

NBP Working Paper No. 229

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The views expressed in this paper are the views of the author and do not necessarily reflect those of Narodowy Bank Polski. I would like to thank prof. Krzysztof Jackowicz and an anonymous reviewer for helpful comments.

Published by:
Narodowy Bank Polski
Education & Publishing Department
ul. Świętokrzyska 11/21
00-919 Warszawa, Poland
phone +48 22 185 23 35
www.nbp.pl

ISSN 2084-624X

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Contents

Introduction	5
1. Relationship between Bank Profitability, Market Structure and Degree of Competition	7
2. Structural and Technological Changes in the Polish Banking Sector	10
3. Banking Structure, Business Cycle and Profitability of Banks – Empirical Results	12
3.1 Panel A (yearly data set, prior to and during the financial crisis) – the baseline model	12
3.2 Panel B (quarterly data set, during the financial crisis)	14
Conclusions	18
References	20
Appendix 1	23
Appendix 2	26

Abstract

The aim of this study is to examine the impact of banking-sector structure and macroeconomic changes on bank profitability in the Polish banking sector over the past fifteen years (i.e., prior to and during the global financial crisis of 2008). The model developed in this paper incorporates the Structure-Conduct-Performance (SCP) hypothesis, as well as the Relative Market Power (RMP) hypothesis created by Smirlock (1985). Furthermore, this paper also examines the overall effect of financial structure and macroeconomic conditions to determine whether financial development and business cycles affect the profit of Polish banks. Finally, this paper tests the impact of foreign capital on the profitability of Polish banks and attempts to determine if there is a link between the context of the parent banks and the profitability of their affiliates.

Empirical results based on two panel data sets describing both micro-level and the macro-level data are ambiguous, and find evidence of the RMP hypothesis, as well as the traditional SCP, in the Polish banking sector. This paper also finds that increased foreign ownership and intermediation have a positive effect on bank profitability. Furthermore, this paper finds a positive correlation between the context of parent banks and the profitability of their affiliates. Also, the profitability of commercial banks in Poland are contingent upon the business cycle.

JEL: F36; G2; G21; G34; L1.

Keywords: bank profitability, foreign – owned banks, concentration, market power, market structure, Lerner index, Polish banks, business cycle.

Introduction

The profitability of banks is a subject of great interest in bank management, financial markets, bank supervisions, and academics. This interest is driven by increasing consolidation within the banking sector, changes in production technology and regulation, as well as macroprudential policy. Identifying the determinants of bank performance is an important predictor of unstable economic conditions. Profitable banking systems are likely to absorb negative shocks, thus maintaining the stability of the financial system.

The aim of this study is to estimate the impact of market structure on the performance of banks in the Polish sector throughout the past fifteen years (i.e., prior to and during the financial crisis of 2008, after Lehman Brothers failure). In order to test the traditional Structure-Conduct-Performance (SCP) hypothesis, this paper empirically investigates the effect of market structure as it relates to profitability with a particular focus on whether banks that are operating in concentrated markets generate more profit or not. This paper besides the traditional SCP hypothesis tests the Relative Market Power (RMP) hypothesis created by Smirlock (1985). He posited that there is no relationship between concentration and profitability but rather between a bank's market share and its profitability. Furthermore, this paper also examines the overall effect of financial structure and macroeconomic conditions to determine whether financial development and business cycles affect the profit of Polish banks.

The profitability of commercial banks in Poland was affected by a large number of internal and external factors such as consolidation and technological processes, the real economy, and Poland's accession to the EU. Throughout the past fifteen years the ownership structure changed and consolidation processes intensified due to the nation's European integration. Between 1997 and 2001 the process of consolidation was quite intense and was a natural consequence of an increasing number of global mergers caused by the establishment of the Eurozone, which took place in 1999. Also, due to the financial crisis and sovereign debt crisis in Europe the consolidation processes intensified and concentration in the Polish banking sector increased once again since 2010. Furthermore, due to that fact that the consolidation processes are correlated with the changing ownership structure in the Polish banking sector, this paper also tests the impact of foreign capital on the profitability of Polish banks. Finally, this paper attempts to determine if there was a link between the context of parent banks and the profitability of their affiliates.

In order to carry out a quantitative assessment of the impact of market structure on banking performance, this study is divided into two investigations that were conducted on two different panels - panels A and B. Both panel data sets combine micro- and macro-statistical data sets for Polish commercial banks as well as macroeconomic data covering cyclical factors and macroeconomic environment. Panel A consists of yearly micro- and macro-level data combining a statistical data set for Polish commercial banks as well as information about the macroeconomic environment for the period 1997–2012. Panel B consists of quarterly micro- and macro-level data combining a data for Polish commercial banks and their parent banks as well as information about the macroeconomic environment for the period 2007Q1–2013Q2. Micro - level data for Polish commercial banks was received from the National Bank of Poland (balance sheets and profit and loss accounts) and micro - level data for their parent banks was received from the Bankscope database¹. For two of the panel data sets - panels A and B respectively, macroeconomic data was received from Polish Central Statistical Office (CSO) and Eurostat. The degree of competition within the Polish banking sector was estimated using the Lerner indices for yearly data, and the change of concentration within the Polish banking industry was analysed using the Herfindahl-Hirschman indices (HHI). Profitability in the Polish banking sector was analysed using the return on assets ratios (ROA).

The major contribution of this study to the literature is to test the SCP paradigm and RMP hypothesis in the Polish banking sector and examine the role of foreign capital in this context, both prior to and during the crisis. This study consists of three parts and a summary. The first part is a broad literature review concerning the relationship between bank profit, market structure, and the degree of competition. The second part describes the structural and technological changes within the Polish banking sector that lead to changes in profitability. The third section consists of two parts: the first part presents the results of the analysis of panel A data and the second part presents the results of the analysis of panel B data. The summary provides an overview of the empirical results and the conclusions that were drawn.

¹ The Bankscope database was created by Bureau van Dijk-Electronic Publishing. It contains information on balance sheets and income statements for commercial banks around the world.

1. Relationship between Bank Profitability, Market Structure and Degree of Competition

In recent years there have been ongoing debates concerning the economic role of market structure and competition within the banking industry. Therefore, developments in the banking sector do not affect banks alone, but are highly relevant for the economy as a whole. Accordingly, the competition between banks and profitability of the banking sector is of interest not just at the individual bank level; rather, it is crucial at a broader macroeconomic level.

Dramatic changes in regulation and technology have modified the structure of the banking sectors. All these changes have strengthened competition, especially in traditional lending activity and encouraged banks to diversify their sources of revenue. Competition amongst banks is a broad concept that covers many aspects of the banking environment and is currently conducted as part of the Industrial Organisation Approach to Banking (IOAB) (cf., Degryse et al., 2009; Van Hoose, 2010, Bikker and Leuvensteijn, 2014). The literature on measuring competition amongst banks can be divided into two major streams: a structural approach developed on the basis of economic theories investigating the Industrial Organisation (IO)² and a non-structural approach on the basis of the New Empirical Industrial Organisation Theory (NEIO). The traditional IO theory is comprised of the following structural models: Structure-Conduct-Performance paradigm (SCP) and a theory based on the Efficient Structure hypothesis (ES). In structural models, concentration ratios (i.e., Herfindahl-Hirschman (HHI)) indices³ and the k bank concentration ratios (CR_k)⁴ are often used to explain competitive performance in the banking industry as a result of market structure (see Bikker, 2004).

The SCP model was developed by Bain (1951). This theory states that in a market with higher concentration, banks are more likely to show collusive behaviour and their oligopoly rents will increase their performance (profitability) (the SCP paradigm dominated until the late 1970s). The SCP model assumed that in a more concentrated system leads to less competition and hence to higher profitability. Berger (1995) advocated based on the traditional SCP paradigm, that banks set prices that are less favourable to consumers, as a

² The above theory deals with market organisation and competition; therefore, the behaviour of the firms is investigated with certain limitations imposed by consumers and competitors. The central issue of this theory was the expansion of the micro-economic analysis with an imperfectly competitive markets and the main model discussed in this theory is the oligopoly model.

³ The HHI is calculated as the sum of the squared market shares of each firm in a market in terms of assets. It ranges from 0 to 1.

⁴ This index is calculated as the market share of the k largest banks in all banking assets.

result of imperfectly competitive markets. Smirlock (1985) tested an alternative explanation for these results, and specifically he posited that there is no relationship between concentration and profitability, but rather between bank market share and bank profitability and created the Relative Market Power (RMP) hypothesis. However, subsequent results of analyses based on the SCP paradigm have shown that the relationship between the structure of the market and conduct is even more complex.

The Efficiency Structure hypothesis (ES) was developed by Demsetz (1973). The ES theory states that if banks enjoy a higher degree of efficiency than their competitors, they can increase shareholder value or gain market share by reducing their prices. According to the ES, concentrated markets are those where highly effective firms (banks) operate. Efficiency is not an effect but a determinant of market structure. However, Hicks (1935) developed a theory opposite to the ES, and it is known in literature as the Quiet Life (QL). According to the QL, banks with superior market strength and thus a privileged position suffer a lower cost efficiency due to the quiet life of their managers. Generally, QL hypothesis assumes that monopoly will reduce the pressure towards efficiency, see Bikker and Leuvensteijn 2014. Table 1 and figure 1 in the appendix illustrate same examples of various theoretical relationships between performance indicators and competition.

The modern theory is based on the New Empirical Industrial Organization (NEIO) literature, which provided empirically applicable tests based on either aggregate industry data or individual firm data. Methods based on NEIO do not take into account the direction of the change in the level of concentration and they presume that the degree of competition does not always depend on concentration measures, as other market characteristics including dynamic barriers to entry and exit are more important. The Industrial Organization Approach to Banking (IOAB) is a theory concerned with the issue of measuring competition specially in the banking sector and defines the following measures of competition: the Lerner index,⁵ the H-statistic,⁶ and the Boone-indicator⁷ (cf., Degryse et al., 2009; Van Hoose, 2010, Bikker and Leuvensteijn, 2014). The Lerner index was used in this paper for evaluating competition within the Polish banking sector.

A large number of studies have already dealt with the determinants of bank profitability on the banking structure level and broader macroeconomic level. The analyses

⁵ The Lerner Index measures the so-called monopoly mark-up. According to the Lerner index, the market power of a monopoly depends on the price elasticity of market demand. The increasing value of the Lerner Index indicates a decrease in competition.

⁶ Panzar and Rosse defined the measure of competition as the value of the sum of revenue elasticities, known in the literature as the H-statistic. The increasing value of the H-statistic indicates an increase in competition.

⁷ The Boone method is based on the so-called efficient structure (ES) hypothesis (cf., Pawłowska (2011)).

focus primarily on microeconomic or bank-specific drivers of profitability, based mainly on variables like size and cost management (efficiency). Number of studies examined the influence of the market structure based on SCP paradigm. A positive relationship between concentration and profitability was reported e.g. by Demircuc-Kunt and Huizinga (1999), Molyneux and Thornton (1992), Goddard et al. (2004), which confirm the traditional SCP hypothesis. However, Mirzaei et al. (2011) and Fernández de Guevara, (2004) confirmed the relative market-power hypotheses (RMP) in advanced economies. ES hypothesis by contrast, was confirm by i.e. Claey's and Vander Venet, (2008). Most of the studies focusing on macroeconomic influences on profitability of banks find that the business cycle has a positive influence on the development of bank profitability and also find a positive correlation between bank profitability and inflation (e.g. Albertazzi and Gambacorta, 2009; Bikker and Hu, 2002; Demircuc-Kunt and Huizinga, 2000, Rumler and Waschiczek, 2010).

Also, researchers have found almost no evidence that the ownership structure of banks had an impact on their profitability (e.g. Molyneux and Thornton, 1992, Cetorelli, 2004). However, La Porta et al. (2002) concluded that a state bank follows a political rather than a social agenda.

Majority of the studies analyzing determinants of banks performance are focusing on selected microeconomic factors. Presented paper offers broad view on the subject and takes into account many micro factors and also cyclical components (similar, comprehensive studies, describing many micro factors and business cycle were published for the Austrian banking sector (cf., Rumler and Waschiczek, 2010) and for Greek banks (cf., Athanasoglou et. al., 2008). Furthermore, there is not a lot of work taking into account the relationship between the profitability of the parent banks and situation of their affiliates, and this paper fills this gap.

2. Structural and Technological Changes in the Polish Banking Sector

Deregulation of 1989 radically restructured the banking system in Poland⁸. It started the process of privatization and consolidation of the banking industry, previously dominated by very few government-controlled banks. Another important factor which influenced the shape of the banking sector was Poland's accession to the European Union in 2004 (owing to this fact, the Polish financial law was harmonised with European Union regulations⁹).

The period prior to financial crisis was a period of rapid change in the Polish banking sector; banks attempted to devise new development strategies in order to achieve the best financial results. Mergers and acquisitions, enhanced by a fast technological development, were one of the key strategic components of commercial banks. However, the Polish banking sector is relatively small in comparison to the other EU worth 85% of the country's GDP¹⁰ and has relatively simple traditional business models¹¹. Polish banks concentrate their activities on lending to local companies and households (housing and consumer loans).

When analyzing the processes that took place in the Polish banking sector over the past 15 years it should be noted that privatization led to increase in the share of foreign capital in the Polish banking sector. As of the end of 2012, the share of banks with predominantly foreign capital was approximately 65% whereas at the end of 1997 it was approximately 15% (see figure 3 and 4 in the Appendix 1). However the share of foreign capital between 2008 and 2014 decreased slightly. It should be noted that the involvement of foreign banks in Poland is relatively large compared with the euro area countries, although smaller than in some countries of Central and Eastern Europe. Schoenmaker (2011) demonstrated that due to the significant involvement of foreign capital, financial stability in the banking sectors of the Central and Eastern Europe are dependent on the performance of banks of the old EU countries

The consolidation in the Polish banking sector led to changes in concentration measured with the HHI and CR5 ratios. The analysis of the variability of concentration ratios shows that in part of the analysed period (1998-2001) those ratios followed an upward trend. The increase in concentration ratios was enhanced by mergers and acquisitions conducted by

⁸ In 1989 a two-tier structure of Polish banking was established, with 9 regional commercial banks.

⁹ As of the date of Poland's accession to EU was introducing a single passport law in Poland. Pursuant to the single passport rule, a credit institution which obtained a banking licence in one EU country may undertake and conduct the activity in the territory of another EU country, without having to undergo another licence procedure. The credit institution is only required to notify the banking supervisor of the host country of its intention to undertake the activity in its territory. See: NBP (2004).

¹⁰ Polish Financial Supervision Authority, 2013.

¹¹ The average for EU-27 countries is about 400% (cf. Bijlsma et al. (2013)).

large banks. In turn, between 2002 and 2009 concentration measures were decreasing. In the period 2010-2014 due to intensification of consolidation process concentration again increased (see figure 2 in the Appendix 1).

The profitability of commercial banks in Poland in the fifteen years (prior to and during the financial crisis) was influenced by a large number of internal and external factors: consolidation, technological processes, changing in regulation due to Poland's accession to the European Union and the real economy. After a significant decrease in the profitability of commercial banks between 2001 and 2003 (related to the economic slowdown), there was a clear improvement in profitability. The improvement in banks' profitability ratios return on assets (ROA) and return on equity (ROE) was facilitated by, among others, a decrease in the share of non-performing loans¹². The slight decrease in profitability indicators within the period of 2008–2009 was caused by the global financial crisis. It should be noted, that the group of Polish commercial banks was not homogeneous during the crisis. Strong deterioration of financial results was observed in banks which in previous periods were characterized by the increasing of market share, particularly in the segment of household loans¹³. The period of 2010-2012 was the sovereign debt crisis in the Eurozone. However, in this period profitability of Polish commercial banks improved again (see figure 7 in the Appendix 1). Furthermore, in comparison to the other EU countries Polish banks performed very well (see figure 8 and 9 in the Appendix 1).

The financial crisis and the increase in systemic risk associated with cross-border links between large banks gave rise to activities aimed at reforming the post-crisis national and international institutional system in an effort to improve the supervision of banks, including the systemically important banks. On the 4th of November 2011 the Financial Stability Board published a list of the largest cross-border banking corporations (G-SIFIs)¹⁴. The list of G-SIFIs¹⁵ is updated and published by the Financial Stability Board in November of each year. The fact that some of banks being on the list of G-SIFIs are parent-banks of banks operating in Poland is of significance for their affiliates (e.g., Unicredit Group and Crédit Agricole Group are parent banks in the Polish banking sector).

¹² Since Poland's accession to the EU the classification of non-performing loans changed to a less restrictive classification, for instance for sub-standard receivables from 1 to 3 months into from 3 to 6 months, for doubtful receivables from 3 to 6 months into from 6 to 12 months, for lost receivables from above 6 months to above 12 months. See NBP (2004).

¹³ Polish Financial Supervision Authority, 2010.

¹⁴ Criteria for the designation of G-SIFI's: size and international links of the bank, lack of readily available substitutes for services provided or adequate infrastructure for services, global activity (i.e., activity in many legal jurisdictions), and complexity of the activity (i.e., its impact on the financial system and the economy).

¹⁵ FSB, 4.11.2011. The group of G-SIFIs will be updated annually and published by the FSB each November.

3. Banking Structure, Business Cycle and Profitability of Banks - Empirical Results

In order to test the traditional SCP hypothesis and RMP hypothesis, and impact of the macroeconomic changes on Profitability of Banks in Poland, this study consists of two investigations.

The first investigation is based on yearly data from 1997 to 2012 (panel A) and the second investigation is based on quarterly data (panel B) covering the period of the financial crises and debt crisis 1997Q4–2013Q2. This data was obtained for all commercial banks operating in Poland (i.e., Polish banks, subsidiaries of foreign institutions, and branches of foreign banking institutions)¹⁶. Both of the panel data sets combine micro-level data for Polish commercial banks and macro-level statistical data covering cyclical factors.

This study uses a variety of microeconomic indicators stemming from the bank data to capture changes in the economic framework, including balance sheet and income statement figures from the National Bank of Poland balance sheet statistics¹⁷. Additionally, panel B data consists of quarterly data from the Bankscope database, which is a source of valuable information about foreign parent institutions of the Polish affiliates. The micro-level data from Bankscope was merged with data on the Polish banking institutions.

Macroeconomic data on the growth of GDP and inflation in Poland come from the Polish Central Statistical Office (CSO). Panel B also includes macro-level data from Eurostat concerning GDP growth in the parent banks' country.

In order to test the traditional SCP hypothesis and RMP hypothesis, model estimation was performed separately to avoid any alignment of variables in both panels A and B. In order to solve the problem arising from extreme outliers that affect estimation, all outliers are removed from each panel data set (i.e., any value below the first percentage point and also above the 99th percentage point in sample distribution were removed).

3.1 Panel A (yearly data set, prior to and during the financial crisis) - the baseline model

In order to carry out a quantitative assessment of the impact of market structure on the banking profitability in the Polish banking sector, GMM¹⁸ estimator was used based on yearly

¹⁶ The numbers of banks fluctuated in the sample due to acquisitions, liquidations, and new banks entering the market.

¹⁷ Panel data sets take into account mergers and acquisitions in the Polish banking sector. The numbers of banks are presented after accounting for mergers and acquisitions, with the acquiring institution treated as a new entity.

¹⁸ System GMM, an update from Arellano-Bond's (1991). Dynamic panel data model, based on the first difference. Actually, Arellano and Bond proposed one- and two-step estimators. In this paper we use the one-step GMM estimator.

data from 1997 to 2012 (panel A). In the model, as profit indicator return on assets was used (ROA). Also the model distinguish between market structure and relative market power.

The following regression with ROA as the dependent variable was calculated as follows:

$$ROA_{it} = \alpha + a_0 ROA_{it-1} + (1 + CRI)(a_1 marketstructure_{it} + a_2 marketpower_{it}) + a_3 businesscycle_t + \sum_{j=1}^N b_j oth_{it} + \varepsilon_{it} \quad (1)$$

where ROA_{it} denotes the return on assets ratio for each bank i for each year t and ROA_{it-1} is the one-period lagged the return on assets ratio (ROA).

Market structure measures were determined by taking the competition measure from the Lerner index average (LA_{it}) for each year t and the variable indicating concentration ratio, the Herfindahl-Hirschman index for assets (HHI_t) for each year t ¹⁹. Additionally, as a proxy of market structure in the regression was also estimated the variable indicating the share of banks with majority of foreign equity (FC_t) for each year t .

Market power measures were calculated as:

- the share of bank assets in the total assets (MP_{it}) for each bank i for each year t ,
- the Lerner Index (LI_{it})²⁰ for each bank i for each year t .

The model also tests the impact of the size on the banking sector profitability, as the relative market power measure:

- the size is calculated as the log of the total assets (LA_{it}) for each banks i for each year t .

Also, model control the impact of financial crisis on relation between profitability and market structure and market power, therefore in regression was used control dummy variable:

- the dummy CRI that takes the values of 1 if $t > 2007$ and zero elsewhere.

The model also tests the impact of *business cycle* on banks profitability define as:

- CPI index (CPI_t) and GDP growth yoy (GDP_t) and for each year t .

In regression were used control variables (oth_{it}) such as:

- the ratio of total deposit to total assets (DTA_{it}), for each bank i for each year t ,
- the ratio of total loans to total assets, as a measures of the magnitude of disintermediation tendencies (LTA_{it}), for each bank i for each year t ,
- the ratio of interest cost divided by total interest income (CTI_{it}), as a measures of the efficiency of bank, for each bank i for each year t .

¹⁹ For robustness check in the regressions, also the CR5 concentration ratio was estimated.

²⁰ See: Pałowska (2014).

The variable α is a constant term, ε_{it} denotes the error, and a_1 , a_2 , a_3 and b_j are the regression coefficients.

In table 4 in the Appendix 2, for the entire analyzed period, the positive coefficients (a_1 and a_2) were found in regressions 2-4. It means that traditional SCP paradigm may exists. However, based on Panel A, this paper finds that during the crisis, the size and relative market power have greater impact of profitability of Polish commercial banks then market structure. Prior to and during the crisis, in regression 1 and 4 coefficients a_1 for HHI as a measure of market structure is insignificant.

This paper finds positive impact of the share of foreign capital on profitability of Polish banks, also during the crisis (estimation 5). What is important, that in each estimation based on Panel A, this paper finds, negative and significant impact on cost to income ratio on profitability. It means that better cost management lead to better profitability of banks, which may support efficiency structure hypothesis ES. Also, based on Panel A, this paper finds positive and significant impact on the ratio of total loans to total assets on profitability (estimations 4 and 5). This means intermediation (i.e., grater loans in total assets) has a positive effect on bank profitability.

Generally crisis had negative impact of bank profitability in Poland, but during the crises the most important factor was the relative market power. It should be noted that, for the entire analyzed period this paper finds that profitability of banks is procyclical. This paper finds the positive coefficients (a_3) between GDP growth and inflation in regressions 1-5.

3.2 Panel B (quarterly data set, during the financial crisis)

In order to carry out a quantitative assessment of the impact of banking sector structure on the banking profitability in the Polish banking sector during the crisis, the quarterly data set was used, based on data 2007Q4-2013Q2, and also GMM estimator.

The following baseline model with ROA as the dependent variable was calculated as follows:

$$ROA_{it} = \alpha + a_0 ROA_{it-1} + a_1 market\ structure_{it} + a_2 market\ power_{it} + a_3 business\ cycle_t + \sum_{j=1}^N b_j oth_{it} + \varepsilon_{it} \quad (2)$$

where ROA_{it} denotes the return on assets ratio for each bank i for each quarter t ²¹.

²¹ To determine the robustness, additional estimations were calculated with the return on equity (ROE) for each banking sector i for each year t , as a dependent variable. The results were very similar.

Market structure measure was defined as:

- the concentration ratio such as Herfindahl-Hirschman index for assets (HHI_t) for each quarter t .

Also in this model was defined the size of the banking sector:

- as the log of total assets, where total assets are the sum of assets of the all banks ($Size_t$) for each quarter t .

Market power, the relative market power measure, was defined as:

- the share of bank assets in the total assets (MP_{it}) for each bank i for each quarter t .
- the share of bank loans in the total loans (ML_{it}) for each bank i for each quarter t .

Also, as the relative market power measure, the model also tests the impact of the size on the bank on profitability, which was defined as:

- the log of total assets (LA_{it}) for each bank i for each quarter t .

In the model was also estimated the dummy variables indicating the foreign ownership:

- the dummy (FO) that takes the values of 1 if bank is foreign-owned and zero elsewhere, for each bank i for each quarter t .

The model also tests the impact of business cycle on bank's profitability during the crisis. The variable *business cycle* was defined as:

- GDP_t growth (yoy) and inflation growth (CPI_t) for each quarter t .

In regressions were also used control variables (oth_{it}):

- the ratio of total deposit to total assets (DTA_{it}), for each bank i for each quarter t ,
- the ratio of total loans to total assets, as a measure of the magnitude of disintermediation tendencies (LTA_{it}), for each bank i for each quarter t ,
- the core capital ratio (CAR_{it}) ratio, as an indicator of bank's risk behavior (the higher the capital ratio, the greater the risk aversion), for each bank i for each quarter t ,
- the share of housing foreign currency loans to the household sector in total loans ($FXHL_{it}$), as an indicator of banking sector development, for each bank i for each quarter t .

The variable α is a constant term, ε_{it} denotes the error, and a_0 , a_1 , a_2 , a_3 and b_j are the regression coefficients.

In table 5 in the Appendix 2, positive coefficient (a_1) was found only in regression 3. However, positive and significant coefficient (a_1) was found for variable *Size*. Also, positive and significant coefficient (a_2) is found for relative size (LA) in regressions 2-4.

However, relative market power – measured in terms of the individual institution's share in total domestic lending (*MPL*) and measured in terms of the individual institution's share in total assets (*MP*) – have no significant influence on the profitability indicators in this study. Also based on Panel B this paper finds positive impact of foreign capital on profitability, the results indicate a significant correlation between the profit, and the dummy variables for, majority foreign owned banks (estimations 4 and 5).

Of the microeconomic control variables, the ratio of core capital to risk weighted assets was found to have a significant and negative influence on bank profitability. Banking sector development – measured in terms of foreign currency lending was found to have a significant and negative influence on bank profitability. The findings indicate that foreign currency loans did not positively contribute to banks' profitability. Similarly to results based on panel A, results based on Panel B indicate the positive correlation between intermediation (i.e., greater loans in total assets) and banks profitability. However, also similarly to panel A, results indicate the negative coefficient between the ratio of total deposit to total assets and profitability.

Generally, for the whole analyzed period this paper finds positive correlation between, GDP growth and inflation (*CPI*), and profitability of banks. It means that profitability of banks is procyclical.

Impact of situation in parent banks on profitability of their affiliates

Furthermore, the paper also tests impact of condition of parent banks on profitability of their affiliates. In this case additional regressions were estimated based on data from Panel B with using GMM estimator. ROA of banks with majority of foreign capital was used as the dependent variable in this model. Independent variables were taken from Bankscope and from Eurostat. The following model with ROA as the dependent variable was calculated as follows:

$$ROAf_{it} = \alpha + a_0ROAf_{it-1} + a_1business\ cycle\ in\ parent\ country_{it} + \sum_{j=1}^N b_j oth_{it} + \varepsilon_{it} \quad (3)$$

where $ROAf_{it}$ denotes the return on assets ratio for each bank with majority of foreign equity i for each quarter t .

The model tests the impact of business cycle in parent country on foreign banks profitability during the crisis. The variable *business cycle* was defined as GDP growth in parent country, and was taken from Eurostat (*parent_GDP*), for each bank with majority of foreign equity i for each quarter t .

In regressions were also used the following control quarterly variables (oth_{it}) from Bankscope database:

- *parent_Total_Capital_Ratio* - the capital ratio of foreign parent institutions of the Polish affiliates, for each bank with majority of foreign equity i for each quarter t ,
- *parent_Net_Loas_to_Assets* – net loans to assets ratio of foreign parent institutions of the Polish affiliates, for each bank with majority of foreign equity i for each quarter t ,
- *parent_ROA* – ROA ratio of foreign parent institutions of the Polish affiliates for each bank with majority of foreign equity i for each quarter t .

The variable α is a constant term, ε_{it} denotes the error, and a_0 , a_1 and b_j are the regression coefficients.

In table 6 in the Appendix 2, the positive coefficient (a_1) was found. It means that GDP growth in the parent country of the bank operating in Poland has a significant and positive impact on its profitability in Poland. Also ratio of net loans to assets of foreign parent institutions of the Polish affiliates (*parent_Net_Loas_to_Assets*) has positive influence of the profitability of bank operating in Poland. It means that generally disintermediation tendencies in European banks has negative impact of profitability of their affiliates. Negative impact of parent total capital ratio (*parent_Total_Capital_Ratio*) may means that a higher capital ratio on average did not prevent higher profitability. This result is also relevant for the current economic policy debate about future regulatory requirements for the banking sector. However, ROA ratio of foreign parent institutions of the Polish affiliates (*parent_ROA*) is insignificant in the model.

Generally, results of above estimations find that economic situation in international parent banks have had the impact on profitability of Polish subsidiaries and branches of these banks during the global financial crisis and debt crisis in the years 2008 – 2013. Those results may support the fact that geographical diversity with parent institutions help the local financial system to remain relatively vigorous throughout the global financial crisis (Pawłowska, Serwa, & Zajęczkowski, 2015).

Conclusions

The global financial crisis as resulted in a massive reduction in profitability for many banks in the EU. However, Poland experienced only a slight decrease in the profitability of its banking sector in the first part of the crisis (in 2009) - after this the profitability of the Polish banks increased. In order to test the traditional SCP hypothesis and the RMP hypothesis, as well as to test the impact of other bank-specific characteristics and the macroeconomic environment on the profitability of Polish banks, particularly the impact of foreign capital, this paper conducted the empirical investigation based on two panel data sets (i.e., prior to and during the crisis).

Generally, the results of comprehensive analysis concerning the profitability of Polish banks indicate that changes in the structure of the Polish banking sector during the past fifteen years have had a positive impact on profitability of banks. Also, the positive impact on the profitability of the Polish banks has had the relative market power. All empirical results based on two panel data sets, for the most part, confirm the RMP hypothesis but when verifying the traditional SCP hypothesis, the empirical results are ambiguous. On the one hand, this paper demonstrates a positive or insignificant correlation between profitability and market structure, and the positive and significant correlation between profitability and market power as well as the size of the bank, prior to and during the crisis (based on panel A data). This result was supported in more detail with the quarterly information during the crisis, based on panel B. What is important, based on panel A, that in each estimation this paper finds a negative and significant impact between the cost to income ratio and profitability. This means that better cost management leads to better profitability in banks.

Of the microeconomic control variables based on other bank-level specific characteristics from panel B, it was found that the core capital ratio have a significant negative influence on bank profitability. Furthermore, the findings indicate that foreign currency loans, did not positively contribute to banks' profitability. Also, it was found a positive correlation between intermediation (i.e., grater loans in total assets) and bank profitability in both panel data sets. These results may show that business models that were based on a strong position with respect to lending were a stabilizing factor in the current financial crisis. Also, based on the Bankscope database, this paper finds that disintermediation tendencies in European banks has negative impact of profitability of their affiliates. However, this paper finds a negative coefficient between the ratio of total deposits to total assets and profitability.

The regression results, based on panel A, showed that banks have generally benefited from a change of ownership structure during the past fifteen years. The increase of foreign capital prior to the crisis seems to have had a significant and positive impact on bank profitability. Also, the detained quarterly data found in panel B shows that foreign capital was a stabilizing mechanism during the crisis. This paper finds a positive correlation between the context of parent banks and the profitability of their affiliates. Those results are in line of the paper Pawłowska at all. 2015 concerning the intragroup links between banking institutions after Lehman Brothers failure.

Finally, as in other countries, bank profitability is strongly influenced by cyclical developments, and this paper finds a positive correlation between GDP growth and bank profit for both panel data sets - the same effect was found for CPI indices. Also, this paper finds a positive correlation between GDP growth in the parent country and profits of their affiliates in Poland.

However, the ratio of assets to GDP in Poland is relatively low, indicating high potential for growth within the Polish banking sector. In addition, banks in the Polish sector are relatively small in comparison with the banks in the EU-15 (Pawłowska, 2014). Also, due to the fact that European financial institutions are the largest foreign investors in banks in Poland (having an approximately 50% share in the Polish banking sector), the context of the parent banks and regulatory changes, including the implementation of the banking union project, will undoubtedly have an impact on the profitability of the Polish sector and will result in further structural changes in the Polish banking market.

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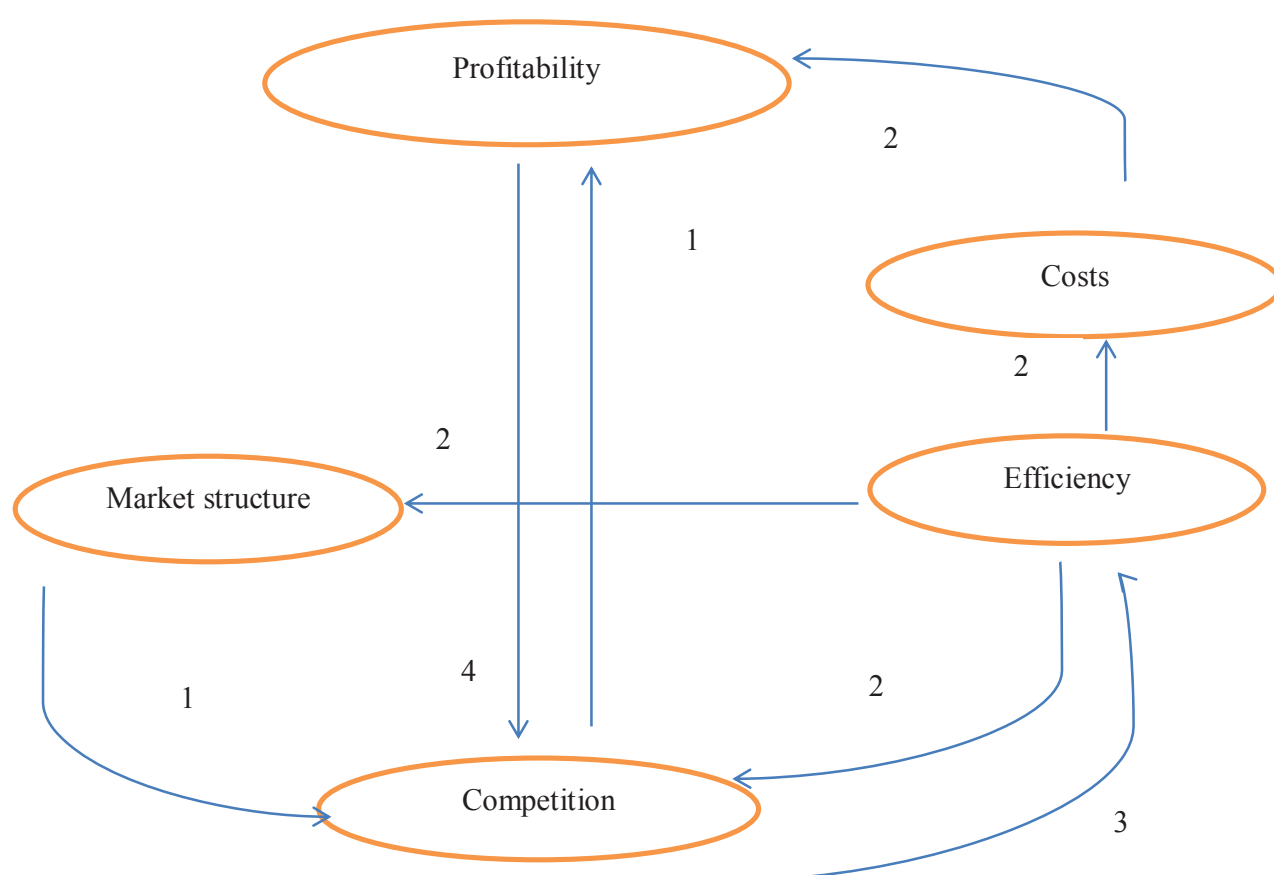
Appendix 1

Table 1 The Correlation of Performance Indicators with Competition

Performance Indicators	Correlation with Competition	Indicators Represented as:
<i>Profit</i>	<i>Negative (?)</i>	<i>Return on assets (ROA), Return on capital (ROE)</i>
<i>Market structure</i> <i>number of banks</i> <i>concentration</i>	<i>Positive</i> <i>Ambivalent</i>	<i>Number of banks</i> <i>HHI, CR_k</i>

Source: own work based on Bikker & Leuvensteijn (2014), p. 76.

Figure 1 Relations between Market Structure, Competition, Profitability, Efficiency and Costs



Note: relations according to the SCP paradigm are indicated by figure 1, according to the efficiency hypothesis by the figure 2, relations according to the “quiet life” hypothesis (and its reversal) is indicated by 3, while the relation following from general principle is indicated by 4.

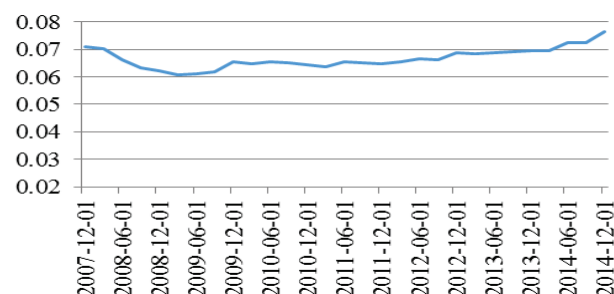
Source: own work based on Bikker & Leuvensteijn (2014), p. 77.

Figure 2: Concentration in the Polish banking sector



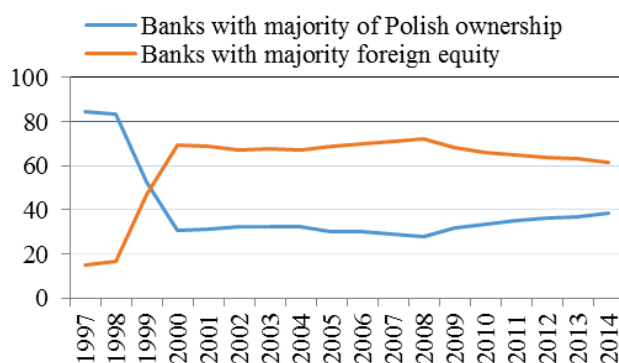
Source: PFS and author's calculations.

HHI (quarterly)



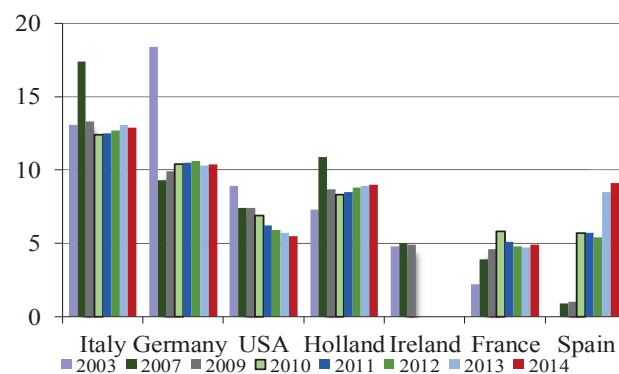
Source: NBP and author's calculations. HHI index was seasonally adjusted.

Figure 3: Share of foreign investors (in assets) in the Polish banking sector



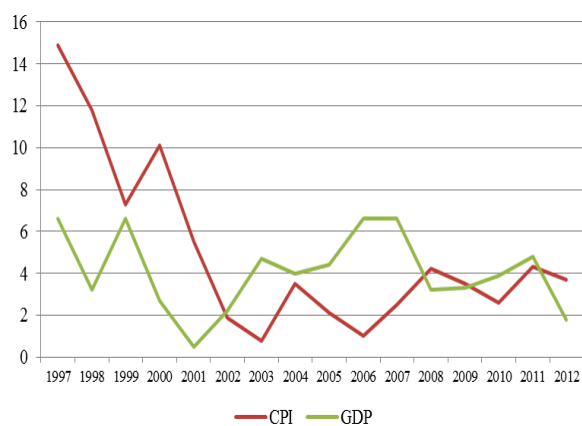
Source: PFS.

Figure 4: Share of foreign investors in assets of the Polish banking sector by country of origin



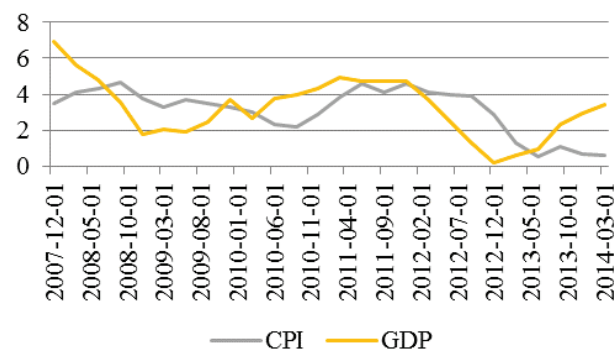
Source: PFS.

Figure 5: GDP growth and Inflation rate (yoy) (%)



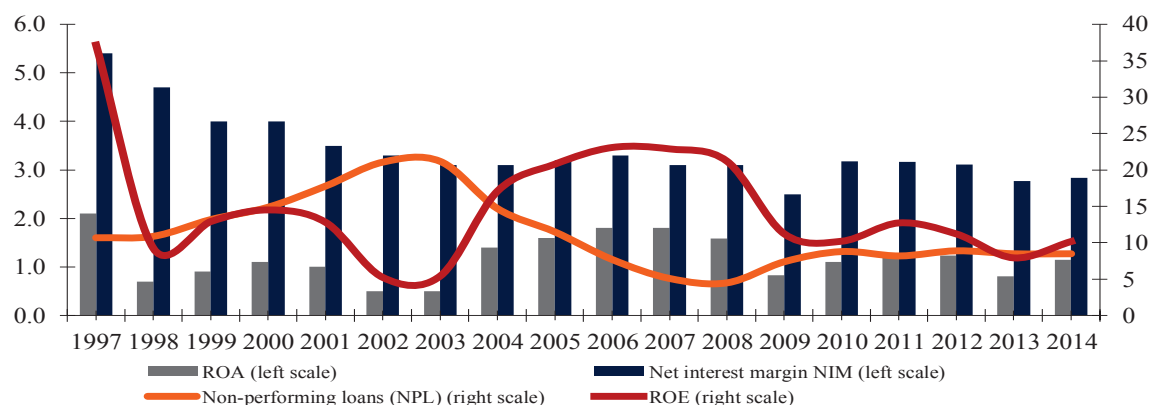
Source: CSO.

Figure 6: GDP growth and Inflation rate (yoy quarterly) (%)



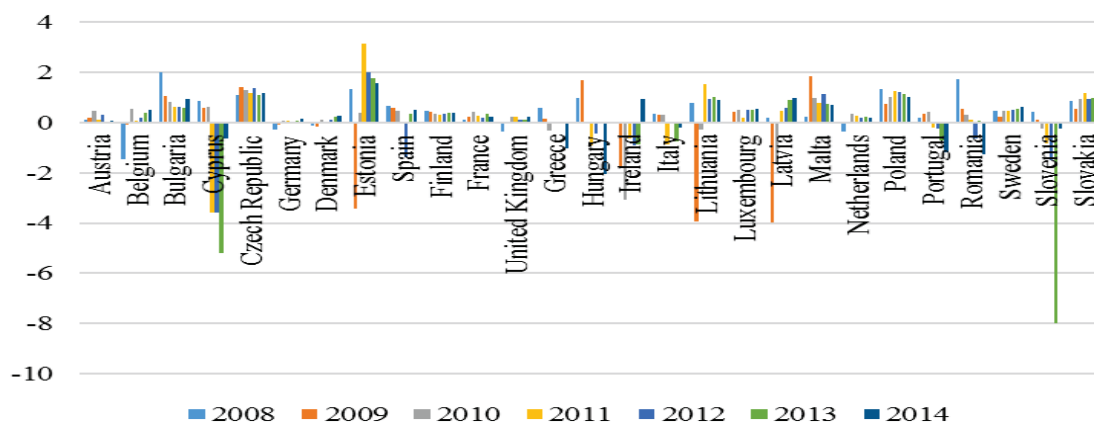
Source: CSO. Data was seasonally adjusted.

Figure 7: Commercial Banking Sector's Profitability Indicators in Poland



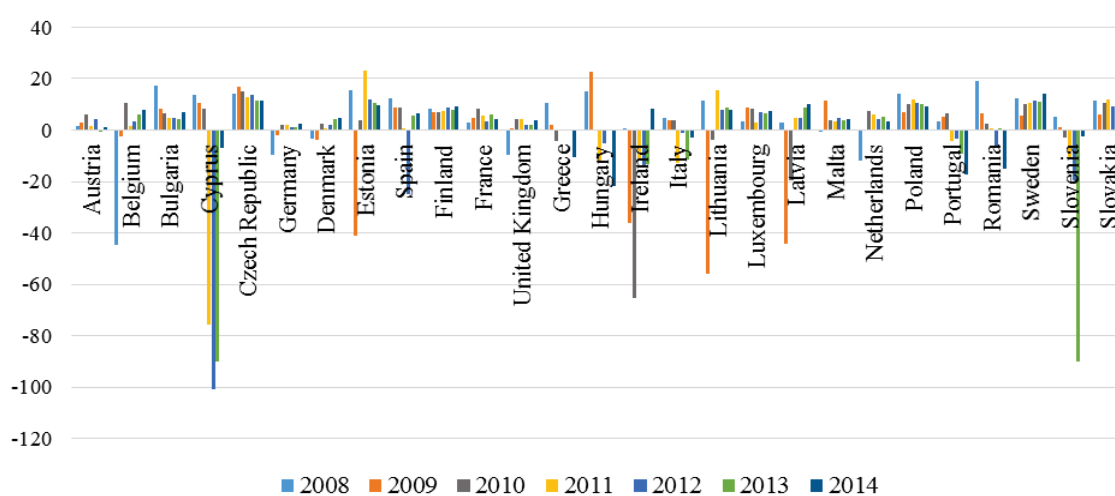
Source: NBP and author's calculations.

Figure 8: Profitability ratio in EU (ROA) in %



Source: ECB.

Figure 9: Profitability ratio in EU (ROE) in %



Source: ECB.

Appendix 2

Table 1: Panel A Summary Statistics on the Characteristics of Polish banking sector structure and balance sheet data

This table provides summary statistics (mean, min, max and standard deviation (SD)) for all variables in the model. Data are observed yearly for each Polish commercial banks (1997-2012).

Model: Data are observed yearly for each Polish commercial banks (1997-2012).				
	All Banks			
	Mean	SD	Min	Max
Observations	1978			
Dependent Variable				
Balance sheet data (for each bank i and year t)				
ROA Ratio (%)	-0.0043726	0.1183983	-1.345672	1.148604
Independent Variables:				
Market Structure				
Balance sheet data for each year t				
HHI	0.0734929	0.0078982	0.0620602	0.0894186
Lerner Index Av^1	0.2251663	0.0602216	0.116554	0.3069982
Share of Foreign Capital (%)	58.28561	19.25915	15.3	72.3
Market Power				
Balance sheet data (for each bank i and year t)				
MP Ratio (%)	0.0145719	0.0294166	1.94e-06	0.197598
Log of Assets (size)	14.37138	2.101532	6.864837	19.07505
Lerner Index	0.1938524	0.2280034	0.0125002	3.912896
Bank-Specific Variables				
Balance sheet data (for each bank i and year t)				
Total Loans/Assets (%)	15.23042	3.212855	6.864837	25.34692
Total Deposit/Assets (%)	0.4173208	0.4128244	0	6.4821
Interest Cost/Interest Income (%)	0.7750329	3.14585	0	75.73241
Macroeconomics				
Data for each year t				
GDP	4.0505	1.81972	0.5	6.6
CPI	5.4792	4.166438	0.8	14.9

Source: author's calculations on the basis of NBP and CSO data. ¹Average of the Lerner index for each year was normalized (see Pawłowska 2014).

Table 2: Summary Statistics on Bank Characteristics for Panel B (quarterly data)

This table provides summary statistics (mean and standard deviation for bank balance sheets data and macroeconomics data). Data are observed quarterly 2007Q4–2013Q2.

1. Data for All sample

	All Banks				Banks with majority of Foreign capital			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Observations	1634				1407			
Dependent Variables:								
Balance sheet data (for each bank i and quarter t)								
ROA Ratio(%)	-0.02455	0.20185	-2.86388	0.81991	-0.0279	0.2178	-2.8639	0.8199
ROE Ratio(%)	0.020114	0.20185	-4.731094	0.48876	0.01802	0.21173	-4.73109	0.4047
Independent Variables:								
Balance sheet data for each quarter t								
Market Structure								
Balance sheet data for each quarter t								
HHI	0.059575	0.002153	0.05599	0.06412	0.05957	0.00215	0.05599	0.06413
Log of Size of Banking Sector	27.68921	0.158017	27.3304	27.8992	27.6892	0.15798	27.3305	27.8992
Market Power								
Balance sheet data (for each bank i and quarter t)								
MP Ratio (%)	0.014539	0.027114	1.42e-1	0.16214	0.01236	0.022408	1.42e-1	0.16213
ML Ratio (%)	0.014539	0.027267	0	0.17197	0.01230	0.021413	0	0.15757
Log of Assets (size)	21.69478	2.438546	12.0695	26.0074	21.4947	2.492519	12.0694	25.7244
Bank-Specific Variables								
Balance sheet data (for each bank i and quarter t)								
Tier1 Ratio (%)	0.182737	0.1653909	0.0054	3.14585	0.17869	0.161253	0.00538	3.14584
Total Loans/Assets (%)	0.777339	0.2256738	0	1.47161	0.79578	0.227887	0	1.47160
Total Deposit/Assets (%)	0.346451	0.3381435	0	2.52977	0.3411	0.330231	0	2.52977
FXHousingLoans/Assets (%)	0.085851	0.1521338	0	0.65490	0.08676	0.1559	0	0.65490
Macroeconomics								
Data for each quarter t								
GDP	3.278261	1.75493	0.2	6.9	3.27721	1.75502	0.2	6.9
CPI	3.408696	1.02258	0.5	4.7	3.40863	1.02233	0.5	4.7

Source: author's calculations on the basis of NBP and CSO data.

2. Data for Parent Banks (quarterly data)

	Mean	SD	Min	Max
Observations	1257			
<i>Independent Variables:</i>				
parent Net Loans/Assets (%)	52.27033	23.10678	0.005	99.251
parent_Total_Capital_Ratio (%)	14.16492	5.224161	7	56.6
parent_ROA (%)	0.477185	0.866871	-6.36	8.958
parent_ROE (%)	6.934040	9.598102	-129.584	42.196
parent_Loan_Loss_Ratio (%)	2.734991	1.982544	0.021	12.44
parent_GDP	0.1164969	2.770955	-9.2	7.9

Source: author's calculations on the basis of Bankscope and Eurostat.

Table 3: Spearman's rank correlation coefficients for all variables in the two panel data sets

Panel A:

	ROA	HHI	CR5	MP	LI	Lm	LA	CTI	DTA	LTA	FC	GDP	CPI
ROA	1												
HHI	-0.0438	1											
CR5	-0.0750	0.8600*	1										
MP	0.1595*	-0.0608	-0.0111	1									
LI	-0.0352	0.2444*	-0.0206	0.1044*	1								
Lm	0.0198	0.3545*	0.1433*	-0.1115*	0.3469*	1							
LA	0.1309*	-0.2309*	-0.0964*	0.9589*	-0.0333	-0.2758*	1						
CTI	-0.2478*	0.1346*	0.0747	0.1218*	0.4369*	0.2703*	0.0482	1					
DTA	-0.0563	-0.2965*	-0.3594*	0.3122*	-0.0759	-0.1955*	0.3870*	-0.0372	1				
LTA	0.0956*	-0.3961*	-0.2783*	0.7820*	-0.0908*	-0.3965*	0.8906*	-0.0357	0.5665*	1			
FC	-0.0978*	-0.0661	0.3291*	0.0580	-0.3452*	-0.3425*	0.1616*	0.0397	-0.2812*	0.0344	1		
GDP	0.1088*	-0.0576	-0.0251	0.0230	0.0021	-0.1318*	-0.0209	-0.0643	-0.0547	-0.0602	-0.1435*	1	
CPI	0.0887*	-0.0343	-0.3919*	-0.0919*	0.4175*	0.5304*	-0.2087*	0.2302*	0.0555	-0.2069*	-0.5051*	-0.1001*	1

Source: author's calculations on the basis of NBP and CSO data. */ indicate significance at the 10% level.

Panel B:

	ROA	MP	MPL	LA	HHI	LTA	DEP	Tier1	FXH	Size	GDP	CPI
ROA	1											
MP	0.0123	1										
MPL	0.0016	0.9797*	1									
LA	0.0183	0.9979*	0.9762*	1								
HHI	0.1035*	-0.0022	-0.0153	0.0404	1							
LTA	0.1549*	-0.3979*	-0.2619*	-0.4006*	-0.0308	1						
DEP	-0.0742	0.2865*	0.1699*	0.2946*	0.0918	-0.7524*	1					
Tier1	0.3373*	-0.5157*	-0.5694*	-0.5075*	0.1660*	0.0307	0.0057	1				
FXH	-0.1137*	0.7254*	0.7780*	0.7260*	0.0200	0.0844	-0.1540*	-0.5934*	1			
Size	0.1731*	0.0023	-0.0171	0.0580	0.7752*	-0.0269	0.1115*	0.1628*	0.0319	1		
GDP	-0.0110	-0.0112	-0.0237	-0.0203	-0.1934*	-0.0142	0.0253	0.0051	-0.0060	-0.1805*	1	
CPI	0.0230	0.0050	-0.0004	0.0104	-0.2349*	0.0392	-0.0158	-0.1027*	0.0200	-0.0030	0.4511*	1

Source: author's calculations on the basis of NBP and CSO data. */ indicate significance at the 10% level.

Panel B: Data for Parent Banks	ROA _f	Parent Total_Capital_Ratio	Parent GDP	Parent ROA	Parent CTI	Parent NetLoans/Assets
ROA _f	1					
parent_Total_Capital_Ratio	0.1142*	1				
parent_GDP	0.0962*	0.2395*	1			
parent_ROA	-0.0381	0.0329	0.2724*	1		
parent_CTl	0.0268	0.2214*	0.0349	-0.5506*	1	
parent_NetLoans/Assets	-0.0056	-0.0734	-0.1615*	0.3737*	-0.6019*	1

Source: author's calculations of Bankscope and Eurostat. */ indicate significance at the 10% level.

Table 4. Results for the Panel A

This table provides empirical results for data are observed yearly 1997-2012.

<i>Variables</i>	Estimate (1)	Estimate (2)	Estimate (3)	Estimate (4)	Estimate (5)
L1.ROA	0.1291524***	0.1848878***	0.1397995***	0.1828694***	0.2213944***
Market structure					
HHI_t	0.004034	0.0183837*	-	-	-
LAv_t	-	-	0.1567493**	-	-
FC_t	-	-	-	0.0006266**	0.1567493
Market power					
MP_{it}	-	1.057503*	-	1.020856**	-
LI_{it}	-	-	-	-	0.155171***
LA_{it}	0.0272884***	-	0.023718***	-	-
Macroeconomics					
GDP	-	0.012952***	0.0090024***	-	-
CPI	0.0069283***	-	-	0.0075206***	0.0020774**
Bank- specific variables					
CTI_{it}	-0.0040247**	-0.004425**	-0.0039121**	-0.004188***	-0.009632***
LTA_{it}	-	-	-	0.0087123**	0.0097125***
DTA_{it}	-0.000698	-0.000392	0.0005646	-	-
Impact of the crisis:					
Market structure					
$HHI_t * CRI$	-0.0014337	0.0642391	-	-	-
$Lm_t * CRI$	-	-	-	-	-
$FC_t * CRI$	-	-	0.2813902	0.0000411	0.0066043***
Market power					
$MP_{it} * CRI$	-	0.4018004	-	0.4831009	-
$LI_{it} * CRI$	-	-	-	-	-0.1312851**
$LA_{it} * CRI$	0.0136843**	-	0.0151119***	-	-
Binary variable					
CRI	-0.2350996*	-0.0337541*	-0.3315409**	-0.0329648*	-0.4615208***
const	-1.138948**	1.183***	-1.307023***	-0.833817***	1.183***
Sargan test	0.2625	0.3081	0.2524	0.2700	0.0592
Time Period	1997-2012				
Number of observations	963	963	896	963	963
Number of groups	117	117	111	117	117

Source: author's calculations. ***/**/* indicate significance at the 1/5/10% level respectively.

Table 5. Results for the Panel B

This table provides empirical results for data are observed quarterly 2007Q4–2013Q2.

<i>Variables</i>	Estimate (1)	Estimate (2)	Estimate (3)	Estimate (4)	Estimate (5)
<i>LI.ROA</i>	0.734351***	0.7206154***	0.877926***	0.6548425***	0.6526878***
Market structure					
<i>HHI</i>		0.4545575	0.617823***	1.767206	3.145156
<i>Size</i>	0.200488**	-	-	-	-
Market power					
<i>MP</i>	-	0.556646	-	-	-
<i>ML</i>	1.017407	-	-0.0946574	-	-
<i>LA</i>	-	-	-	0.058173***	0.0581294***
Foreign ownership					
<i>FO</i>	-0.0475637	-0.016291	-	0.2766389**	0.3084672***
Macroeconomics					
<i>GDP</i>	-	0.0023232	-	-	0.0028546**
<i>CPI</i>	-0.0016897	-	0.0009523**	0.0496***	-
Bank-Specific Variables					
<i>LTA</i>	-	0.1969856***	-	0.0497474**	-
<i>DTA</i>	-0.0371561***	-	-0.017174***	-	-0.080709**
<i>CAR</i>	-	-	-0.013356***	-	-
<i>FXHL</i>	-	-0.0246905	-	-0.780618**	-0.752328**
const	-5.254702	-0.1833865	-0.0270513	-0.0270513	-1.62991
Sargan test	0.1698	0.1465	0.0408	0.2524	0.0097
Time Period	2007Q4-2013Q2				
Number of observations	1231	1231	1231	1231	1231
Number of groups	86	86	86	86	86

Source: author's calculations. ***/**/* indicate significance at the 1/5/10% level respectively. All variables were seasonally adjusted.

Table 6. Impact of Situation in Parent Banks on Profitability of Foreign Banks in Poland: results based on the Panel B

<i>Variables</i>	Estimate
<i>LI.ROAf</i>	0.8000654***
Macroeconomics - business cycle in parent country	
<i>parent GDP</i>	0.0045741***
Bank-Specific Variables in parent country	
<i>parent Total Capital Ratio</i>	-0.0061702*
<i>parent Net Loas to Assets</i>	0.0025147***
<i>parent ROA</i>	0.0067614
const	-0.091345
Sargan test	0.0021
Time Period	2007Q4-2013Q2
Number of observations	710
Number of groups	51

Source: author's calculations. ***/**/* indicate significance at the 1/5/10% level respectively. Macroeconomic variable was seasonally adjusted.

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