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Analysing the Performance of European Commercial Banks

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Declaration of Authorship

The author hereby declares that she compiled this thesis independently, using only the listed resources and literature. The thesis has not been used to obtain a different or the same degree.

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Acknowledgments

Abstract

The present thesis analyses the performance of the European banks in 2007-2011. First, brief information on the banking sector of each EU-27 country is provided. By the means of comparative analysis, it is, further, shown that banks, coming from countries less affected by the financial crisis, outperformed (in terms of ROA and ROE) banks coming from the worst affected countries. Additionally, panel-data and OLS estimation methods are employed to investigate the importance of various CAMEL determinants for banks' profitability. Assets quality, management ability, and interest earnings turn out to be strongly significant. Moreover, we report a structural change in the relationship relative to the ownership structure (foreign vs. domestic-owned banks) and observe a structural time-break that occurred as the result of the recent financial crisis.

Abstrakt

V této práci se zabýváme analýzou výkonu evropských bank v rocích 2007-2011. Na začátku je uvedená stručná informace o bankovních sektorech každého státu z EU-27. Pomocí komparativní analýzy dále ukazujeme, že banky ze států, méně ovlivněných finanční krizí překonaly (z hlediska ROA a ROE) banky, z více ovlivněných států. Kromě toho, jsou použity panel-data a ols metody odhadu pro vyšetření signifikantnosti různých CAMEL determinantů ziskovosti bank. Ukázalo se, že jakost aktiv, schopnost řízení a úrokové zisky jsou velmi signifikantní. Navíc jsme také postřehli strukturní změnu ve vztahu ke struktuře vlastnictví (srovnáním cizího a domácího vlastnictví) a strukturní časové přerušení, které vzniklo jako výsledek nedávné finanční krize.

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Acronyms

BIS	Bank for International Settlements
BoE	Bank of England
BOS	Bank of Slovenia
BoES	Bank of Spain
CEE	Central Eastern Europe
EBF	European Banking Federation
ECB	European Central Bank
EC	European Commission
EU	European Union
FCC	Federal Communications Commission
FSAP	Financial Sector Assessment Program
IMF	International Monetary Fund
NBR	National Bank of Romania
NATO	North-Atlantic Treaty Organisation
OENB	Oesterreichische Nationalbank
OECD	Organisation for Economic Co-Operation and Development

Abbreviations

CAMEL   Capital Adequacy

              Assets Quality

              Management Ability

              Earnings Profitability

              Liquidity Risk

BHA   Banks from Highly Affected countries

BLA   Banks from Less Affected countries

GDP   Gross Domestic Product

MDO   Majority Domestic-Owned banks

MFO   Majority Foreign-Owned banks

NIM   Net Interest Margin

ROAA   Return on Average Assets

ROAE   Return on Average Equity

RWA   Risk-weighted assets

1   Introduction

It is widely acknowledged that banks play an integrable role in the economic system and that their efficiency is closely related to the economic growth. Thus, the performance of the banking sector has been always a subject of considerable concern for different economic agents such as investors, depositors, policy makers, and bankers themselves. Recently, the European banking sector has faced several challenges that have strongly affected banks' profitability and could have contributed to structural changes in its determinants. As the result of the 2008-2009 financial crisis, the efficiency of the EU-27 banks decreased significantly: average profitability ratio, measured by the return on equity (ROE), had fallen to -2.7% from the average ROE in 2008 of 4.5%. Moreover, the variance of the performance indicators has grown, signalling that the banks were not equally affected by the economic downturn. Apart from that, the crisis has induced bank executives and policy-makers to pay more attention to the developments in the financial sector, henceforth, increasing concern about its stability. New regulation and supervision rules (specifically, within the BASEL III framework) are being implemented in order to enhance the level and quality of equity and to improve the banks' ability to face external shocks. Meanwhile, realization of these measures could permanently affect fundamentals, which are behind the banks' efficiency.

The present thesis aims at determining the factors responsible for the performance of the European banks, focusing particularly on the period 2007-2011. Within the scope of the work, we aim at verifying several presumptions. Namely, whether the performance depends on: a) a bank's origin and macroeconomic situation, with banks from highly-affected by the crisis countries performing worse than those from less-affected ones; b) a bank itself, i.e. its internal characteristics; c) a bank's ownership structure, with foreign-owned banks outperforming their peers. Apart from that, we will test, whether the 2008-2009 crisis has resulted in the structural change of the relationship between the banks' profitability and its determinants. In order to verify the propositions, the thesis makes use of comparative and econometric (panel data) methods.

The present thesis is structured as follows: Chapter 2 is dedicated to background information and literature review. Chapter 3 briefly describes the national banking sectors of 27 EU member states. Chapter 4 introduces the hypotheses, methodology and provides data description. The empirical results are presented in Chapter 5. The conclusion is found in Chapter 6.

2   Background information and literature review

2.1   CAMEL+S Rating Parameters – the background

It would seem improper to begin our discussion about literature overview on the CAMEL model without a priory explaining the meaning of this expression. Abbreviation "CAMEL" stands for: Capital adequacy, Assets quality, Management ability, Earnings profitability, and Liquidity risk.

Evaluation of the financial institution soundness using the CAMEL rating system dates back to the year 1979 (Federal Communications Commission, 1997). This rating system helped supervisory agencies to monitor bank conditions and to identify those who required supervisory concern. After many years of exploitation, some revisions on improving the function were made, deciding so to add a sixth component to "CAMEL+S" pointing for the Sensitivity to market risk. This regulation became applicable in 1997. The CAMELS ratings components are assigned on a numerical scale from 1 indicating the strongest performance (with little or no supervisory concerns) to 5 suggesting the weakest performance and bad management practices (with farthermost supervisory concerns) (Federal Communications Commission, 1997).

Following the Federal Register (1997), we will provide some brief information about each component of the CAMELS rating system adopted in the United States. For a more detailed explanation please refer to the above source.

The first component, the Capital Adequacy is the minimum level and quality of capital, which financial institutions are expected to maintain in a way that their viability is not threatened by credit, market and other risks. The Asset Quality, inter alia, reflects the quality of all asset investments and loan portfolios, off-balance sheet transactions, etc. The Management Ability characterizes the capability of the financial institution executives to comply with law and regulation, to manage risks, ensure effectiveness of the institution's operations, while avoiding self-dealing and by demonstrating willingness to serve the community needs. The next component of the CAMELS ratings is the Earnings Profitability. It represents not only the quantity of the bank's earnings, but also its quality and moreover its stability. The Liquidity Risk reflects the institution's ability to maintain a sufficient level of liquidity in order to

meet financial obligations in a timely manner. Lastly, the Sensitivity to the market risk represents the capability of the management to face and control the market risk, which arises from changes in foreign rates, commodity prices, interest rates, etc.

2.2   Introduction to the Basel framework

It has been 25 years, since a common capital adequacy framework was introduced in Basel, Switzerland. Nevertheless, the adoption of minimum capital requirements was firstly initiated in the USA and in the UK in 1981 (Jackson, et al., 1999). After many years of consulting and joint workshops with the G-10 countries, in 1988, the Basle Committee issued the "Basle Capital Accord" on Banking Supervision (Basle Committee on Banking Supervision, 1988).[1] This agreed framework was intended especially for the banks that were active in the international settlements, suggesting them to establish a minimum level of capital. The most important objectives of this framework were not only to fortify the stability and soundness of the international banking system but also to reduce competitive inequalities, suggests the paper (Jackson, et al., 1999).

Since then the accord for international regulation and supervision framework for banks has been significantly developed, reformed and implemented successfully through three Pillars of BASEL II. Nevertheless, due to the necessity of bettering the governance and risk management and moreover with the aim of improving the banks' ability to absorb external shocks, the Basle accord has been even more enhanced via the implementation of the new framework, BASEL III.

When comparing to BASEL II, the BASEL III framework surely has introduced new challenges for the banking sector. Enhancing the level and quality of the common equity in relation to risk-weighted assets (RWAs) is an important confront for all the banks' profitability. The phased in implementation is foregoing. Starting January 1, 2013, banks had to meet the requirements for Common Equity Tier1 of 3.5% (from the level of 2%), Tier 1 capital of 4.5% (from the level of 4%). From January 1, 2014, the minimum Common Equity Tier 1 will be 4% and Tier 1 Capital 5.5%. The increasing will proceed on January 1, 2015 (the minimum Common Equity Tier 1 will be 4.5% and Tier 1 Capital 6%) (Basel Committee on Banking Supervision, 2011).

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[1] In 1974 was established "Basle Committee" as a representative of central banks and supervisory authority of main industrialized countries (Bank for International Settlements, 2009).

Also a new Capital Conversation Buffer is introduced as a new element in the framework. According to the Basel Committee on banking supervision (2011), this ratio is created to make sure that banks establish capital buffers outside the periods of stress, in order to use them in case the losses occur. Its gradual implementation (starting from January 2016 with 0.625% level, 1.25% level in January 2017 and 1.875% level in 2018) will increase the Minimum Total Capital by 2.5% in 2019, raising it to 10.5% level. By January 2019, all banks must have set the minimum requirement according to the new BASEL III framework.

Another proposed requirement is the Countercyclical Capital Buffer consisting of common capital which will range from 0% to 2.5% level. This requirement will be set by the judgment of national authorities. They will monitor and assess the credit growth. If there is a signal of excess aggregate credit growth threatening with a system-wide risk, they will apply the countercyclical buffer requirement. When the system-wide risk dissolves they will release banks from this requirement. This ratio will further increase the capital conversation buffer.

Except for the changes in capital requirements, the BASEL III framework introduces two important ratios on behalf of liquidity standards. The first ratio, the Liquidity coverage ratio will expect banks to maintain 30-day high-quality liquid assets starting from 1 January 2015 (Basel Committee on Banking Supervision, 2013), in order to fund a possible stressed scenario. The second is the complementary Net stable funding ratio designed to improve the maturity structure of assets and liabilities in time horizon of one year (Basel Committee on Banking Supervision, 2013).

The complete overview of the regulations and reforms, which have been introduced by BASEL III, can be found in the available sources of the Bank for International Settlements (BIS).

2.3   Empirical Literature Review

We will begin by reviewing works that employed the ratings of CAMEL components as measures of banks' performances and continue with studies, where the ratios were applied to broader empirical research. Lastly, we will go through study papers that have considered the foreign ownership issues and structural break with respect to time.

The paper of Sangmi and Nazir (2010) analyses the financial position of the two largest banks in the northern part of India. The authors used CAMEL parameters, to range banks in scale from 1 indicating a strong bank to 5 indicating a weak bank.

Their study used annual data for the 5-year period. The financial performance of these banks was measured using the ultimate earnings ratios: the return on equity (ROE) and the return on assets (ROA).

In the paper of Kosmidou and Zopounidis (2008), the authors adopt a further extension of the CAMEL rating system to evaluate the banks' performances in Greece. This extension was constructed by Brans and Vincke (1985) and is called PROMETHEE[2] method. Model applied by Kosmidou and Zopounidis (2008) uses a dataset of 16 cooperative banks and 14 commercial banks in Greece for the period 2003-2004. Such observation period was chosen in order to capture the implementation of banking principles set by the Second Banking Directive in 2003. These principles provide equal competitive conditions for all banking institutions in the European Union. Authors' remarks conclude that most commercial banks try to improve financial ratios, increase the number of consumers and maximize their profit by being more competitive in the market. In all banks, especially in cooperative ones, growth of equity and loans was observed, and the benefit was mostly seen in the development of the local economy. However the implementation of the principles by some banks was not satisfying as they showed a decrease in financial indices, which could be a sign of the forthcoming problems.

The parameters of the CAMEL model were recently used by Lakhtaria (2013), for a comparative analyse of three banks' performances in India.[3] The study employed only selected public banks for the period of three years 2010-2012. Regarding each parameter of the model, more than one ratio was used to assess the ranking scale. Different from the fundamental ranking method applied in the US, the author here limited ranking only from 1 to 3, where number one reflects the best performance score. To finally reach the overall grand ranking the group rankings were averaged out to find that Bank of Baroda scored the best, followed by State bank of India and Punjab Bank.

Looking back to the previous studies it is quite hard to find when the CAMEL parameters were firstly used in an empirical research. In the working paper of DeYoung, et al. (1998), the authors apply an econometric technique using panels of quarterly data for 1,079 US national banks. They prove that private information that is assessed through the CAMEL rating system is useful to financial markets only some months after the rating exam is done.

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[2] PROMETHÉE - Preference Ranking Organization Method for Enrichment Evaluation

[3] Punjab National Bank, State Bank of India and Bank of Baroda

The study of Huang, et al. (2012), employs CAMEL determinants as explanatory variables to examine the performance of two banking groups in Taiwan, which is presented by the ROA ratio. Except for the first determinant (the capital adequacy), the authors employ two ratios for each CAMEL determinant. They also divide the sample into two periods, the pre-crisis and the post-crisis period, to investigate, whether the effect of financial determinants has changed over time. They show that ROA is highly related to some specific CAMEL ratios, and find out the changes due to the crisis.

The empirical study of Ongore and Kusa (2013) uses CAMEL ratios to analyse the performance of commercial banks in Kenya. Authors utilise panel data on 37 banks for 10 years, from 2001 to 2010. They run generalised least square and apply a linear multiple regression model separately on three dependent variables; return on assets, return on equity and net interest margin. Knowing that commercial banks' main goal is to increase their profitability, these dependent variables truly represent that objective, suggest the authors. Further on, they test for the significance of bank internal factors, whereas for independent variables CAMEL parameters are used, and bank external factors, where independent variables are GDP growth rate and inflation rate. Additionally, the authors investigate the effect of domestic ownership on the dependent variables. Except for the liquidity variable, all other variables from internal factors resulted significant in the three models. From external factors, GDP had a positive correlation with ROE but a negative correlation with NIM and ROA. Thus, this relationship was reported as insignificant. The other external variable, inflation, had a significant negative correlation with all dependent variables. The role of bank ownership did not reflect any significant difference on overall determinants of bank performance.

Another study finds the use of CAMEL ratios to compare the significance of ownership for commercial banks' results. The study of Jha and Hui (2012) separates 27 banks in three groups according to ownership status, namely; domestic private, public sector and venture banks. Except for the descriptive analysis, an econometric multivariate regression model was used to analyse their performance. The latter method firstly employed both the ROA and ROE for dependent variables. As a result, two similar models were constructed. The prediction power of the model with the ROE was lower compared to the ROA variable. Therefore, the first model with the ROA as a dependent variable was used to further explain the model and determine the drivers of banks' performance. The authors conclude that the relationship of ROA with the capital adequacy ratio and interest expenses to total loan and net interest margin proved to be negative and significant while other ratios were not significant.

They also found that foreign-owned banks are equally efficient to domestic private banks, but public sector banks were significantly less efficient than their counterparts.

3 National Banking Sectors Overview

This chapter provides brief information about the state of the banking sector in each EU member country - subject of our analysis. We aim to obtain a general idea on the banks' performances during and after the crisis and possibly to determine country-specific characteristics. For more detailed information please refer to the sources provided especially to the latest released report of the European Banking Federation (EBF, 2012) and International Monetary Fund country specific reports.

3.1 Austria

The large and very developing banking sector of Austria constitutes 766 credit institutions, which in 2011 summed total assets of €1,010 billion (EBF, 2012). Due to favourable exchange rates, loans to households in a foreign currency were given in a higher amount. Only after financial crisis in 2008 austere rule were initiated with the intention to reduce the loan volumes given in foreign currencies and at the end of 2011 measures for 'sustainability-boosting' were introduced by banking regulators. Two significant reasons behind the later act are counted, first as an approach to support the implementation of Basel III rules in time and the second reason to improve the refinancing structure of bank subsidiaries. Meanwhile Austrian subsidiaries that operate in Central, Eastern and Southeastern Europe, generate more profits than the domestic banking and hence are loaded with higher risk, especially with higher loan loss provisions (OENB, 2013). Notably Austrian banking sector was weakened by the global financial crisis and credit bubbles of CESEE countries. Some Austrian banks were bailed out and restructured, amongst them KommunalKredit and Hypo Group Alpe Adria was nationalized (IMF, 2010) (Raiffeisen Research, 2012). According to the Austrian national bank report (OENB, 2013), the ongoing sovereign debt problems have reflected to a weak operating performance in Austrian banks. A supervisory guidance document intended for Austrian large international active banks was published in 2012 from the National Bank of Austria and the Financial Market Authority. This guidance document consists of measures that ensure the capital buffers are raised and recovery plans are prepared (OENB, 2013).

3.2 Belgium

Residing in the centre of Western Europe, Belgium is not only the centre of European institutions (having European Commission located in the centre of Brussels) but it also embraces the North-Atlantic Treaty Organisation. With the presence of such important international institutions, it is no wonder that more than four fifths of the banking sectors are foreign-owned. Four leading large banks in Belgium (KBC, Belfius, ING Belgium and BNP Fortis) hold more than 65% of the entire banking segment. Following the EBF report (EBF, 2012), 106 banks in Belgium amount total assets more than €1,100 billion (values for the end year of 2011). Households and small enterprises lead on receiving loans. But worth mentioning could be that customer deposits, especially households also deposit roughly half of these bank liabilities. Being considerably hit by the 2008 financial crisis, three large banks have been supported with capital injection from the government. Due to structural changes in banking supervision in 2011, National Bank of Belgium took competences from Financial Services and Market Authority in micro and macro-prudential supervision.

3.3 Bulgaria

The market structure of the banking sector in Bulgaria is a typical model to those of Central Europe countries. 10 banks share 77% of total assets which is the average number on the whole region (Deloitte, 2012). In 2009, Bulgarian economy faced a decline in GDP growth (-5.5%). After the stagnation figures of the year 2010 (0.4%), recovery appeared with a growth rate of 1.7% in 2011, (Deloitte, 2012). The economic crisis affected the income of households and solvency of the firms according to the report analysis (ElanaTrading, 2012), however the banking sector continues to be liquid and well capitalised. The main concern remains on assets quality, because nonperforming loans continued to rise (even in 2012), (IMF, 2012). Foreign investors own the majority of the market share. According to the EBF report (EBF, 2012), there were 31 credit institutions, averaging €42.16 billion, in 2011.

3.4 Cyprus

Since becoming a Eurozone member state in 2008, Cyprus' loose fiscal policies led the country to public debt and large fiscal deficits (IMF, 2013). Low corporate tax regime attracted abundant cash inflows from non-resident clients into the banking sector. This money incursion was used to finance large account deficits, deteriorating foreign investment situation. The size of banking sector got increased to eight times over GDP. Different from countries that also have a large banking system, total assets

here are rather owned 63% by domestic-owned credit institutions (commercial banks and cooperatives) (Stephanou, 2011). However the accumulated deep debt imbalances triggered insolvency problems of the two largest banks, consequently the authorities took decisive restructuring steps to resolve and recapitalise the two biggest banks. Financial support Fund from European Stability Mechanism, provided to restore the banking sector health, is expected to extend the contribution fund. According to the EBF (EBF, 2012), at the end of the year 2011, in Cyprus were 141 credit institutions counted, amounting for €134.01 billion of total assets.

3.5 Czech Republic

Foreign banks own more than 95% of total assets in the banking sector in the Czech Republic. By the end of the year 2011, total assets amounted €180.4 billion. 44 banks hold 99.4% of that amount of assets and only 0.6% is held by 14 credit unions (EBF, 2012). Since merging with the EU, the number of foreign branches remarkably increased, increasing so the competition for market shares. However, more than 57.5% of all assets is managed by the four largest banks in the Czech Republic, namely Česká Spořitelna, Komerčni Banka, ČSOB and UniCredit bank. Because of a good loan-to-deposit ratio, good level of capital adequacy, most activities in domestic currency and in the domestic market, few activities in international financial markets and many other reasons, the banking sector was slightly hit by the financial crisis.

3.6 Denmark

A number of financial institutions and their branches had apparently decreased in the last decade in Denmark. Meanwhile employment was more stable, following a positive average growth in assets with total amount of €1,145 billion by the end of 2011. More than 67% of the market is managed by the two biggest banks, specifically Nordea and Danske Bank. Negative figures of return on equity have appeared in 2008 and 2009 but they improved to 2.4% in 2010. Likewise the Czech Republic, Denmark also has its own national currency, but contrariwise the Danish Central Bank maintains a fixed exchange rate policy with the euro area. Financial enterprises in Denmark are monitored by the Danish Financial Supervisory Authority. This authority is very powerful; it can even declare enterprises as incapable to manage their activity, concludes the EBF report (EBF, 2012). In 2008, it established the Financial Stability Company, with the main aim to incorporate and help enterprises which have insolvency problems, that is, providing the deposit Guarantee Fund. In return, this agreement with Danish State and Danish banking sector, made the government profit a significant amount of money.

3.7 Estonia

The banking system in Estonia is represented mostly by commercial banks. The market share is evidently dominated by the four largest foreign-owned banks which are: Swedbank, SEB Pank (both Swedish subsidiaries), Sampo Pank (a Danish branch) and Nordea Pank (a Finnish branch). During the financial crisis in September 2008, Swedbank experienced an excessive withdrawal of deposits, around 15 percent, reports the OECD, (OECD, 2011). Consequently, considered as safer banks for deposit, Nordea and Sampo Pank increased their market share at the deposit side, because on the other hand, the Swedish subsidiaries were not considered secure. However the liquidity problem was normalised by the central bank of Sweden. The soundness of the banking system is completely linked with the soundness of foreign banks that operate in the country. Yet, according to the OECD (OECD, 2011), Ministry of Finance, the Financial Supervision Authority and the Central Bank (Eesti Pank), were responsible for managing the financial crisis. In 2008, the IMF recommended them to act jointly with Swedish and other Baltic authorities to proceed against any financial risk. Thus, the central bank of Estonia entered into an agreement with Sweden's RiskBank in February 2009. The real estate market has steadily recovered, and, currently, the banking sector is well capitalised, is liquid and remains profitable according to the consultation report of the IMF (IMF, 2013). Indicators in the EBF report (EBF, 2012) for the end of the year 2011, numerate 17 credit institutions with aggregate assets €19.02 billion.

3.8 Finland

Banking sector in Finland has remained strong and stable during the sovereign debt crisis in Europe. Loan growth to non-financial companies increased in 2011, including housing loans to households because of low interest rates, reports the EBF, (EBF, 2012). Total assets amount €643 billion at the end of 2011. This amount includes a considerable amount of derivatives and loans of credit institutions granted to euro area. Meanwhile in 2011, there was also a substantial increase in loans to non monetary financial institutions outside Finland. In general, the growth of the balance sheet was faster than any other country in the euro area.

3.9 France

Banking sector in France comprises a large number of credit institutions. Working on a very sophisticated system, banks in France operate their activity in a universal banking model. Banks: BNP Paribas, Société Générale, Crédit Agricole, BPCE and

Crédit Mutuel lead the market. Following the EBF report (EBF, 2012) in 2011, 660 credit institutions were operating in France, amounting total assets of more than €8,391 billion. These institutions operate under French ownership around 70%. Activity of French banks is spread on many other countries, but also many foreign banks (mainly coming from the EU), same time operate in France. The banking supervisory is also sophisticated, accounting that separate supervisory institutions, controlling authorities and advisory committees operate under the Ministry of Economy. Same applies for legal framework for banking business; they have special commissary authority's monitoring and issuing regulation and codes of conduct to assure a clear and concise legislation.

3.10 Germany

Europe's largest economy gladdens one of the world's most stable banking system. Germany's financial sector is composed of three pillars according to the operational purpose and ownership (Brunner, et al., 2004). First pillar consists of the public sector banks (Landesbanken and Sparkassen) and development institutions. Second pillar consists of cooperatives, and third pillar compromises commercial banks. In 2011, according to the EBF report (EBF, 2012), there were 1,898 credit institutions with total assets €8,393 billion. The ranking of the leading banks, according to the total assets, starts with the biggest private commercial banks (Deutsche Bank AG, Commerzbank AG), public sector bank (KfW Bankengruppe) followed by the cooperative (DZ Bank AG) and so on.[4] Among them, on top 10 there is also listed the foreign-owned bank, the HypoVereinsbank which was acquired by Italian UniCredit. Even though German banks are meeting the minimum levels of regulatory capital, they are making progress in meeting leverage and liquidity ratios and raising capital according to the requirements of Basel III. Restructuring of Landesbanken is gradually progressing, while the outstanding balances of capital support to banks (support under the original Special Fund for Financial Market Stabilization mechanism) have remarkably decreased. Strong trade linkages with the financial market and macroeconomic developments of the leading economies, like the United States, countries from emerging Asia and United Kingdom, have quite an influence to the German economy in general. Vulnerabilities of large banks, according to the IMF report (IMF, 2012) are as follows; they generate low profitability (and have relatively low capital quality), continue to maintain and depend on funding from the wholesale, and exhibit considerable income abroad.

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[4] Source: http://www.moneystockstycoons.com/bank-lists/germany-banks/

3.11 Greece

During the global financial crisis (2007-2009), Greek banks were adequately capitalised. The worsening of liquidity conditions was wind-up by the government capital injections and European Central Bank to ensure stability. Nevertheless, the burst of Greek sovereign debt crisis affected harshly the banking system in the country. Deposits declined significantly reducing the level of capital adequacy below the minimum requirement level. The worst peak of non-performing loans ratio reached up to 14.7% in September 2011, reports the EBF (EBF, 2012). Immense capital aid came from Eurosystem credit and Emergency Liquidity Assistance by the Bank of Greece achieving a figure of €130 billion by the end of the year 2011. In the beginning of 2012 report indicates that household could agree to deposit their money in one year maturity for 4.79%, while in the euro area it was 2.96%. Greek banks were still undercapitalised, but their main challenge amongst others' was to reach the capital adequacy up to 10% by the end of June 2013. According to the EBF report (EBF, 2012) Greece has 58 credit institutions that amount total assets €476.8 billion by the end of 2011.

3.12 Hungary

When the global financial crisis approached Hungary, the economic outlook had been already weak in the country. The GDP trough of (-6.8%) was descent in 2009. The government had to borrow €20 billion from IMF to prevent possible bankruptcies employing austerity measures (Deloitte, 2012). To balance the budget deficit, government amidst others introduced a new banking tax, which highly affected the performance of the financial sector in general. Forint, the Hungarian currency also faced an enormous depreciation, affecting so the mortgage lending of households which estimation is usually denominated in foreign currencies. Additionally in 2010 losses in banking sector appeared. Except main incomes from the net interest incomes, fees contribute also a sizable amount of 20% in total incomes of the banking sector. Concentration of the assets is shared amongst 10 largest banks. Many of them are part of international groups. Only 4% are state owned. Return on equity in 2010 was -2.5% (Deloitte, 2012). The financial sector is facing unfavourable environment, because of the high tax burden (IMF, 2013). Non-performing loans have increased together with bank losses. Meanwhile, due to injections by parent banks and deleveraging process and reduction of liquidity risk, banks manage to keep a good capital adequacy ratio and be liquid. In 2011, there were 189 credit institutions amounting €114.9 billion total assets (EBF, 2012).

3.13 Ireland

By the end of the year 2011, Ireland has counted approximately 480 total credit institutions with €1,025 billion total assets (EBF, 2012). Only 20 were domestic banks and building societies. Activity of remaining foreign-owned institutions goes even beyond Ireland, mainly to international clients. Domestic banking sector in Ireland is predominantly owned by the government. They compromise of building societies of which the largest is the Irish Bank Resolution Corporation, AIB Group, Bank of Ireland Group and Permanent TSB Group. These banking groups are going through a restructuring scheme since 2010 which it results on merging into banking groups that amongst others have to meet loan-to-deposit target of 122.5%, reports the EBF (EBF, 2012). Different financial services including savings, investments, payment services, cash-based banking services and many more are provided by the postal service, An Post (a state-owned operator) whereas insurance services are provided by its subsidiary the One Direct. On the other hand the international financial sector provides widely services contribution up to 16% on overall corporate income tax in Ireland.

3.14 Italy

Banking sector in Italy is almost completely privatised, hence the government owns less than one percent of the shares. Its banking industry is large, accounts for 740 banks (754 reported in the year 2011), 411 of them are small mutual banks, reports the EBF (EBF, 2012). Other entities are cooperative banks and joint stock companies which mostly operate in the domestic market. Foreign banks are counted to be 72. Total assets account to be €4,065 billion. The sovereign debt crisis in Italy has affected the banking sector. The downgrade of the country's credit rating has resulted in decline of wholesale funding and acceptance of higher costs from international funding market. Italian Minister of Economy and Finance (Grilli, 2013), during the International Monetary and Financial Committee meeting held on April 2013, states that the GDP decrease of 2.4% was affected by the fall of domestic demand. More rigid conditions for lending (incurred because of the growth of non-performing loans) led to a fall in demand for credits. In April 2013, Government has introduced a funding package to help the employment and domestic demand. These capital injections are expected to help the economy recover, however positive figures are not anticipated until the year 2014 (Grilli, 2013).

3.15 Latvia

When Latvia joined the EU in 2004 large investments hastened economic growth and inflation so much that the real estate bubble was created and soon deficit on current account emerged. To pull out from the liquidity crisis, to Latvia was approved a Fund program with total financing amount of €7.5 billion, reports the IMF (IMF, 2013). This funding program called Stand-By Arrangement amongst others compromised measures to stabilise the financial sector. Hence in mid-2010, non-performing loans decreased remarkably. The banking sector is controlled from 20 commercial banks, comprising a strong presence of foreign banks. The operation model of the banks is divided amongst banks that work with non-resident clients and those working with resident clients. The latter group consists of the subsidiaries of Nordic banks and other foreign bank branches that operate in Latvia. According to the EBF report (EBF, 2012), 31 was the number of credit institutions with assets totalling €29.5 billion in 2011. The banking sector is going through a restructuring program, especially after the Latvijas Krājbanka and Parex Banka have lost their banking license. According to the IMF report (IMF, 2013), these banks were suspended because of insolvency problems and fraud discovery. The real GDP growth figures show that the country is doing well in recovering from the crisis. In 2014 euro adoption is expected to take place.

3.16 Lithuania

Banking sector in Lithuania is driven by well-capitalized and liquid foreign-owned banks. According to the IMF report (IMF, 2013), from the domestic sector, four credit institutions were liquidated in the late 2011. Third largest bank by deposits, the Bank Snoras, was declared bankrupt as a result of fraud and money laundering. This intervention resulted in the decline of underscore in effective banking supervision; however the threat of financial instability was notably removed. Bank of Lithuania now monitors the crucial banks' loan loss provisions and applies more austere stress testing measures to keep the banking system healthy. At the end of 2011, the report of EBF (EBF, 2012) accounts 92 credit institutions with €24.7 billion assets. Adoption of Euro currency instead of Lithuanian Litas is expected to be implemented in 2015.

3.17 Luxembourg

Luxembourg is number one Europe's leading investment fund centre providing banking services to worldwide clients. Being a small country, domestic financial market consist a small share in the banking sector. According to the EBF report (EBF, 2012),

total net assets of Luxembourg had decreased for 24% after the sub-prime crisis in 2007 and stock market crisis in 2008, but because of the superior reputation very soon they recovered, giving unexpected positive growth figures. At the end year of 2011, 141 credit institution summing €1,101.4 billion assets were reported by the EBF (EBF, 2012), moreover in March 2012, total assets weighed to €2,217.2 billion.

3.18 Malta

The smallest EU economy of Malta has a large financial sector, accounting for assets eight times GDP (IMF, 2012). According to the report of EBF (EBF, 2012), in 2011, financial sectors' total assets were €51.34 billion, allocated on 26 credit institutions. It is divided into domestically-oriented banks and foreign-oriented banks. The first group consists of seven banks, four of which are subsidiaries of EU banks. The second group is involved in non-resident business activities, for investment banking, money transfer, trade financing etc. Hence the market is dependent on tourism and trade of nonfinancial corporations (mostly foreign-owned), the economy is exposed to shocks and relies on FDI and EU investment funds. In general, banks are liquid, well capitalised, and continue to outperform. The two major domestic banks in Malta share 80% of total assets (Bank of Valletta and HSBC Bank Malta) (Moodys, 2004).

3.19 Netherlands

The banking sector in the Netherlands is dominated by four largest banks (ABN AMRO, ING Group, Rabobank and Fortis. These banks hold around 95% savings of Dutch consumers. Financial sector similar to neighbour countries is internationally oriented and it has benefited from external investments from European banks. Financial reforms and regulations are taking place to ensure a good flexibility and resilience during the turmoil of the global economy. The 2011 report of EBF (EBF, 2012), numerates 287 credit institutions with €2,428.7 billion total assets.

3.20 Poland

The banking industry in Poland is characterised by a huge number of cooperative banks that present only 6% of market share. Big players are commercial banks which are majority foreign-owned. Taking deposits and granting loans remains in high demand especially for households for the purpose of buying houses. Inter alia Poland is an attractive place for domestic business investments crucially on big infrastructure projects and small medium enterprises. According to the report of EBF (EBF, 2012), in 2011, there were 700 credit institutions with total assets amount of €309.8 billion.

3.21 Portugal

The financial sector of Portugal is characterised with mutual agricultural credit banks. Financial institutions did recover from the financial crisis, without the necessity of the bail out from the government aid package. However, this fund is being used to accomplish the capital requirements set by the national bank. The international banking activity is very relevant for the financial sector. The good geographical position, similar cultural and linguistic binding with Brazil and other countries around, make Portuguese banks attractive for retail and investment banking. Amid others, activity comes also from European countries, where most the community of immigrants live. The EBF report (EBF, 2012), numerates 155 credit institutions in 2011 with total assets €573.6 billion.

3.22 Romania

The banking structure in Romania is composed of banks that are majority or entirely state-owned, banks that are majority foreign-owned, and eight foreign branches. A number of 34 majority foreign-owned banks hold more than 80% of total banking sector assets (NBR, 2012). Austrian banks lead by 38%, followed by Greek bank's subsidiaries (IMF, 2012). Thanks to solid deposits and sustaining commitments to parent banks, the overall banking sector is well capitalised. However, the profitability has remained poor, because of high provision costs and stagnant credit growth. Following the IMF report (IMF, 2012), non-performing loans had risen up to 17% (by the end of June 2012) because of the loans which were given in foreign currencies those and to un-hedge borrowers. In 2011, the EBF reported €91.76 billion total assets shared to 41 (EBF, 2012).

3.23 Slovakia

Subsidiary banks from Austria, Italy, Belgium and Czech Republic control the financial sector in Slovakia. Four leading banks (Slovenská sporiteľňa – member of Erste Bank, VUB Banka-Intesa Sanpaolo, Tatra Banka – member of Raiffeisen and CSOB-KBC) share more than 55% of total assets in the market.[5] In the beginning year of 2009, Slovakia went through a short recession period, but it successfully recovered due to solid policies and good economic fundamentals, reports the IMF (IMF, 2012). Sound inter-trade connections with partners strengthen the economy, driven by lately enlargement of auto production in the country. Banking sector being reliant on do-

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[5] Source (Raiffeisen Research, 2012)

mestic deposits is profitable, liquid and well capitalised. According to the EBF report (EBF, 2012), in 2011, there were 31 credit institutions averaging €58.02 billion.

3.24 Slovenia

The total number of credit institutions in 2011 was 25, with total assets summing €52.35 billion (EBF, 2012). Banks clearly dominate the market in terms of total assets (€48.7 billion) (BOS, 2012). In the Financial Stability Review, banks are divided in three groups, namely those operating under majority foreign ownership (11 banks, three of them are branches of foreign banks), the large and small domestic banks. Large domestic banks hold around 62% of the market share, following next the majority foreign-owned banks with around 29%. The financial sector has been hit very hard by the global financial crisis (IMF, 2012). For the last two-three years, operating losses in the banking sector have been reported. With weak governance in domestic banks, it is no doubt that the government had to inject with capital the largest banks controlled by the state. According the report of Slovenian central bank (BOS, 2012), banking system is facing a hard period (decline in total assets), total assets continued to decrease widely €2 billion first 10 months of 2012. The decline of household consumption and gross investment has reflected in a decline in GDP (by -1.2%, in the second quarter of 2012). In addition demand for housing loans decreased because of more rigid credit standards. Capital market continues to face difficulties, characterised with restriction on specific equity investments, falling returns and low liquidity (over the first 10 months of 2012). The market capitalisation of the shares and the trading volume were still below the level where they have been (prior to the crisis 2008), while bonds issued to US markets were successful. Albeit, refinancing risk is high, because of the downgrading on long-term sovereign debt and banks. Regarding the capital adequacy, the banking system overall, still meets the EU requirements with 11.5% in September 2012, and 10.1% Tier 1 capital ratio (BOS, 2012). Liquidity pressures have been reduced by funds supported from the European Central Bank. However a continuous downgrading by the rating agencies would significantly weaken the capability of the government to recapitalise banks in need. Furthermore, except for the privatisation of state-owned banks, the Financial Sector Assessment Program (FSAP) mission recommends the immediate establishment of the company that will deal with asset management, operational crisis arrangements and ensure recapitalisation (IMF, 2012).

3.25 Spain

Deterioration and persistence of sovereign debt crisis in the euro area affected the Spanish economy accumulating high fiscal imbalances. In the beginning of 2011, a legislation for banks was approved, a new solvency ratio introduced. To restore the confidence of the investors and to strengthen the financial system soundness, the banking sector had to overcome a restructuring and recapitalisation adjustments to meet the minimum required level of capital (BoES, 2011). Because of a fall in consumption and investment in both private and public sector, the Spanish economy entered through a second recession in late 2011 (BoES, 2012). Spanish banks' access to international funding markets remains limited. The government asked for financial support from the ECB (in a form of a program €100 billion) in order to help banks that need recapitalising, and to apply measures that help boost the resilience of the financial system from different shocks. Shortcomings from domestic real estate boom-bust, and external factors contributed to the crisis for the past four years. The restructuring process included merging and acquisition of 50 entities into only 14 large and medium-sized banks, not including small private banks and other non-foreign banks. They are categorised into four groups, namely G1- large internationally active banks (account 33 percent), G2 - former savings banks (17 percent), G3 - former savings banks that have received state support (22 percent) and G4 consisting of medium and small private sector banks (only 11 percent) (IMF, 2012). Banks dominate the financial sector which comprised of 335 credit institutions averaging €3,643 billion total assets in 2011 (EBF, 2012). Biggest five banks (Banco Santander, BBVA, Caixabank, BFA-Banks, Banco Sabadell) share more than 70 of total assets of the whole financial sector. The largest banks, being well capitalised and profitable same time, resist the economic situation very well, whereas those groups of banks that were more in a critical condition and needed public support have been acquired by the solvent entities or are further in the restructuring process. On the third review of the financial assistance programme for Spain, held at the end of May 2013, the delegation from the European Commission, the European Banking Authority and the European Stability Mechanism argues the following remarks about the latest situation in Spain. Banking sector solvency and liquidity situation improved (ECB, 2013). For banks having received State aid, the restructuring process is well underway they suggest, regaining so the access to funding markets. In addition the volatility of corporate and sovereign bond yields decreased indication of further stabilising of financial markets. Challenges remain on correction of fiscal imbalances, decreasing unemployment and many other country specific reform recommendations from the European Commission (EC).

3.26 Sweden

The financial sector in Sweden is divided into four categories. The main group consists of domestic commercial banks, dominated by four banks, namely Nordea, Swedbank, Handelsbanken and Skandinaviska Enskilda Banken providing consumers with retail services in stores and online services. Listed in the second category, Danske Bank is the leading foreign bank which focuses its activity on securities, market and corporate banking. In the third and fourth category enter small regional savings banks, and respectively co-operative banks, which co-operate with the Swedbank to provide better solutions to its clients. The financial infrastructure as mediation of payment is technically very sophisticated. Many services are obtainable through internet means and co-operation with other enterprises such as petrol stations and supermarkets. At the end of 2011, 175 credit institutions with aggregate assets €1,140 billion, reports the EBF (EBF, 2012).

3.27 United Kingdom

The basic financial services like payment, intermediation, risk transfer and insurance have been everlasting , whilst the system providing them has evolved over the past 50 years in the UK, stress/examine Davies et al. (Davies, et al., 2010) on the bulletin research and analysis paper of the Bank of England (BoE). They illustrate, how financial innovation and globalisation, have transformed the financial sector into various banking groups according to the function and location. Banking services nowadays are provided by more than 300 banks and building societies in the UK (Davies, et al., 2010), however the four largest UK banking groups dominate the market (Barclays, Lloyds Banking Group, HSBC and RBS).[6,7] Strengthening of banks' balance sheets (after the crisis) has gradually improved, thus at a slower pace (IMF, 2012). Largest UK banks keep core Tier 1 capital ratios above 10% which is higher than the average of European banks but still it is lower than the US and Asian peers. Capital rising from cutting off risk-weighted assets is in progress. However, the IMF report shows that the bank's capital level required by Basel III is 25 percent below (IMF, 2012). In 2011, because of increased wholesale funding costs, and high impairments from non-UK exposures, the profitability has declined, and two large banks being supported by the government reported losses. Exposures of UK owned banks, to countries facing sovereign debt risk has been steadily reduced, thus US followed by

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[6] Barclays, LBG and HSCB are English Clearing Banks, whilst RBS is a Scottish bank

[7] For more detailed information about the consolidation of merging or acquisition banking groups please refer the source (Davies, et al., 2010).

France and Germany remain the top external borrowers. On the latest Financial Stability Report (BoE, 2013), the remaining risks coming from global recovery and euro area imbalances, are not the only concerns for the UK market participants nowadays. Operational risk is among them, and it includes threats coming from cyber attack. [8] Measures reducing and preventing cyber risks have been a focus of attention in the UK recently. In 2011, number of credit institutions were counted 373, with total assets €9,708 billion (EBF, 2012).

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[8] Following the report (BoE, 2013), cyber attack refers to: when an individual or group seeks to exploit vulnerabilities in IT systems for financial gain or to disrupt bank services.

4   Hypotheses, Methodology, and Data Description

4.1 Hypotheses Statement

In the present thesis, we aim at verifying three hypotheses related to the performance of the European banks in 2007-2011.

We start by checking, whether banks from countries that were highly affected by the financial crisis are performing worse than those from less affected countries. In order to accept or reject the hypothesis, we employ several comparative methods. For a robust closure we apply a formal statistical test. First, we find out which countries have been strongly affected by the financial crisis in 2008-2009. The GDP growth rate, as a complex measure of economic activity, could be used as a threshold variable. In order to divide countries into Less Affected (LA) and Highly Affected (HA) we first calculate the benchmark, which is the average GDP growth rate in 2009-2010 for the EU-27 area as a whole. The countries are then separated into two groups according to their own average GDP growth rates in 2009-2010 relative to the benchmark. Next stage shall deal with commercial banks. Based on their country of origin, we divide all banks into two groups: Banks from Less Affected countries (BLA) and Banks from Highly Affected countries (BHA). To compare and find out which group has performed better during the financial crisis, we will make use of banks' profitability and performance ratios, specifically, the return on average assets (ROAA), the return on average equity (ROAE) and the net interest margin (NIM). According to the wide literature, rates of return are good predictors and the best to interpret the performance of banks. We will use these ratios to find the individual bank averages for the years 2009-2010 to test our hypothesis.

In order to compare the means of the two groups, we perform a statistical T-test for testing the difference of population means, in our case means of bank groups. We will use the Excel to calculate the T-test for two sample assuming unequal variances. We will construct our null hypothesis for three ratios as follows:

Null Hypothesis: $\mu_{BLA} - \mu_{BHA} = 0$

Alternate Hypothesis: $\mu_{BLA} - \mu_{BHA} \neq 0$

Where,

μ_{BLA} – denotes the mean of return ratios for banks from Less Affected countries, and

μ_{BHA} – denotes the mean of return ratios for banks from Highly Affected countries.

The T-test assumes the data to be normally distributed, and for more accurate results, data should not have outliers, because they might harshly affect the results. Having obtained the statistical results, we will discuss the rejection or approbation of the null hypothesis.

The second proposition to challenge is that ownership structure of commercial banks matters for their performance. To test this hypothesis, we take the advantage of the rich and diverse dataset information provided and employ an econometric technique. Using the CAMEL ratios we run the panel model regression on an unbalanced panel of all commercial banks, where the maximum number of observations per bank will be five years, and minimum - one year. We define our model following the previously discussed approaches from the existing studies, with ROAA being the dependent variable and CAMEL ratios as the explanatory variables. To investigate our hypothesis, we further employ the ownership information. We pertain a similar technique as in Ongore and Kusa (2013), and set the dummy variable equal to one for banks with more than 50.01% of foreign capital. We consequently determine, whether ownership structure affects the relationship between banks' performance and CAMEL ratios.

The third hypothesis to be tested is whether there was a structural break in banks performance following the 2008-2009 financial crises. To verify this proposition, we will apply a similar approach as with the previous hypothesis. We divide the observations into two periods similar to the work of Huang, et al. (2012) and Ongore and Kusa (2013). The pre-crisis period will contain the data from the two-year period, 2007 and 2008. The post-crisis period will comprise the observations separately for the years 2009 and 2010. For testing this hypothesis we will run separate regressions for each period and by the means of the Chow test will infer on the presence of a structural time-break.

Regressions will be conducted for the all commercial banks of all 27 European Countries jointly. Apart from presenting the estimation results, coefficients signs and their significances will be analysed in more detail with more stress to the constant. Further explanation concerning the choice and description of the variables will be discussed in the following section.

4.2 Data

We have focused our research on the years around the period of the financial crisis 2007-2011). The entrance of two countries, Bulgaria and Romania, in the EU in 2007, is also another reason and a good advantage for us to have a larger dataset in the analysis. Two sources for the data were used. Microdata on commercial banks were obtained from the Fitch's database Bankscope Bureau Van Dijk for the years 2007-2011.[9] Annual real GDP growth rates for the EU-27 countries in 2009-2010 (needed to test the first hypothesis) were retrieved from the World Bank database. The obtained information from both sources was arranged, tested, compiled and regressed using the data worksheets of Excel, the econometric programmes Stata and Gretl.[10]

We proceed with a more detailed description of the data from the Bankscope database. For the needs of testing the first hypothesis, we employed the average Return on Assets (ROAA), the average Return on Equity (ROAE), and the Net Interest Margin (NIM) as alternative measures of the performance and profitability of banks. While challenging the second and third hypotheses, we aimed to determine the main drivers of the banks' profitability (proxied by the ROA ratio). Henceforth, annual CAMEL ratios were obtained for each bank, when available. Information about ownership structure was likewise retrieved from the database. Table 4.1 presents the chosen variables, the particular proxies of CAMEL determinants, together with their bankscope code.

Table 4.1: Bankscope variables definition

CAMEL	Variable Notation*	Definition	Bankscope code
Capital adequacy	CA_CAP	Capital Adequacy Ratio	(4008)
	AQ_LOSS	Loan loss reserve/Gross loans	(4001)
Assets quality	AQ_IMP	Impaired loans/Equity	(4037)
	AQ_LLP/NIR	Loan loss provisions/Net interest revenue	(4002)

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[9] Version lastly updated 16 January 2013.

[10] Stata/SE ver. 11.2, Gretl ver. 1.9.9

CAMEL	Variable Notation*	Definition	Bankscope code
Management	MA_NIE	Total non-interest expense minus total non-interest operating income/Total assets	(UDV1)[11]
Ability	MA_IE	Total interest expense and total non-interest expense/Total assets	(UDV2)[12]
Earnings	EP_INI	Net interest income/Total assets	(UDV3)[13]
Profitability	EP_FEE	Net fees and commissions/Total assets	(UDV4)[14]
Liquidity	LR_LOAN	Net loans/Total assets	(4032)
Risk	LR_LA	Liquid assets/Customer and short term funding	(4035)

*All variables are expressed in percentage format.

The selection of such variables (which enter the tested models as explanatory variables) has been influenced by the research work of Huang, et al. (Huang, et al., 2012). The supplementary significant explanation should justify the decision.

The first determinant, the Capital Adequacy ratio (CA_CAP) is the minimum level of capital that all the banks are recommended to maintain according to the "Capital Adequacy Framework" set by the Basel Committee. This ratio measures bank's capital expressed as a percentage of its risk-weighted credit exposures. The ratio is calculated according to the formula:

$$CAP = \frac{Tier\ I + Tier\ II}{RWA}$$

Where,

$Tier\ I$ – comprises equity capital and free reserves minimum 4%;

$Tier\ II$ – includes subordinate debt, revaluation reserves, hybrid debt capital instruments and undisclosed reserves and cumulative perpetual pref-

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[11] User defined variable 1: $MA\_NIE = \frac{10170-10140}{2025} \times 100$

[12] User defined variable 2: $MA\_IE = \frac{10070-10170}{2025} \times 100$

[13] User defined variable 3: $EP\_INI = \frac{10080}{2025} \times 100$

[14] User defined variable 4: $EP\_FEE = \frac{2088}{2025} \times 100$

erence shares;

RWA – denotes risk weighted assets.

According to the Basel Framework, the minimum requirement for the CA_CAP equals 8%, but with enforcing of new framework BASEL III banks are expected to maintain their capital requirements up to 10.5% by 2019. This ratio is expected to have a positive relationship with the dependent variable ROAA (and similarly with NIM), which according to Ongore and Kusa (2013), signifies that banks do not face volatility in their profit due to leverage. In the process of compiling the data, we have found that many banks have incomplete or missing information about the CA_CAP. Since this ratio is relevant for the analysis of banks' performance determinants, we excluded banks, for which CA_CAP was not provided at least one time in the period 2007-2011, from the sample used to estimate econometric models.

For the Assets Quality (AQ) measures, we selected three ratios. Two of them were used as in Huang et al. (2012), the AQ_LOSS and AQ_IMP. The ratio, AQ_LLPNIR, was added to substitute for the AQ proxy, when two first determinants were missing. Following the explicit explanation found in Bankscope and in Huang et al. (2012), the AQ_LOSS, calculated as the ratio of the loan loss reserve over the gross loan, refers to loss reserves expressed as percentage of the total loans given. The higher the ratio, the worse the quality of the loans, therefore we expect to have a negative relationship with the return on assets. Impaired loans expressed as a percentage of equity, the AQ_IMP, has the same association with the return on assets. It states the weakness of the loans given in rapport to the equity. The last ratio, which also represents the assets quality, is the AQ_LLPNIR, calculated as loan loss provisions over net interest revenue. It may be also interpreted as the measure of risk remuneration. If the ratio increases, it signals that growing risk is not adequately compensated by higher margins.

For the following ratios we have implied same variables as in Huang et al. (2012). The management ability is represented by two ratios which are expected to have a negative relationship with the ROAA. The first is MA_NIE, calculated as the difference between total non-interest expenses and total non-interest operating income over total assets. The second MA_IE is the sum of total interest expenses and non-interest expenses over total assets.

The earnings profitability consists of the net interest income as a percentage of total assets EP_INI and the net fees and commission as a percentage of total assets

EP_FEE. Since these ratios describe the earnings which are commodity based and routinely, they have a positive relationship with the return to assets ratio.

The last CAMEL determinant, the liquidity risk includes the liquidity ratios, the LR_LOAN expressed as a percentage of the amount of net loans in rapport to total assets, and the LR_LA calculated as the ratio between liquid assets and customer and short-term funding. Since the first ratio tells how much of bank assets are given for loans, meaning that with its increase a bank becomes less liquid, we expect this ratio to have a negative relationship with the ROA ratio. The last ratio measures the extent, to which a bank is able to meet its obligations in case of a sudden withdrawal from the customers (deposit run-off). The higher the ratio, the more liquid the bank is. Consequently, we expect it to have a positive relationship with the ROA as in Huang et al.

4.3 Methodology

For the first hypothesis, we perform simple comparative analysis of banks' performance indicators. The relevant methodology has been already described in Section 4.1. Below, we specify in more detail the econometric approach employed to analyse internal drivers of banks' performance.

With multiple individual observations for up to five time points, the panel data framework was chosen for analysing relationship between banks' profitability and CAMEL determinants.

The benchmark specification is of the form

$$Y_{i_t} = \alpha + \beta_{it} X_{it} + \varepsilon_{it} \tag{1}$$

Where,

Y :	is the matrix of dependent variables which refers to the yearly return on average assets (i.e. profitability) for every bank *i* at time *t*;
α :	is the constant, intercept of the regression;
β_{it}:	is the vector of coefficients;
X :	the matrix of independent variables, the CAMEL ratios – presumably, the determinants of the banks' profitability;
ε_{it}:	the matrix of disturbance terms in the regression equation.

For the purpose of our analysis we employ the variables as presented below in (2):

$$
\begin{aligned}
ROAA_{it} = \; & \alpha + \beta_1 CA\_CAR_{it} + \beta_2 AQ\_LLP/NIR_{it} + \beta_3 AQ\_LOSS_{it} \\
& + \beta_4 AQ\_IMP_{it} + \beta_5 MA\_NIE_{it} + \beta_6 MA\_IE_{it} + \beta_7 EP\_INI_{it} \qquad (2) \\
& + \beta_8 EP\_FEE_{it} + \beta_9 LR\_LOAN_{it} + \beta_{10} LR\_LA_{it} + \varepsilon_{it}
\end{aligned}
$$

The choice of particularly these proxies of CAMEL ratios is motivated by data availability and preliminary estimations with different sets of variables.

We start by evaluating the benchmark model using different panel-data approaches in order to determine whether individual effects are present. Further, the model is augmented to allow for the verification of the aforementioned hypotheses. In order to test for the ownership effect, we determine whether intercept and slopes are jointly varying, by separating the sample based on the ownership dummy and employing the Chow test. In a similar way, we test the third hypothesis: starting with the inclusion and analysis of the time dummies and proceeding with the separate model estimation for different periods Pre and Post-Crisis.

5 Empirical Results

We comment on all the findings and regression outputs according the hypotheses order. Starting from the simple data analysis and hypothesis testing, we continue with the CAMEL model, analysing the empirical results in a more comprehensive way.

5.1 Banks from Highly Affected Countries Performing Worse than those from Less Affected Countries

The division of 27 European countries into two groups is shown in the table below. The first group was named as the Less Affected, and the second was named Highly Affected. Based on the mean and median calculated from the GDP growth rates averages of the years 2009 and 2010, we constructed the benchmark in order to divide the sample. We obtained -1.97% for the average, and -1.09% for the median. Italy's average of annual GDP growth rates resulted above the mean, however we decided to group it with the area of Highly Affected countries, because it was below the median. Annual real GDP growth rates by country are presented in Table 5.1. Averages of three analysed profitability measures for each country can be found in the Appendix A: Hypothesis I.

Table 5.1: List of the countries Less Affected and Most Affected

Less Affected		Highly Affected	
Average of annual GDP growth (2009-2010)		*Average of annual GDP growth (2009-2010)*	
Austria	-0.87	Bulgaria	-2.55
Belgium	-0.19	Denmark	-2.04
Cyprus	-0.18	Estonia	-5.37
Czech Republic	-1.01	Finland	-2.61
France	-0.71	Greece	-4.04
Germany	-0.48	Hungary	-2.77
Luxembourg	-0.58	Ireland	-3.11
Malta	0.03	Italy	-1.89
Netherlands	-1.02	Latvia	-9.15
Poland	2.75	Lithuania	-6.71
Portugal	-0.49	Romania	-4.11
Slovak Republic	-0.37	Slovenia	-3.31
Sweden	0.76	Spain	-2.03
United Kingdom	-1.09		
Average (2009-2010)	-0.25	Average (2009-2010)	-3.82

Source: World Bank, author's computations.

Comparing the ROAA

To visually see the performance of commercial banks from the Less and Highly Affected countries, we have constructed the figure below to show the dynamics of the return on average assets ratio for the years 2007 – 2011. Up to the year 2008, it is difficult to say that their performance varies. The mean difference is easily seen from the year 2009. The ROAA of the BLA countries is visually higher than the ROAA of the BHA countries. It can also be noted from the figure that this change starts to narrow in the year 2011, unfortunately we do not have the values for the year 2012, to see the latest developments.
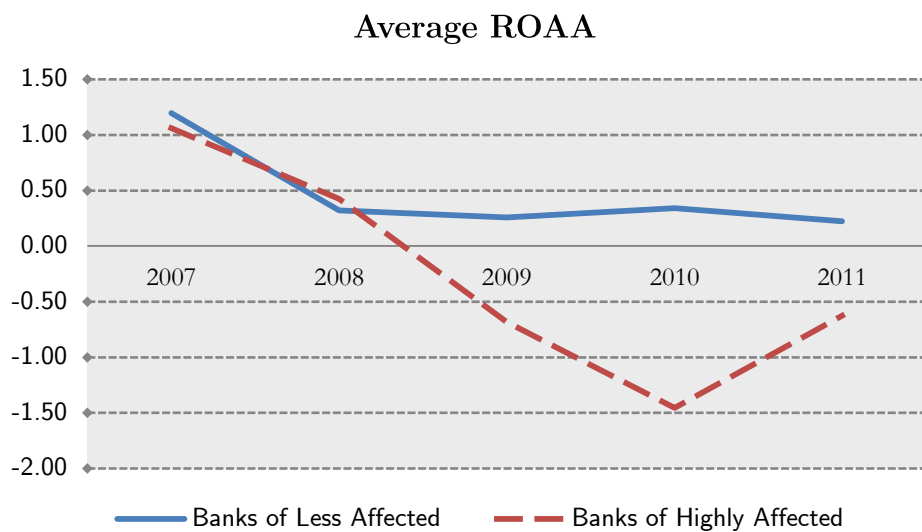
Average ROAA

Figure 5.1: Average trend of ROAA

Source: author's computations.

To more accurately test our hypothesis whether during the crisis the banks from Highly Affected countries have performed worse in terms of return on average assets ratio than those from Less Affected countries during the crisis, we have narrowed our data only for the years 2009 and 2010. Figure 5.2 depicts separate histograms of the average ROAA ratios in 2009 – 2010 for the banks based in the Less and Highly Affected countries. It can be seen that the returns of the BHA, unlike those of the BLA, are negatively skewed, thus, pointing that the banking sector in the Highly Affected countries experienced harsher profitability drops following the financial crisis.

Before the statistical test, the data underwent slight transformations. First, natural logarithms of the series were taken in order to account for its skewness and high variability. Besides, with logarithmic data it is easier to track negative outliers.

Since, ROAA are measured in percentages and, moreover, may be negative, the logarithms were taken according to the formula:

$$ROAA_{ln} = 100 * \ln\left(1 + \frac{ROAA}{100}\right)$$

Then, the evident outliers were removed from both samples.

Banks from Less Affected countries   Banks from Highly Affected countries
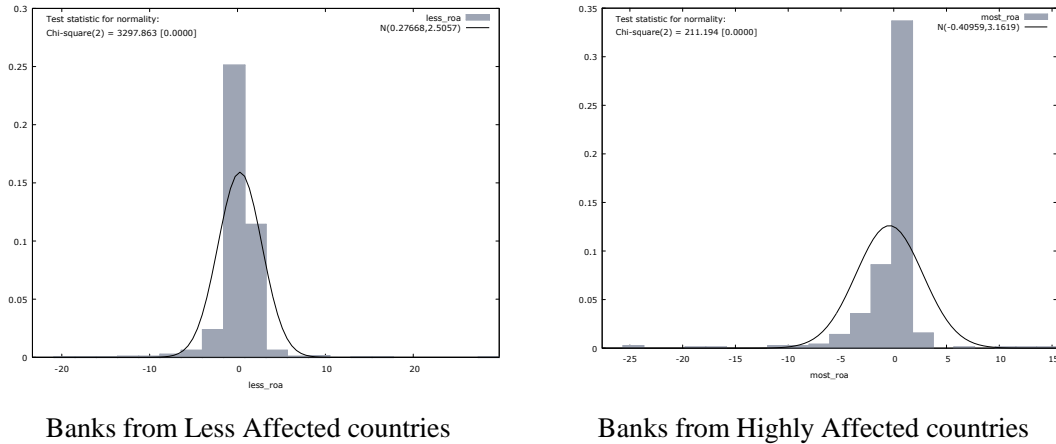
Figure 5.2: Frequency distributions of ROAA for the two samples
Source: Bankscope

From the output table of the test performed, we can see the actual means, standard deviations of both variables and number of banks used to perform the test. We notice here that the number of banks is slightly smaller because of the omitted outliers.

Table 5.2: Two Means t-Test Results (ROAA)

ROAA, averages for 2009-2010	Banks from LA	Banks from HA
Mean	0.244964	-0.4648925501
Variance	6.31449	11.403
St. deviation	2.512864	3.376825468
Observations	723	356
Hypothesized Mean Difference	0	
df	581	
t Stat	3.51584	
P(T<=t) two-tail	0.0004384	

the test assumed unequal variances of the samples.

The test statistic computed is t=3.51584. The rejection region t-Critial two tail is 2.5843. The computed probability is p=0.0004384 (two tail), or 0.043% which is smaller than the value α=1%. Therefore, we reject the null hypothesis which means that there is a significant difference between the two groups. Looking at the actual values of the means as computed by Excel, we can clearly conclude that the banks

from Highly Affected countries performed worse than those from Less Affected countries. Another observation is that the banks from the BHA group are more diverse: the null hypothesis of equal variances is rejected at 1% confidence level. Additionally, high variance should be noted for both samples; even though the average returns are stacked around 0% for both groups; the spread between the minimum and maximum returns is significant: from -22% to 25% for the BLA group and from -28% to 13.5% for the BHA selection. In this way, further analysis of banks' performance is of interest in order to determine the main (internal) factors behind profitability. The results of such analysis by the means of an econometric panel-data model, that shall also complement the present analysis, are provided in Section 5.2. However, prior to it, we outline the results of the comparative analysis with the alternative performance measures: ROAE and NIM.

Comparing the ROAE

In the following figure we see how the return on average equity has decreased since 2007. The difference of the means is noticeably seen, banks from Highly Affected countries had on average negative returns, whilst the banks from Less Affected countries still had positive numbers. The difference between these banks increases in the year 2011.
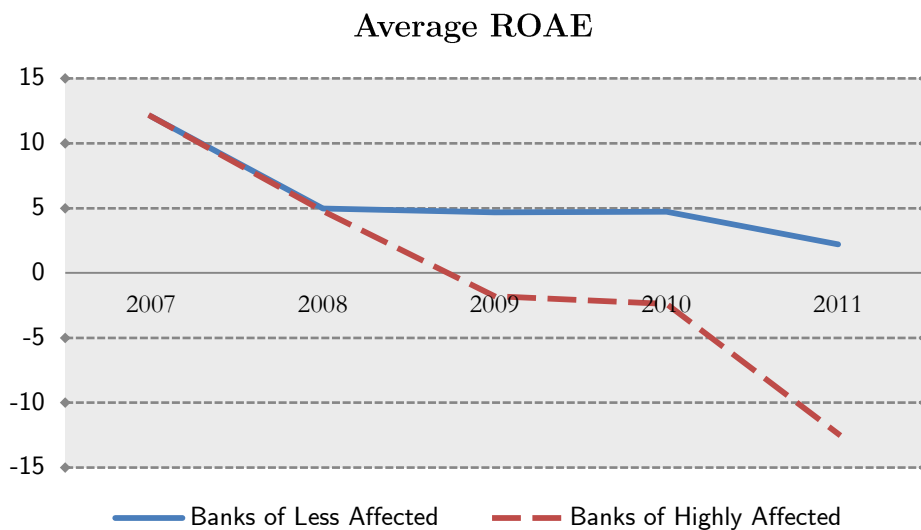
Figure 5.3: Average ROAE

Similar to the previous section we apply the T-test to significantly test the Null hypothesis that banks of HA countries perform the same as the banks from LA countries, in terms of ROAE for the average ratios of 2009 and 2010.

Table 5.3 Two Means t-Test Results (ROAE)

ROAE, averages for 2009-2010	Banks from LA	Banks from HA
Mean	3.557091413	-2.145528571
St. deviation	14.866	17.815
Observations	722	350
Hypothesized Mean Difference	0	
df	592	
t Stat	5.178103238	
P(T<=t)	3.07626E-07	

the test assumed unequal variances of the samples.

From the output table test statistic, t=5.1781, is on the rejection region of the null hypothesis with level of significance set at 1%. We conclude that there is a significant difference in the population means in terms of the return on average equity ratio. The actual difference calculated is higher than the ROAA, mainly since the ROAE ratios are bigger by construction. Greater variability between the observations can be again explained by the spread between the minimum and the maximum values. High standard deviations point on the significant performance diversity within both groups.

Comparing the NIM

By the end of 2008, the trend of the Net Interest Margin of banks from both groups in average was going similarly upwards. After the year 2008, the financial crisis brought changes into the trend flow. From the figure we see that banks from Less Affected countries have been hit more in terms of curve declining. It seems that banks from Highly Affected countries take the lead on the ratio of net interest income to average interest earning assets. However the graph might mislead the visual conclusion, because it comprises also the outliers (the raw data), which might have affected the results; therefore we will statistically test the assumption. Prior to the test, the data were transformed as the ROAA cross-section.
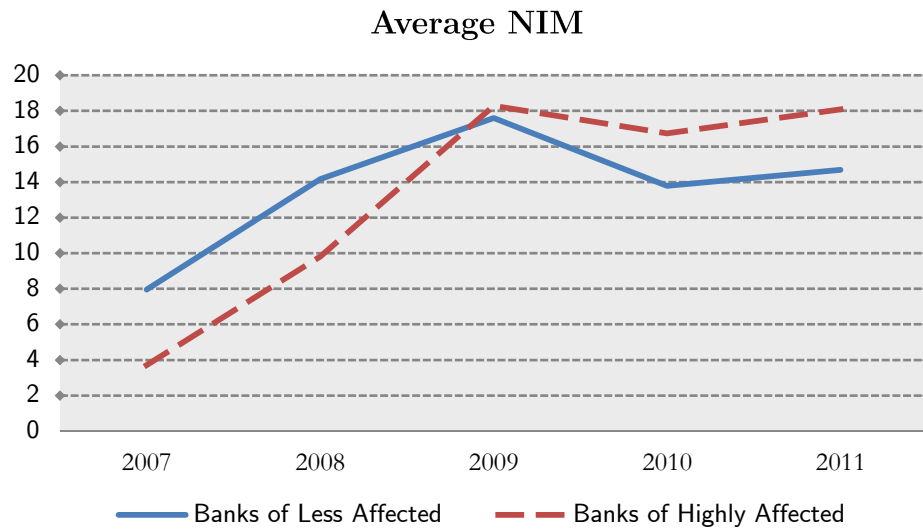
Figure 5.4: Average trend on NIM

Source: author's computations.

Unlike with the two previous performance measures, we could not reject the null hypothesis that there is the mean difference amongst the groups at 10% significance level.

Table 5.4: Two Means t-Test Results (NIM)

NIM, averages for 2009-2010	Banks from LA	Banks from HA
Mean	12.2548	10.4139
St. deviation	21.4063	17.2022
Observations	702	349
Hypothesized Mean Difference	0	
df	853	
t Stat	1.50281	
P(T<=t)	0.1329	

the test assumed unequal variances of the samples.

Such result may suggest that the reported above differences in banks' performance were weakly related to the interest income and the amount of interest paid. Instead, other (non – interest) income components were responsible for sharper decrease of the ROAA and ROAE ratios of the banks located in the Highly Affected countries. The further section aims to investigate in a more sophisticated way other factors that could determine banks' profitability during the period of 2008-2010.

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5.2   CAMEL Approach: Preliminary estimations

We start by estimating the benchmark panel-data model as presented in Section 4.3. The original data sample comprises 405 cross-sectional units and 5 time-periods. The panel is unbalanced because of the missing data for particular banks during some years.

To decide for the concrete model, firstly we have estimated the pooled OLS and have tested the Breusch Pagan LM hypothesis, and concluded that the pooled OLS regression is inferior to the random-effects model (variance of the individual effects is statistically above zero). Next, we run the Hausman test, whose null hypothesis supports both fixed and random-effects results (they are consistent at null with the random-effects coefficients being more efficient) and alternate is that random-effects estimates are not consistent. Having strongly rejected the null, we concluded that constant individual effects are present. According to such result, the performance/profitability varies across European banks and depends on their internal characteristics. Further, we are going to use fixed-effects models for the research purpose.

Another step was to add time dummies to test whether years had any specific impact on the dependent variable. We obtained statistically significant time-dummies. The greatest decrease of the constant due to time effect (-0.23 percentage points), as expected, was observed in 2009 and 2010.

We have used the robust standard errors option for all conducted regressions, in order to yield a more accurate test statistic for our regression output. The summary statistics together with all tests that we have run can be found in the Appendix B: Hypothesis II and Appendix C: Hypothesis III.

5.3   Ownership Matter

In this section, using the CAMEL approach, we show the results on how the bank specific factors have affected the performance of the 27 EU commercial banks during the period of years 2007 – 2011. Furthermore, we will focus on how this performance changes between majority foreign-owned banks and those majority domestic banks.

In the table presented below, we have provided three regression result outputs.

Table 5.5: Regression output, Ownership Matter

Variables	Full Sample (1) ROAA	Majority Foreign-owned (2) ROAA	Majority Domestic-owned (3) ROAA
CA_CAP	0.00356	-0.00070	0.02140
	(0.004)	(0.003)	(0.020)
AQ_LLPNIR	-0.01051***	-0.00987***	-0.01128***
	(0.002)	(0.002)	(0.003)
AQ_LOSS	-0.10231***	-0.14423***	-0.05505
	(0.035)	(0.040)	(0.045)
AQ_IMP	-0.00440***	-0.00419**	-0.00465**
	(0.001)	(0.002)	(0.002)
MA_NIE	-0.73086***	-0.76221***	-0.73267***
	(0.063)	(0.072)	(0.126)
MA_IE	-0.13099***	-0.11475***	-0.13083
	(0.033)	(0.030)	(0.085)
EP_INI	0.49042***	0.49702***	0.54831***
	(0.101)	(0.119)	(0.141)
EP_FEE	0.08861	0.09340	0.12660
	(0.079)	(0.086)	(0.176)
LR_LOAN	-0.01336**	-0.01431*	-0.00948
	(0.006)	(0.008)	(0.011)
LR_LA	-0.00639	-0.00559	-0.00450
	(0.004)	(0.004)	(0.007)
2008.PERIOD	-0.12370**	-0.08625	-0.16191**
	(0.049)	(0.071)	(0.076)
2009.PERIOD	-0.24222***	-0.23489**	-0.24265
	(0.090)	(0.104)	(0.163)
2010.PERIOD	-0.23287***	-0.15850	-0.27701*
	(0.089)	(0.117)	(0.141)
2011.PERIOD	-0.11922	0.00225	-0.19648
	(0.103)	(0.128)	(0.176)
CONSTANT	1.97897***	2.16346***	1.15794
	(0.495)	(0.592)	(0.999)
Observations	1,520	703	817
R-squared Within	0.6801	0.7401	0.6490
R-squared Between	0.6455	0.7492	0.6604
R-squared Overall	0.6921	0.7425	0.6726
Number of Banks	405	185	220
Sum of Squared Residuals	704.1375	234.4061	458.1270

Robust standard errors in parentheses, * significant at 10%;** significant at 5%; *** significant at 1%

The first model (1) presents the results for the whole sample of banks. The model explains overall about 69% of banks' profitability variance by their internal factors, which are proxied by the CAMEL ratios. The intercept parameter shows that the average ROAA of the European commercial banks constitutes about 1.98%. Capital adequacy ratio (CA_CAP) did not prove to be significant in determining the increase of the returns on assets. From the CAMEL determinants we see that the assets quality determinants significantly affect the financial performance of the banks. The ratio AQ_IMP (standing for impaired loans as a percentage of equity) and also the ratio AQ_LOSS (standing for loan loss reserves as a percentage of total loans) descent the ROAA. A much higher effect on decreasing the financial performance is seen on the management ability ratios. The increase of total interest and non-interest expenses (MA_NIE) decreased the ROAA to 0.13%, but we see a worse effect at the ratio MA_IE (standing for non-interest expenses and non-interest operating income) with a significant result of -0.73%. About the earnings profitability determinants, we see that the earnings coming from net interest income (EP_INI) increased the ROAA for about 0.49% to 1% level of significance. From the liquidity ratios, the LR_LOAN (the net loans as a percentage of total assets) proved to significantly affect the ROAA at 5% significance level. Whilst the last ratio LR_LA (representing the ability of the bank to meet its obligations), did not result significant. The time dummy variables proved to be significant except for the year 2011, which may indicate that the average profitability in 2011 has returned to the level of 2007.

The second (2) and the third (3) models present the regression results for the data separated into two groups, the majority foreign-owned group (MFO) and the majority domestic-owned (MDO) banks group. From the Chow test we learned that there is a structural change with respect to ownership type. The sum of squared residuals for two separate groups was statistically smaller comparing to the one of the full dataset.

We see that the model fits the data better in the majority foreign-owned bank group even though there are fewer degrees of freedom. The majority foreign-owned banks have a bigger intercept value, meaning that, on average, for a five-year period, the MFO banks have performed better compared to the MDO banks. However, the intercept for the domestic group was not significant. The ratio AQ_LOSS (loan loss reserves in rapport to total loans) and the management's ability ratio MA_IE (non-interest expenses and non-interest operating income) were not significant for the domestic bank group, whilst it is the opposite case for the foreign bank group.

The time effect was also different between the groups. At majority foreign-owned banks, only year 2009 features significant drop in the profitability indicator. At majority domestic-owned banks the year dummy variable was significant also in 2008 and 2010, showing that during these years the banks' return on assets was decreasing. Thus, we may infer that the foreign capital had facilitated faster recovery of the foreign-owned banks relative to the banks with a dominant share of the domestic equity.

5.4   Structural Time Break during the Crisis Period

The section presents the results of banks' performance analysis during the period 2007-2010. We have already noted the significance of the time dummies for the constant (average ROAA). In order to complement the findings, we divide the data on the Pre-Crisis (2007 – 2008) and Post-Crisis (2009 – 2011) and run separate regressions. We use the Chow test to find out whether there was a structural break with respect to time in the financial performance of the banks. Having strongly rejected the null hypothesis of the Chow test (Appendix C: Table.1), we prove that there was a structural change during the financial crisis.

To further analyse how commercial banks have performed during this period, we divide the dataset into three periods. First period consists of the years 2007 -2008, second period comprises observations for the year 2009 and lastly third period employs data only for the year 2010. We have named the period 2007-2008 as the Pre-Crisis. We included 2008 in the pre-crisis, because the crisis effect has become observable in the financial performance of the commercial banks mostly since 2009. We omitted the year 2011, because we do not consider it relevant within the scope of the present study.

To have even a more comprehensive analyse we again divide these three period samples, according to the ownership structure (MFO and MDO). All Chow test results conducted can be found in tables of test summaries in Appendix C: Hypothesis III separately for each following period. All regression outputs are shown in the table (5.6) below.

Table 5.6: Regression output, Structural Time-Break and Ownership Matter

Variables	Full Sample Pre-Crisis (4) ROAA	Majority FO Pre-Crisis (5) ROAA	Majority DO Pre-Crisis (6) ROAA	Full Sample 2009 (7) ROAA	Majority FO 2009 (8) ROAA	Majority DO 2009 (9) ROAA	Full Sample 2010 (10) ROAA	Majority FO 2010 (11) ROAA	Majority DO 2010 (12) ROAA
CA_CAP	-0.00571	-0.01974	0.01148	-0.01527	-0.02778	-0.00754	-0.00577**	-0.00430**	-0.01944
	(0.011)	(0.013)	(0.017)	(0.010)	(0.021)	(0.010)	(0.003)	(0.002)	(0.013)
AQ_LLPNIR	-0.00731**	-0.00655*	-0.01169***	-0.00994***	-0.00968***	-0.01111***	-0.02023***	-0.01854***	-0.02007***
	(0.004)	(0.003)	(0.004)	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)	(0.004)
AQ_LOSS	-0.30648***	-0.26558**	-0.31132***	-0.13788***	-0.20918***	-0.05340**	-0.05429**		-0.07131**
	(0.105)	(0.113)	(0.103)	(0.043)	(0.067)	(0.025)	(0.023)		(0.033)
AQ_IMP	-0.00223**	-0.00159*	-0.00449*	-0.00034	0.00128	-0.00088	-0.00158	-0.00211	-0.00265**
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
MA_NIE	-0.91529***	-0.91328***	-0.87906***	-0.83293***	-0.93785***	-0.66052***	-0.91418***	-0.97592***	-0.87993***
	(0.100)	(0.127)	(0.142)	(0.055)	(0.094)	(0.078)	(0.075)	(0.109)	(0.103)
MA_IE	-0.10389	-0.13535	-0.08127	0.00711	0.01259	0.08153	-0.04046**	-0.01508	-0.04755
	(0.068)	(0.089)	(0.063)	(0.019)	(0.024)	(0.053)	(0.020)	(0.018)	(0.037)
EP_INI	0.62371***	0.59132***	0.70227***	0.53435***	0.66516***	0.40785***	0.59654***	0.53189***	0.62087***
	(0.121)	(0.163)	(0.113)	(0.054)	(0.088)	(0.039)	(0.050)	(0.050)	(0.082)
EP_FEE	0.22383	0.27370	0.03873	0.10235	0.17580	0.12609*	-0.02311	-0.08201***	0.08516
	(0.183)	(0.202)	(0.189)	(0.093)	(0.152)	(0.071)	(0.050)	(0.031)	(0.077)
LR_LOAN	-0.01073	-0.00467	-0.01196	-0.00798***	-0.01607***	0.00113	0.00827*	0.00119	0.01610**
	(0.009)	(0.014)	(0.011)	(0.003)	(0.005)	(0.002)	(0.004)	(0.003)	(0.007)
LR_LA	-0.00165	-0.00514	-0.00144	-0.00564**	-0.00536**	-0.00055	0.00334	0.00012	0.00808
	(0.004)	(0.006)	(0.005)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.006)
Constant	1.81387***	1.73923**	1.75541**	1.48254***	1.94658***	0.60739**	0.40431	0.82954***	-0.01966
	(0.608)	(0.874)	(0.731)	(0.334)	(0.535)	(0.245)	(0.293)	(0.235)	(0.527)
Observations	551	264	287						
R-squared	0.760	0.724	0.838	0.841	0.842	0.882	0.858	0.858	0.874
Nr. of banks	321	155	166	317	149	168	330	152	179

Robust standard errors in parentheses, * significant at 10%;** significant at 5%; *** significant at 1%

For the Pre-Crisis period we estimated the fixed-effects model as in the previous section. The first column, model (4), gives the results for the whole pre-crisis sample. We notice here that the number of banks is smaller because information for some particular banks was missing for the first years of our research study. However the prediction power of the model is satisfying, with R-square equal to 76%. In the pre-crisis period the significant intercept shows that, on average, these banks generated return on assets equal to 1.81%. When testing for structural break with respect to foreign ownership, we strongly rejected the null hypothesis, meaning that there is a structural change with respect to ownership. The regression outputs can be seen in the model (5) and model (6).

The CAMEL determinants representing the assets quality were significantly negatively correlated with the ROAA. Their effect appeared less important for the performance of majority foreign-owned banks. As for the management ability the MA_NIE ratio (total interest and non-interest expenses), resulted statistically significant at the 1% level, with a higher impact on the MFO banks.. Earnings coming from net interest income (EP_INI) ratio, have significantly positively affected the ROAA, with a higher impact on the MDO banks. Regarding the intercepts we see they are almost the same for both bank groups meaning that, on average, among European commercial banks there was not much difference in ROAA during favourable economic times, in contrast to what was observed during the crisis. Capital adequacy ratio did not prove to be significant in any of the cases, a similar result we obtained in the second-hypothesis testing.

Moving our analysis to the crisis period, we focus now on the regression outputs on the same the table (5.6), but now we look for the models (7) till (12). Having observations for just one point in time, we have run the simple OLS regression, where the same dependent variable was explained by the independent variables of the CAMEL determinants. Except for the model (11), we found no problem with multicollinearity between independent variables. To solve the problem we removed the AQ_LOSS, which resulted in high correlation with AQ_IMP (0.7515). Meanwhile, the heteroscedasticity was present; in order to control for it, we estimated robust-error regressions. Similarly to the pre-crisis period, we have divided and run the regressions according to ownership structure for years, the 2009 and the 2010.

Total number of observations for the year 2009 was 317. The model's prediction power was high for all the samples, explaining above 84% variation of the dependent variable. What we can easily detect is that the R-square was higher for the MDO banks. We see that for a short period of time, the CAMEL model fits better the

data for the MDO banks, additionally this result may support our conclusion that MFO banks are less affected by internal factors represented by the CAMEL determinants than the MDO banks. In other words external factors, which we have not considered in our analysis, are likely to affect more MFO banks than MDO banks.

In the year 2009, the intercept difference compared to the pre-crisis period shows that banks' performance started to deteriorate, they were having a lower average ROAA. When we separated the data according to the ownership structure, the intercept differed significantly. The majority foreign-owned banks performed better, compared to the majority domestic-owned banks and also to the pre-crisis period. Similar to the pre-crisis period, the assets quality determinants affected the performance of commercial banks, except for the AQ_IMP (impaired loans as a percentage of equity). The performance of the MFO banks was significantly determined by the liquidity risk ratios (LR_LOAN and LR_LA). The earnings profitability ratio EP_INI proved to be significant for both bank groups, with a stronger positive effect on ROAA for the MFO banks. The EP_FEE ratio (standing for net fees and commissions as the percentage of total assets) was positively correlated with the performance of the MDO banks at 10% significance level. The management ability ratio MA_NIE (total interest and non-interest expenses) was negatively correlated with the ROAA ratio at 1% level of significance. Comparing our overall results to the Pre-Crisis period, we see that except for the deterioration of the average ROAA, the liquidity ratios became significant for the MFO banks.

In the year 2010, we have 330 observations in total. From the first view, we see the estimated intercept has decreased even further relative to the pre-crisis years and 2009, however, its significance has decreased, thus, signalling that the sample has become more heterogeneous. We again separated the data according to the ownership structure and tested for structural break with respect to ownership (Chow test results in the Appendix C). From the intercept of model (11) and model (12), we see how different these banks have performed. Testing further for collinearity between independent variables we noted positive high correlation between AQ_LOSS and AQ_IMP (0.7516) at the model (11) for MFO banks, so we dropped AQ_LOSS from the model.

In 2010, the MFO banks have visibly had a smaller average of return on assets ratio compared to the previous period. The significant intercept of the MFO banks compared to all the previous periods was smaller; meaning that on average the ROAA was deteriorating. In the MFO banks, the capital adequacy ratio CA_CAP has become significant at 5% level, meaning that banks have increased their capital re-

quirements and it affected the ROAA ratio by a small decrease, keeping other variables constant. The assets quality determinants (AQ_LLPNIR, AQ_LOSS and AQ_IMP) for the MDO banks were negatively related to the ROAA at 1% (respectively 5%) significance level. The AQ_LLPNIR ratio (standing for the ratio between the loan loss provisions over the net interest revenue), was also significant with the performance of the MFO banks at 1% level. The earnings profitability ratio EP_INI (earnings deriving from the net interest income as a percentage of the total assets), was significant for both bank groups with a higher impact on the increase of ROAA at the MDO banks. Earnings coming from the net fees and commissions ratio (EP_FEE) were also significant for the MFO banks. The MA_NIE resulted to be significant at 1% level for both groups, with a higher negative impact at the MFO banks. The liquidity ratio LR_LOAN (net loans as a percentage of the total assets) was significant for the MDO banks at 5% level. Comparing to the year 2009, the assets quality determinant AQ_IMP (impaired loans/equity) became again significant for the MDO banks. The liquidity risk determinant LR_LOAN in 2010 resulted significant showing that increase of net loan as a percentage of total assets determined the performance ratio of MDO banks. In 2010, also we see a significant change in the MFO banks in the case of earnings profitability becoming significant at 1% level. Other explanatory variables were not significant or had an opposite impact at ROAA (not in line with the assumptions), which could be because of the crisis period.

6   Conclusion

Using comparative analysis and statistical tests, we checked if banks coming from the countries that were less affected by the financial crisis outperform banks originating from those highly affected countries. We constructed the null hypothesis on three performance/ profitability ratios; the return on assets ROA, the return on equity ratio ROE and the net interest margin ratio NIM. The average mean of countries GDP growth rate for $2009 - 2010$ was used as a benchmark to split the banks into Less Affected and High Affected. We strongly rejected the null hypothesis that there was no difference in the means of ROA and ROE. Regarding the net interest margin we could not reject the hypothesis even at 10% confidence level suggesting that both groups had same profitability efficiency ratio.

This study also applied empirical model to comprehensively analyse the performance of commercial banks, using the bank internal factors as explanatory variables, specifically the CAMEL determinants. The motivation behind the econometric methodology approach, has derived from several recent working papers analysing and comparing the banking sector in Taiwan, Kenya and India (Huang, et al., 2012) (Ongore & Kusa, 2013) (Sangmi & Nazir, 2010).

We run the panel data models using unbalanced data in pursuit of explaining the performance of the independent variable ROAA (return on average assets). We equated the dummy variable to 1 for banks that are majority foreign-owned, and to 0 for otherwise (banks that are majority domestic-owned), with the objective to study the ownership implication on the dependent variable ROAA.

Fixed-effects panel-data model provided the best-fit for the data, thus, indicating that the profitability is varying across the banks and is, in large, determined by individual internal factors. Assets quality, management ability, and interest earnings ratios came out as strongly significant for the banks' profitability; importance of liquidity (proxied as a ratio of net loans to assets) was likewise significant, but with somewhat higher uncertainty. Capital adequacy and income from fees and commissions were not proven to be statistically significant for the ROAA. A structural break in the relationship was observed owning to the ownership structure. Assets quality indicators were more important for the banks with majority foreign ownership, while interest earnings turned out to make a higher contribution to the ROAA of the domestic-capitalized banks. The time dummy variable resulted significant for the year 2009

for MFO banks, and in 2008 and 2010 for MDO banks, suggesting so different time break periods. Having also conducted the Chow test, we proved our claim that there was a structural change in banks' performance during the crisis period. For a more comprehensive analysis, we had divided the data according to the years and also according to the ownership structure. The crisis period was analysed separately for the years 2009 and 2010, conducting a simple OLS regression on cross sectional data.

Below we briefly conclude how each of the employed CAMEL determinants performed in the estimated models.

Capital Adequacy

The capital adequacy ratio (CA_CAP) was not a significant determinant of the performance of commercial banks, except for the MFO banks in the year 2010 at the 5% level, where it had a negative relationship with the dependent variable. It could be attributed to the fact, that banks started increasing their level of capital requirements, in order to meet the BASEL III directives, and to have enough capital to sustain operating losses, as Huang et al (Huang, et al., 2012) suggest.

Assets Quality

In the pre-crisis period, all determinants of the assets quality were negatively correlated with the ROAA. The negative impact was more visible for the MDO banks, meaning that their profitability was more sensitive to the quality of assets. Only in 2009, the net loans expressed as a percentage of total assets (AQ_LOSS) were affecting more strongly the performance ratio of the MFO banks. The impaired loans expressed as a percentage of equity (or the bad loans) (AQ_IMP) proved to be significantly negatively correlated with the ROAA only for the MDO banks in 2010.

Management Ability

The management ability ratio (MA_NIE), calculated as the difference between total non-interest expenses and total non-interest operating income over the total assets, proved to be significantly negatively correlated with the ROAA for the whole periods (that is: Pre-Crisis, year 2009 and year 2010). The performance of the MFO banks was more susceptible to the management ability changes compared to the banks with more domestic capital. The second ratio, the MA_IE was not significant.

Earnings Profitability

The only profitability ratio which proved to be significantly and positively correlated with the ROAA for the whole period is the EP_INI. This ratio described the return on average assets to a certain value. The second ratio EP_FEE (representing earnings coming from net fees and commission as a percentage of total assets) proved to be positively correlated to the ROAA at 1% level in 2009 for the MDO banks.

Liquidity Risk

In the pre-crisis period, the liquidity risk ratios did not prove to be significantly correlated with the dependent variable. The first ratio LR_LOAN representing net loans was negatively correlated at the 1% level in 2009 in the MFO banks, whilst was not significant for MDO banks. The opposite was seen in 2010, where at the 5% significance level, this ratio was positively correlated with the ROAA (which is not in line with the assumption, maybe due the crisis effect which was deteriorating the performance of MDO banks). The second ratio was at the 5% significance level negatively correlated with the ROAA in 2009 for the MFO banks.

Moreover, our results show that in the Pre-Crisis period, on average the ROAA was similar for both bank groups. The deterioration of the intercept was more vivid on the MDO banks in 2009; whereas the MFO banks the crisis affect was seen more in 2010. Both years, the MFO banks had slighter higher ROAA value. This study should not end here. A further research is recommended. In the absence of time, the CAMEL model in the present thesis was not employed separately for each country of the European Union, therefore a similar approach is suggested. Moreover we suggest adding to the list: the highly developed European countries, members of European Free Trade Agreement (EFTA) and also countries which are possible future EU candidates and members, particularly countries assigned for the Central Eastern Free Trade Agreement (CEFTA).[15]

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[15] EFTA members: Norway, Switzerland, Iceland and Liechtenstein. CEFTA members: Albania, Bosnia and Herzegovina, Macedonia, Moldova, Montenegro, Serbia and the new member Kosovo.

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Appendix A: Hypothesis I

Appendix A: Hypothesis I Table.1: The average performance ratios of banks according to countries for the years 2007-2011.

Less Affected Countries					Highly Affected Countries				
	Total Number of Banks	ROAA	ROAE	NIM		*Total Number of Banks*	ROAA	ROAE	NIM
Austria	74	-0.1463	2.9187	2.1748	Bulgaria	22	0.9710	8.3468	4.4643
Belgium	33	0.3346	5.1770	1.8422	Denmark	42	-0.1639	-1.3307	48.5469
Cyprus	19	0.4762	9.3827	3.0809	Estonia	7	0.2638	0.0373	67.0267
Czech Republic	19	0.8213	14.3511	2.7666	Spain	56	0.6024	4.4710	1.7425
France	126	0.5039	4.5352	21.9270	Finland	10	0.4503	6.9035	11.8478
Germany	129	0.9887	8.5514	16.4267	Greece	15	-1.7984	-38.9583	75.0114
United Kingdom	139	0.1829	2.2724	43.1516	Hungary	29	-0.1950	-0.8227	4.9652
Luxembourg	71	0.6506	9.5266	1.1164	Ireland	14	-1.0883	-21.8545	1.4117
Malta	9	-4.0839	-1.0039	2.7311	Italy	94	0.4914	4.6987	2.5873
Netherlands	35	1.2467	5.0516	2.1310	Latvia	12	-0.1600	39.5929	2.4331
Poland	49	0.2923	5.2192	3.6412	Lithuania	23	-0.8120	-13.3924	2.5090
Portugal	26	0.2085	3.3423	2.5864	Romania	26	-4.6434	-2.9021	4.3253
Slovak Republic	23	1.2096	11.2673	3.3794	Slovenia	18	0.3411	2.6024	2.3586
Sweden	13	0.4793	3.8767	3.0018					
Grand Total	765	0.2260	6.0334	7.8541	Grand Total	368	-0.4416	-0.9698	17.6331

Appendix B: Hypothesis II

Appendix B: Hypothesis II Table.1: Correlation Matrix of CAMEL model variables

	CA_CAP %	AQ_LOSS %	AQ_IMP %	MA_NIE %	MA_IE %	EP_INI %	EP_FEE %	LR_LOAN %	LR_LA %	AQ_LLP/NIR %	ROAA %	FO
CA_CAP %	1											
AQ_LOSS %	0.0072	1										
AQ_IMP %	-0.1538	0.5251	1									
MA_NIE %	0.1786	0.1634	0.1293	1								
MA_IE %	-0.3975	-0.1030	-0.0135	-0.2987	1							
EP_INI %	0.0157	0.3006	0.1135	0.3302	-0.1891	1						
EP_FEE %	0.1698	0.0190	-0.0946	-0.1736	-0.3820	-0.0201	1					
LR_LOAN %	-0.2610	0.0310	0.2035	0.1127	0.1334	0.3308	-0.1036	1				
LR_LA %	0.4079	-0.0457	-0.1525	-0.1045	-0.1691	-0.0642	0.3324	-0.4774	1			
AQ_LLP/NIR%	-0.0301	0.3883	0.5349	0.0189	-0.0666	0.0395	0.0595	0.1073	-0.1910	1		
ROAA %	-0.1028	-0.4166	-0.4995	-0.6553	0.1090	0.1052	0.4567	-0.0051	0.2434	-0.4334	1	
FO	0.0219	-0.0184	-0.0023	-0.0153	0.0503	-0.0104	0.0090	-0.0978	0.0558	-0.0155	0.0263	1

Appendix B: Hypothesis II Table.2: Panel Data Summary

Variable		Mean	Std.Dev	Min	Max	Observations
index	overall	34920.580	71866.150	10028	945119	N = 3040
	between		71913.500	10028	945119	n = 608
	within		0	34920.58	34920.58	T = 5
period	overall	2009.026	1.400	2007	2011	N = 2745
	between		0.511	2007	2011	n = 608
	within		1.356	2006.693	2011.359	T = 4.5148
ca_cap	overall	17.629	16.698	-5	285.4	N = 2320
	between		15.618	6.238	180	n = 608
	within		9.439	-78.57137	230.1146	T-bar = 3.81579
aq_loss	overall	3.989	5.021	0	88.16	N = 2046
	between		5.522	0	88.16	n = 499
	within		2.895	-13.14051	26.89949	T-bar = 4.1002
aq_imp	overall	61.119	85.349	0	902.63	N = 1686
	between		67.375	0	485.77	n = 428
	within		55.657	-341.8706	734.6014	T-bar = 3.93925
ma_nie	overall	1.129	3.076	-29.28	71.85	N = 2743
	between		3.087	-24.18	46.025	n = 608
	within		1.693	-24.69645	33.96055	T = 4.51151
ma_ie	overall	-0.434	6.631	-216.46	31.98	N = 2715
	between		5.629	-58.24	23.91333	n = 606
	within		4.391	-172.1362	46.24383	T-bar = 4.4802
ep_ini	overall	2.292	2.010	-26.74	31.72	N = 2739
	between		2.144	-8.46	31.72	n = 608
	within		0.858	-15.98822	14.51778	T = 4.50493
ep_fee	overall	1.442	9.164	-2.04	433.28	N = 2723
	between		17.929	-1.018	433.28	n = 606
	within		1.152	-17.23552	36.46448	T-bar = 4.4934
lr_loan	overall	55.757	24.497	0	99.9	N = 2736
	between		23.530	0.034	99.87	n = 606
	within		7.085	-9.69666	122.4673	T-bar = 4.51485
lr_la	overall	38.260	59.146	0	916.09	N = 2720
	between		67.199	0.025	892.86	n = 605
	within		28.422	-473.7378	671.4602	T-bar = 4.49587
aq_llp~r	overall	35.545	79.317	-914.29	947.15	N = 2601
	between		58.992	-186.51	691.12	n = 591
	within		60.379	-785.6952	770.9448	T-bar = 4.40102
ROAA	overall	0.180	3.411	-71.22	77.28	N = 2744
	between		4.540	-45.47	77.28	n = 608
	within		1.866	-25.57036	25.92964	T = 4.51316
FO	overall	0.469	0.499	0	1	N = 3040
	between		0.499	0	1	n = 608
	within		0	0.4688	0.4688	T = 5

Appendix B: Hypothesis II Table.3: Tests Summaries

Breusch Pagan test, full sample:

Breusch and Pagan Lagrangian multiplier test for random effects
ROAA[index,t] = Xb + u[index] + e[index,t]
Estimated results:

	Var	sd = sqrt(Var)
ROAA	3.2235250	1.7954180
e	.6445941	.8028662
u	.0769447	.2773890

Test: Var(u)   =   0
chibar2(01)   =   0.41
Prob > chibar2   =   0.2612

Hausman test, full sample:

---- Coefficients ----

	(b) Fixed	(B) Random	(b-B) Difference	sqrt(diag(V_b-_B)) S.E.
ca_cap	.002386	-.0047351	.0071211	.0036942
aq_llpnir	-.0108251	-.0115883	.0007631	.0002686
aq_loss	-.1055776	-.0436914	-.0618861	.0094735
aq_imp	-.0044665	-.0038035	-.0006629	.0003628
ma_nie	-.7174054	-.8736048	.1561994	.0293865
ma_ie	-.1105019	-.0213875	-.0891145	.0177325
ep_ini	.4958652	.5714841	-.0756189	.0458446
ep_fee	.1119085	.0047401	.1071684	.0530651
lr_loan	-.0150767	-.0027824	-.0122943	.0042123
lr_la	-.0064169	-.0046997	-.0017172	.0008328

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

Test: Ho: difference in coefficients not systematic

chi2(10)   =   (b-B)'[(V_b-V_B)^(-1)](b-B)
                =   134.31
Prob>chi2   =   0.0000

Heteroscedasticity test, full sample:

```
. xttest3
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

        chi2 (405)      =       1.3e+34
        Prob>chi2       =       0.0000
```

Chow test, full sample:

```
Chow test for structural difference with respect to FO
F(15, 1490) = 3.64445 with p-value 0.0000
```

Hausman test, Majority Foreign-owned banks:

---- Coefficients ----

	(b)	(B)	(b-B)	sqrt(diag(V_b-_B))
	Fixed	Random	Difference	S.E.
ca_cap	-0.00028	-0.0057	0.005428	0.003256
aq_llpnir	-0.01045	-0.01076	0.000305	0.000234
aq_loss	-0.14411	-0.11243	-0.03167	0.007211
aq_imp	-0.00408	-0.0029	-0.00117	0.000339
ma_nie	-0.74811	-0.91289	0.16478	0.036229
ma_ie	-0.1089	-0.02577	-0.08313	0.018086
ep_ini	0.489894	0.618194	-0.1283	0.063617
ep_fee	0.104876	0.033354	0.071522	0.045597
lr_loan	-0.01563	-0.00597	-0.00965	0.005305
lr_la	-0.0061	-0.00533	-0.00077	0.000663

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

Test:  Ho:  difference in coefficients not systematic

chi2(10)        =       (b-B)'[(V_b-V_B)^(-1)](b-B)
                =       97.41
Prob>chi2       =       0.0000
```

Heteroscedasticity test, Majority Foreign-owned banks:

. xttest3
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (405)	=	1.8e+34
Prob>chi2	=	0.0000

Hausman test, Majority Domestic-owned banks:

---- Coefficients ----

	(b)	(B)	(b-B)	sqrt(diag(V_b-_B))
	Fixed	Random	Difference	S.E.
ca_cap	0.015573	-0.00508	0.020652	0.010755
aq_llpnir	-0.01144	-0.01213	0.000692	0.000478
aq_loss	-0.05675	-0.01823	-0.03852	0.017708
aq_imp	-0.00493	-0.00365	-0.00129	0.000676
ma_nie	-0.71037	-0.83061	0.120241	0.048287
ma_ie	-0.10277	-0.01827	-0.0845	0.035155
ep_ini	0.563223	0.55378	0.009443	0.067965
ep_fee	0.195344	0.007954	0.187391	0.158189
lr_loan	-0.01059	0.003388	-0.01398	0.007859
lr_la	-0.00314	0.001022	-0.00417	0.004075

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

Test: Ho: difference in coefficients not systematic

chi2(10)	=	(b-B)'[(V_b-V_B)^(-1)](b-B)
	=	36.47
Prob>chi2	=	0.0000

Heteroscedasticity test, Majority Domestic-owned banks:

. xttest3
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (405)	=	5.9e+33
Prob>chi2	=	0.0000

Appendix C: Hypothesis III

Appendix C: Hypothesis III Table.1: Test for Structural Time-Break

Chow test, full sample:

Chow test for structural difference with respect to Pre-Crisis
F(11, 1498) = 8.99102 with p-value 0.0000

Appendix C: Hypothesis III Table.2: Tests Summaries, Pre-Crisis

Hausman test, full sample, Pre-Crisis period:

---- Coefficients ----

	(b)	(B)	(b-B)	sqrt(diag(V_b-_B))
	Fixed	Random	Difference	S.E.
ca_cap	-0.00571	-0.00642	0.000709	0.008898
aq_llpnir	-0.00731	-0.01254	0.005231	0.000912
aq_loss	-0.30648	-0.15314	-0.15334	0.038951
aq_imp	-0.00223	-0.00047	-0.00176	0.000669
ma_nie	-0.91529	-0.98188	0.066594	0.049913
ma_ie	-0.10389	-0.08342	-0.02047	0.034401
ep_ini	0.623712	0.731827	-0.10811	0.093138
ep_fee	0.223828	-0.08469	0.308523	0.132201
lr_loan	-0.01073	-0.00245	-0.00828	0.00657
lr_la	-0.00165	-0.00039	-0.00126	0.002673

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

Test: Ho: difference in coefficients not systematic

chi2(10)   =   (b-B)'[(V_b-V_B)^(-1)](b-B)
                  =   48.47
Prob>chi2   =   0.0000

Heteroscedasticity test, full sample, Pre-Crisis period:

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

$$\text{chi2 (405)} \quad = \quad \text{1.4e+34}$$
$$\text{Prob>chi2} \quad = \quad 0.0000$$

Chow test, full sample:

Chow test for structural difference with respect to FO
Chi-square(11) = 21.8738 with p-value 0.0254
F(11, 529) = 6.27342 with p-value 0.0275

Hausman test, Majority Foreign-owned banks, Pre-Crisis period:

---- Coefficients ----

	(b)	(B)	(b-B)	sqrt(diag(V_b-_B))
	Fixed	Random	Difference	S.E.
ca_cap	-0.01974	-0.00988	-0.00986	0.012796
aq_llpnir	-0.00655	-0.00984	0.003294	0.001024
aq_loss	-0.26558	-0.19182	-0.07376	0.052046
aq_imp	-0.00159	-1.9E-05	-0.00157	0.000864
ma_nie	-0.91328	-0.93983	0.026548	0.094467
ma_ie	-0.13535	-0.11493	-0.02042	0.048249
ep_ini	0.591319	0.732358	-0.14104	0.124297
ep_fee	0.2737	-0.10268	0.376385	0.191845
lr_loan	-0.00467	-0.00405	-0.00062	0.012009
lr_la	-0.00514	-0.00103	-0.00411	0.003932

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

Test: Ho: difference in coefficients not systematic

$$\text{chi2(10)} \quad = \quad \text{(b-B)'[(V\_b-V\_B)^{(-1)}](b-B)}$$
$$= \quad 21.63$$
$$\text{Prob>chi2} \quad = \quad 0.0171$$

Heteroscedasticity test, Majority Foreign-owned banks, Pre-Crisis period:

. xttest3
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (405)	=	1.1e+34	
Prob>chi2	=	0.0000	

Hausman test, Majority Domestic-owned banks, Pre-Crisis period:

---- Coefficients ----

	(b)	(B)	(b-B)	sqrt(diag(V_b-_B))
	Fixed	Random	Difference	S.E.
ca_cap	0.011476	0.005552	0.005924	0.012328
aq_llpnir	-0.01169	-0.02119	0.0095	0.002868
aq_loss	-0.31132	-0.01647	-0.29485	0.074702
aq_imp	-0.00449	-0.0019	-0.00259	0.001606
ma_nie	-0.87906	-0.9775	0.098438	0.050263
ma_ie	-0.08127	-0.037	-0.04426	0.054588
ep_ini	0.702269	0.672975	0.029295	0.145468
ep_fee	0.038733	-0.06857	0.107308	0.189125
lr_loan	-0.01196	0.000608	-0.01257	0.008889
lr_la	-0.00144	0.00072	-0.00216	0.003863

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

Test: Ho: difference in coefficients not systematic

chi2(10)	=	(b-B)'[(V_b-V_B)^(-1)](b-B)
	=	26.58
Prob>chi2	=	0.0030

Heteroscedasticity test, Majority Domestic-owned banks, Pre-Crisis period:

. xttest3
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (405)	=	9.0e+33
Prob>chi2	=	0.0000

Appendix C: Hypothesis III Table.3: Tests Summaries, year 2009

Multicollinearity check, full sample, year 2009:

. estat vif
variance inflation factor

Variable	VIF	1/VIF
aq_loss	2.57	0.38902
aq_imp	2.24	0.447102
aq_llpnir	2.1	0.476429
ep_ini	1.9	0.525888
lr_la	1.67	0.598329
ma_ie	1.49	0.67133
lr_loan	1.47	0.680961
ep_fee	1.36	0.736839
ca_cap	1.26	0.795248
ma_nie	1.24	0.808767
Mean VIF	1.73	

Heteroscedasticity test, full sample, year 2009:

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
    Ho: Constant variance
    Variables: fitted values of ROAA
  $chi2(1)$ =   140.30
  $Prob > chi2$ =   0.0000

Chow test for structural difference with respect to FO
Chi-square(11) = 25.7793 with p-value 0.0070
F-form: F(11, 295) = 2.34357 with p-value 0.0089

Multicollinearity check, Majority Foreign-owned banks, year 2009:

. estat vif
variance inflation factor

Variable	VIF	1/VIF
aq_loss	2.58	0.387166
aq_imp	2.22	0.449464
lr_la	2.06	0.485607

Variable	VIF	1/VIF
ep_ini	2.04	0.489684
aq_llpnir	2	0.500155
lr_loan	1.64	0.610726
ma_ie	1.37	0.730959
ep_fee	1.34	0.747748
ca_cap	1.28	0.784291
ma_nie	1.17	0.85582
Mean VIF	2.58	0.387166

Heteroscedasticity test, Majority Foreign-owned banks, year 2009:

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
     Ho: Constant variance
     Variables: fitted values of ROAA
  chi2(1)   =   65.93
  Prob > chi2 =   0.0000

Multicollinearity check, Majority Domestic-owned banks, year 2009:

. estat vif
variance inflation factor

Variable	VIF	1/VIF
aq_loss	2.79	0.358575
ma_ie	2.66	0.375904
aq_llpnir	2.65	0.377256
aq_imp	2.47	0.405601
ma_nie	2.22	0.449495
lr_loan	2.17	0.460841
ep_ini	2.09	0.479069
lr_la	1.91	0.52228
ep_fee	1.91	0.52271
ca_cap	1.3	0.769849
Mean VIF	2.22	

Heteroscedasticity test, Majority Domestic-owned banks, year 2009:

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

```
        Ho: Constant variance
        Variables: fitted values of ROAA
  chi2(1)        =        44.02
  Prob > chi2    =        0.0000
```

Appendix C: Hypothesis III Table.4: Tests Summaries, year 2010

Multicollinearity check, full sample, year 2010:

. estat vif
variance inflation factor

Variable	VIF	1/VIF
aq_loss	3.79	0.263831
aq_imp	2.65	0.377689
ep_ini	2.56	0.390911
aq_llpnir	2.32	0.430654
ma_nie	2.04	0.489614
lr_loan	1.97	0.506346
lr_la	1.84	0.542209
ep_fee	1.59	0.628772
ma_ie	1.59	0.62956
ca_cap	1.08	0.929078
Mean VIF	2.14	

Heteroscedasticity test, full sample, year 2010:

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
      Ho: Constant variance
      Variables: fitted values of ROAA
  chi2(1)   =   1309.05
  Prob > chi2   =   0.0000

Chow test for structural difference with respect to FO
 Chi-square(11) = 15.4332 with p-value 0.1635
 F-form: F(11, 308) = 1.40302 with p-value 0.1701

Multicollinearity check, Majority Foreign-owned banks, year 2010:

```
. estat vif
variance inflation factor
```

Variable	VIF	1/VIF
aq_loss[a]	5	0.199939
aq_imp	3.19	0.313809
ep_ini	2.54	0.393647
aq_llpnir	2.16	0.46366
lr_loan	2.13	0.469225
lr_la	1.72	0.582462
ep_fee	1.61	0.622307
ma_nie	1.57	0.635237
ma_ie	1.48	0.676889
ca_cap	1.1	0.912923
Mean VIF	2.25	

[a]VIF – is high, corr(aq_loss| aq_imp)=0.7516, therefore we drop aq_loss

Heteroscedasticity test, Majority Foreign-owned banks, year 2010:

```
. estat hettest
```

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
     Ho: Constant variance
     Variables: fitted values of ROAA
  chi2(1)   =   178.62
  Prob > chi2 =   0.0000

Multicollinearity check, Majority Domestic-owned banks, year 2010:

```
. estat vif
variance inflation factor
```

Variable	VIF	1/VIF
aq_loss	3.5	0.285859
ep_ini	3.12	0.320052
ma_nie	3.01	0.331754
aq_llpnir	2.77	0.361582
aq_imp	2.68	0.373333
lr_loan	2.24	0.446879
lr_la	2.2	0.453849
ma_ie	1.87	0.534723
ep_fee	1.66	0.603518
ca_cap	1.19	0.840454
Mean VIF	2.42	

Heteroscedasticity test, Majority Domestic-owned banks, year 2010:

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of ROAA
    chi2(1)   =   635.54
    Prob > chi2   =   0.0000

Master Thesis Proposal

Author:	Bc. Adelina Hajzeraj
Supervisor:	Prof. Petr Gapko, PhDr.
Defense Planned:	September 2013

Proposed Topic:

Analysing the Performance of European Commercial Banks

Topic Characteristics:

My thesis will try to evaluate the performance of commercial banks in some countries in Europe. It will consider two groups of commercial banks. First group will comprise of those from countries that have been highly affected by the financial crisis, during the last years/decade, such as Greece, Spain, Italy, etc. The second group will consider banks from less affected countries. Intending to analyse how the financial environment affects the performance of commercial banks, it will examine the cost and profit efficiency using the relevant methodology. The questions I will consider are: does the ownership play any role in helping banks overcome economic crises. Are foreign-owned banks less sensitive to economic fluctuations? My contribution mainly will be dedicated to banks, giving them a feedback when deciding about ownership structure. Data sources will be taken from annual reports of respective banks and from the financial database *Bankscope*.

Hypotheses:

1. Banks from countries that were highly affected by the financial crisis are performing worse than those from less affected countries:

2. Ownership structure of commercial bank matters in their performance:

3. There was a structural break in banks performance during the last crisis:

Methodology:

Regarding the methodology, I think different methodologies should be used for different hypothesis. To test the first hypothesis, I will estimate the frontier efficiency using Stochastic Frontier Analysis and use bank ranking to cross-compare the groups. The second step shall consider a dummy variable. I need to test whether commercial banks that are foreign-owned are indeed performing better than domestic-owned banks. Dummy variable should equal to zero, if more than half of the bank ownership belongs to domestic investors. Besides the SFA methodology, I will try to look over the financial performance of respective banks using the parameters of CAMEL model. Regarding the third hypothesis, I will try to prove that there was a structural break in the profitability of the commercial banks.

Outline:

Structure of the thesis is expected to contain: abstract, introduction, literature review, methodology, data, empirical results, conclusion and references.

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