*****	0.168	**(0.047)*****
DEBTGDP	-0.020	**(0.006)*****	-0.016	**(0.005)*****	-0.006	(0.006)
FX	0.005	(0.010)	0.003	(0.010)	0.005	(0.019)
Constant	2.818	(1.065)	1.365	(0.828)	0.258	(0.773)
No. of banks	140		140		140	
No. of observations	336		336		336	
R-sq within	0.3592		0.3343			
R-sq between	0.0628		0.2138			
Overall	0.1118		0.2860		0.4257	
Hansen J test	0.0000					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Table 18. Regression Results for ROAA Specification without Time Dummies

ROAA	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.033	**(0.008)*****	-0.033	**(0.004)*****	-0.033	**(0.003)*****
BS	0.000	(0.000)	-0.000	(0.000)	-0.000	(0.000)
LLP	-0.099	**(0.025)*****	-0.118	**(0.021)*****	-0.126	**(0.022)*****
NLTA	0.007	(0.008)	-0.001	(0.005)	-0.005	(0.004)
NONINT	0.244	**(0.108)****	0.289	**(0.077)*****	0.376	**(0.070)*****
EQTA	0.073	**(0.025)*****	0.066	**(0.018)*****	0.062	**(0.013)*****
HHI	0.013	(0.032)	-0.002	(0.027)	-0.007	(0.025)
GDPG	0.038	**(0.013)*****	0.034	**(0.012)*****	0.026	**(0.014)***
INFL	0.005	(0.032)	-0.009	(0.032)	-0.029	(0.032)
DEBTGDP	-0.002	(0.005)	0.001	(0.004)	0.005	(0.005)
FX	0.001	(0.009)	0.009	(0.008)	0.025	**(0.009)*****
Constant	1.407	(0.999)	2.208	(0.624)	2.397	(0.542)
No. of banks	140		140		140	
No. of observations	336		336		336	
R-sq within	0.4360		0.4304			
R-sq between	0.5450		0.6066			
Overall	0.4690		0.5048		0.5144	
Hansen J test	0.0516					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%

Table 19. Regression Results for ROAE Specification without Time Dummies

ROAE	Fixed effects		Random effects		OLS	
	Coef.	Robust St.Errors	Coef.	Robust St.Errors	Coef.	Robust St.Errors
CIR	-0.361	**(0.097)*****	-0.344	**(0.040)*****	-0.333	**(0.032)*****
BS	-0.000	(0.002)	-0.001	**(0.000)***	-0.001	**(0.000)****
LLP	-0.836	**(0.314)*****	-1.156	**(0.285)*****	-1.232	**(0.220)*****
NLTA	0.009	(0.106)	-0.081	(0.062)	-0.109	(0.044)
NONINT	2.402	**(1.189)****	2.400	**(0.863)*****	2.729	**(0.699)*****
EQTA	0.077	(0.313)	-0.014	(0.183)	-0.008	(0.143)
HHI	0.110	(0.301)	-0.060	(0.284)	-0.049	(0.249)
GDPG	0.315	**(0.173)***	0.274	**(0.153)***	0.242	(0.161)
INFL	0.366	(0.274)	0.164	(0.294)	0.006	(0.306)
DEBTGDP	-0.000	(0.066)	0.045	(0.057)	0.058	(0.051)
FX	0.083	(0.103)	0.190	**(0.095)****	0.289	**(0.099)*****
Constant	25.452	12.070	34.565	(6.449)	35.388	5.685
No. of banks	140		140		140	
No. of observations	336		336		336	
R-sq within	0.3925		0.3821			
R-sq between	0.5777		0.6822			
Overall	0.4678		0.5280		0.5319	
Hansen J test	0.0157					

Note: Robust standard errors in brackets

*indicates significance at 10%, ** at 5% and *** at 1%