

The Impact of Market Structure and the Business Cycle on Bank Profitability: the role of foreign banks

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Abstract

The aim of this study is to examine the effect of bank-specific and macroeconomic determinants of bank profitability in Poland, using an empirical framework that incorporates the traditional Structure-Conduct-Performance (SCP) hypothesis, as well as the Relative Market Power (RMP) hypothesis. Furthermore, this paper also examines the overall effect of financial structure and macroeconomic conditions during the Global Financial Crisis. 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 during the Global Financial Crisis of 2008 and debt crisis in the Eurozone.

Empirical results based on panel data sets describing both micro-level and the macro-level data are ambiguous, and find evidence only of the RMP hypothesis. 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.

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Keywords: bank profitability, market power, market structure, Polish banks, foreign banks, business cycle.

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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 globalization process and consolidation within the banking sector. Globalization is changing the ownership structure of the banking sectors around the world, and the Polish banking sector is no exception. Foreign banks may not only enhance the availability of credit by directly lending to domestic firms or households, but also have strengthen competition between banks. Also in many countries and in the Polish banking sector the increased trend toward bank disintermediation was observed.

Currently, the profitability of commercial banks in Poland was influenced by a large number of internal and external factors: consolidation, technological processes and changing in regulation and the real economy. However, the Polish banking sector is relatively small in comparison to the other EU worth 85% of the country's GDP² and has relatively simple traditional business models³ dominated by foreign banks. 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 4 and 5 in the Appendix). The parent financial institutions of Polish banks were located mostly in Western Europe (Austria, Belgium, Greece, Germany, France, Italy, Netherlands, Portugal, Spain) and in the United States (cf., Figure 5). Finally, 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 institutional system, including the systemically important banks G-SIFIs. The fact that some of banks being on the list of G-SIFIs⁴ 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).

The aim of this study is to estimate the impact of market structure on the performance of banks in the Polish during the financial crisis of 2008, after Lehman Brothers failure. Furthermore, this paper also examines the overall effect of financial structure and macroeconomic conditions to determine whether financial development and business cycles

² Polish Financial Supervision Authority, 2013.

³ The average for EU-27 countries is about 400% (see also Bijlsma et al. (2013)).

⁴ 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).

affect the profit 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 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.

In order to carry out a quantitative assessment of the impact of market structure on banking performance, this study is used panel data set combine micro- and macro-statistical data covering cyclical factors and macroeconomic environment. Panel data 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 database⁵. Macroeconomic data was received from Polish Central Statistical Office (CSO) and Eurostat. 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, during the crisis. This study consists of two parts and a summary. The first part is a broad literature review concerning the relationship between bank profit, and market structure. The second part describes the changes in the profitability within the Polish banking sector and presents data, empirical model and the results of the analysis of panel data for the period 2007Q1–2013Q2. The summary provides an overview of the empirical results and the conclusions that were drawn.

⁵ 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 and Market Structure

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.

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 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 some examples of various theoretical relationships between performance indicators and market structure.

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

Demirguc-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 confirmed by i.e. Claeys and Vander Vennet, (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; Demirgüç-Kunt and Huizinga, 2000, Rumler and Waschiczek, 2010).

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 (cf. Delis et al. (2014). 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).

The relation between profitability and foreign banks was also analyzed in many papers. However, empirical research on the relative performance of domestic and foreign banks has produced ambiguous results, with some studies finding that foreign banks perform better and other studies reporting stronger performance of domestic banks (cf., Degryse and Ongena (2008) and Chen and Liao (2011)). From one hand, Havrylchyk and Jurzyk (2011) showed that foreign banks (i.e. acquired by foreign investors) in Central and Eastern European countries are more profitable due to cost minimization and better risk management. Claessens and Van Horen (2012) find that foreign banks have higher capital and more liquidity, but lower profitability than domestic banks. Also, during the global crisis foreign banks reduced credit more compared to domestic banks, except when they dominated the host banking systems. From the other hand, some 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). Furthermore, La Porta et al. (2002) concluded that a state bank follows a political rather than a social agenda.

Finally, there is not a lot of work taking into account the relationship between the profitability of the parent banks and situation of their affiliates in the context of determinant of banks profitability, and this paper fills this gap. However, the paper (Pawłowska, Serwa, & Zajączkowski, 2015) finds the intragroup links between banking institutions after Lehman Brothers failure in the Polish banking sector.

2. Banking Structure, Business Cycle and Profitability of Banks – panel data analysis

The profitability of commercial banks in Poland prior to and during the financial crisis was influenced by a large number of internal and external factors: consolidation and technological processes and real economy. After Poland's accession to the European Union a clear improvement in profitability was observed as the results of changes of with return on assets (ROA) and return on equity (ROE). The improvement in banks' profitability was facilitated by, among others, a decrease in the share of non-performing loans⁶ in assets. In the 2009, the slight decrease in the profitability indicators caused by financial crisis (see figure 8 and 9 in the Appendix). It should be noted, that the group of Polish commercial banks was not homogeneous during the first part of the crisis. Strong deterioration of financial results of several institutions was observed in banks which in previous periods were characterized by the increasing of market share, particularly the segment of household loans. This banks had a negative impact on the performance of the entire group (however, some banks reported an improvement in financial results as compared to 2008)⁷. In the period 2010-2014 profitability of Polish commercial banks improved again.

2.1 Data and model specification

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 provides the investigation based on quarterly data 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)⁸. 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 statistics. Additionally, panel data set consists data from the Bankscope

⁶ 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).

⁷ Polish Financial Supervision Authority, 2010.

⁸ The numbers of banks fluctuated in the sample due to acquisitions, liquidations, and new banks entering the market.

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 also includes macro-level data from Eurostat concerning GDP growth in the parent banks' country.

In order to carry out a quantitative assessment of the impact of market structure on the banking profitability in the Polish banking sector, the Generalized Method of Moments (GMM) estimator was used. The GMM estimator was proposed by Arellano and Bond (1991)⁹ and generalized by Arellano and Bover (1995) and Blundell and Bond (1998). In this paper was used system GMM (xtabond2) which can fit two closely related dynamic panel data models (the Arellano-Bond (1991) estimator and Arellano and Bover (1995) estimator and fully developed in Blundell and Bond (1998)). The original estimator is sometimes called "difference GMM" and the augmented one, "system GMM." However, xtabond2 implements both estimators. As GMM estimators, the Arellano-Bond estimators have one- and two-step variants (Arellano and Bond 1991; Blundell and Bond 1998). However, using the two-step GMM estimator may impose a downward (upward) bias in standard errors (t-statistics) due to its dependence on the estimated residuals. This may lead to unreliable asymptotic statistical inference (Bond, 2002; Bond and Windmeijer, 2002; Windmeijer, 2005), especially in data samples with relatively small cross section dimension (Arellano and Bond, 1991; Blundell and Bond, 1998). However, xtabond2 procedure makes available a finite-sample correction to the two-step covariance matrix derived by Windmeijer (2005).

Finally, taking into account the above factors in this paper was used *two-step robust*¹⁰ estimator with correction derived by Windmeijer (2005). We used the Hansen test of over-identifying restrictions, which tests the overall strength of the instruments for one step estimator (Arellano and Bond, 1991; Arellano and Bover, 1995; Blundell and Bond, 1998). Also, we used the Arellano-Bond tests for AR(1) and AR(2) in first differences. Also, model estimation was performed separately to avoid any alignment of variables. 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).

⁹ Use of a GMM estimator also accounts for possible correlations between any of the independent variables. For a thorough description of the various GMM estimators, see Baltagi (2001).

¹⁰ In the estimations were used lagged dependent variables as an instruments.

2.2 The baseline model and estimation (quarterly data set, during the financial crisis and Eurozone debt 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.

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

$$ROA_{it} = \alpha + a_0 ROA_{it-1} + a_1 \text{market structure}_{it} + a_2 \text{market power}_{it} + a_3 \text{business cycle}_t + a_4 FO + a_5 CRI * FO + a_6 EuDCRI * FO + \sum_{j=1}^N b_j oth_{it} + \varepsilon_{it} \quad (1)$$

where ROA_{it} denotes the return on assets ratio for each bank i for each quarter t ¹¹.

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 .

Model also control impact of the Global Financial Crisis and the Eurozone debt crisis on relation between profitability and the foreign ownership therefore in regression another control dummy variables were used:

¹¹ 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.

- dummy variable (*CRI*) that takes the values of 1 if $t < 2010Q3$ and $t \geq 2008Q4$, and zero elsewhere.
- dummy variable (*EuDCRI*) that takes the values of 1 if $t \geq 2010Q3$ and zero elsewhere.

Therefore, the full sample was split into three intervals: (1) the Global Financial Crisis, (2) the Eurozone debt crisis of 2011-2012 (the sample begins in 3Q 2010 and ends in 2Q 2013) and the whole analyzing period (2007Q4-2013Q2). 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.

Table 5 of the statistical Appendix presents results of regressions using two-step GMM robust estimator. For each estimations, is also reported the Hansen test results at the bottom of the table, as well as Arellano-Bond tests (AR(1) and AR(2)). The model seems to fits the panel data reasonably well, the Hansen-test shows no evidence of over-identifying restrictions.

In table 5 in the Appendix, 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 assets (*MP*) – have a positive and significant influence on the profitability indicators in this study. However, relative market power – measured in terms of the individual

institution's share in total domestic lending (*MPL*) – have no significant influence on the profitability indicators in this study.

Also this paper finds positive impact of foreign capital on profitability also for the period of the Eurozone debt crisis (estimation 5). However, for the period of Global Financial Crisis this paper finds negative impact of foreign capital on profitability of Polish banks (estimations 3 and 4). Finally, this paper finds a positive correlation between the context of parent banks and the profitability of their affiliates for whole analysis period

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. Panel indicate the positive correlation between intermediation (i.e., grater loans in total assets) and banks profitability. However, 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.

In addition to all these estimated results, this paper finds evidence for RMP hypothesis however this paper find not significant evidence for verification SCP hypothesis.

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:

$$ROAf_{it} = \alpha + a_0 ROAf_{it-1} + a_1 \text{business cycle in parent country}_{it} + \sum_{j=1}^N b_j oth_{it} + \varepsilon_{it} \quad (2)$$

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.

We constructed three regressions for three time periods: (1) for the Global Financial Crisis, (2) for the Eurozone crisis of 2011-2012 (the sample begins in 3Q 2010 and ends in 2Q 2013) and (3) the whole analyzing period (2007Q4-2013Q2).

Table 6 of the statistical Appendix presents results of regressions using two-step GMM robust estimator. For each estimations, is also reported the Hansen test results at the bottom of the table, as well as Arellano-Bond tests (AR(1) and AR(2)). The model seems to fits the panel data reasonably well, the Hansen-test shows no evidence of over-identifying restrictions.

In table 6 in the Appendix, the positive coefficient (a_1) was found (estimations 1 and 2). 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 for the whole period of analysis and for the period of the Global Financial Crisis. 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.

Also, ROA ratio of foreign parent institutions of the Polish affiliates (*parent_ROA*) is insignificant in the model. However, in estimation 3, during the Eurozone crisis of 2011-2012, most of the variables were insignificant.

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. Those results may also 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, & Zajączkowski, 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. Generally, the results of comprehensive analysis concerning the profitability of Polish banks indicate that the positive impact on the profitability of the Polish banks has had the relative market power that confirm the RMP hypothesis. 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.

Of the microeconomic control variables, 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. 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.

Also, the result show that foreign capital was a stabilizing mechanism during the whole analysis period. However this paper finds negative impact of foreign banks during the first part of the crisis. This paper finds a positive correlation between the context of parent banks and the profitability of their affiliates for whole analysis period. Those results are in

line of the paper Pawłowska, Serwa, & Zajączkowski, 2015 concerning the intragroup links between banking institutions after Lehman Brothers failure and confirms this links in the context of the profitability of parent banks.

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 - 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.

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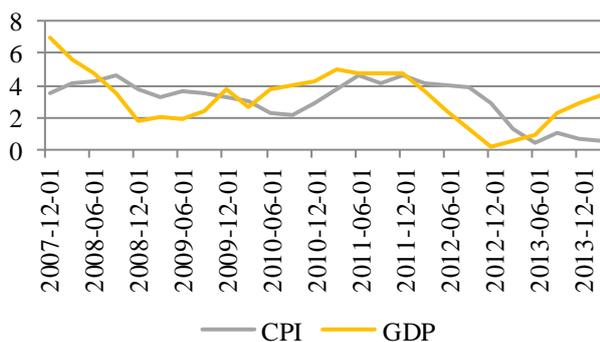
Appendix

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>
<ul style="list-style-type: none"> • <i>number of banks</i> • <i>concentration</i> 	<i>Positive Ambivalent</i>	<i>Number of banks HHI, CR_k</i>

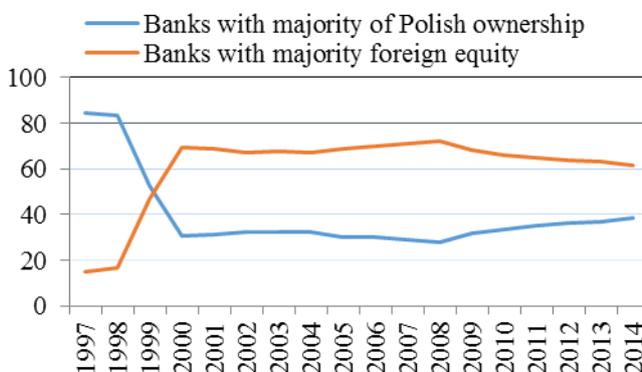
Source: own work based on Bikker & Leuvensteijn (2014), p. 76.

Figure 2: GDP growth and Inflation rate (yoy quarterly) (%)



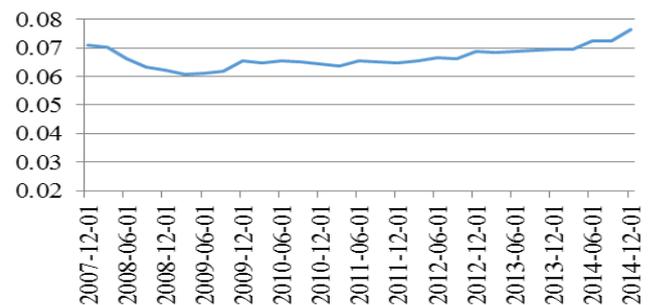
Source: PFS and author's calculations.

Figure 4: Share of foreign investors (in assets) in the Polish banking sector



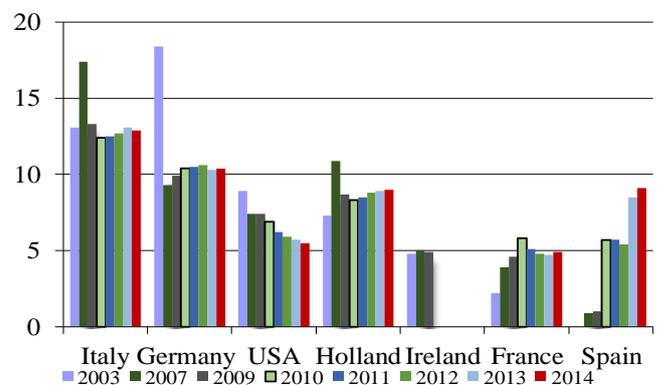
Source: PFS.

Figure 3: HHI (quarterly)



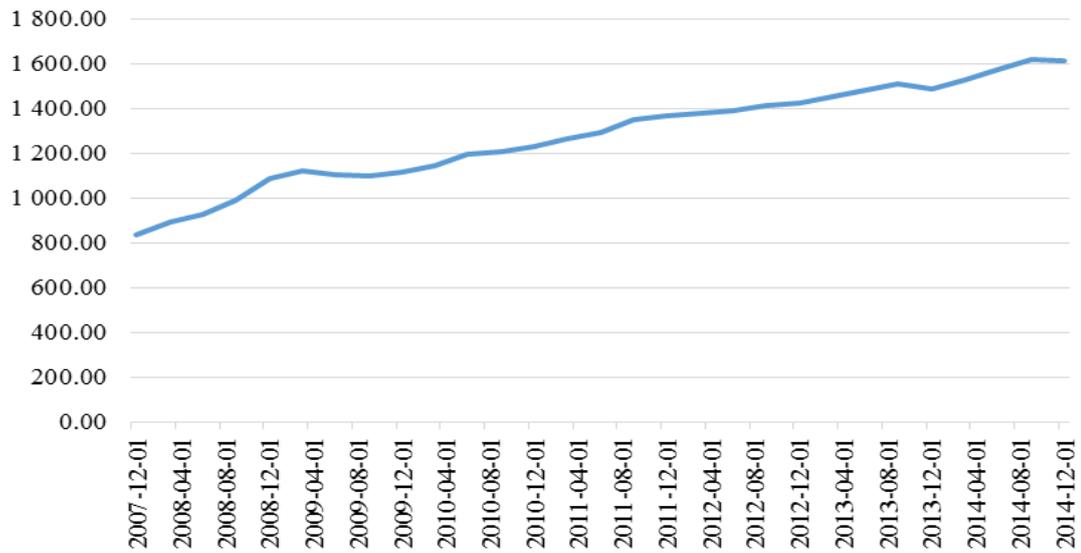
Source: NBP and author's calculations. HHI index was seasonally adjusted.

Figure 5: Share of foreign investors in assets of the Polish banking sector by country of origin



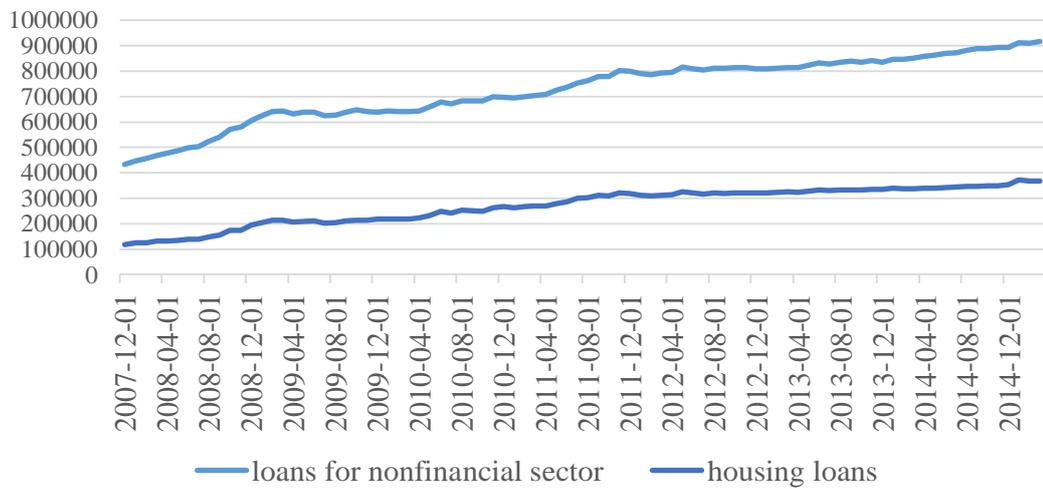
Source: PFS.

Figure 6: Assets of the Polish Banking Sector [in bill PLN]



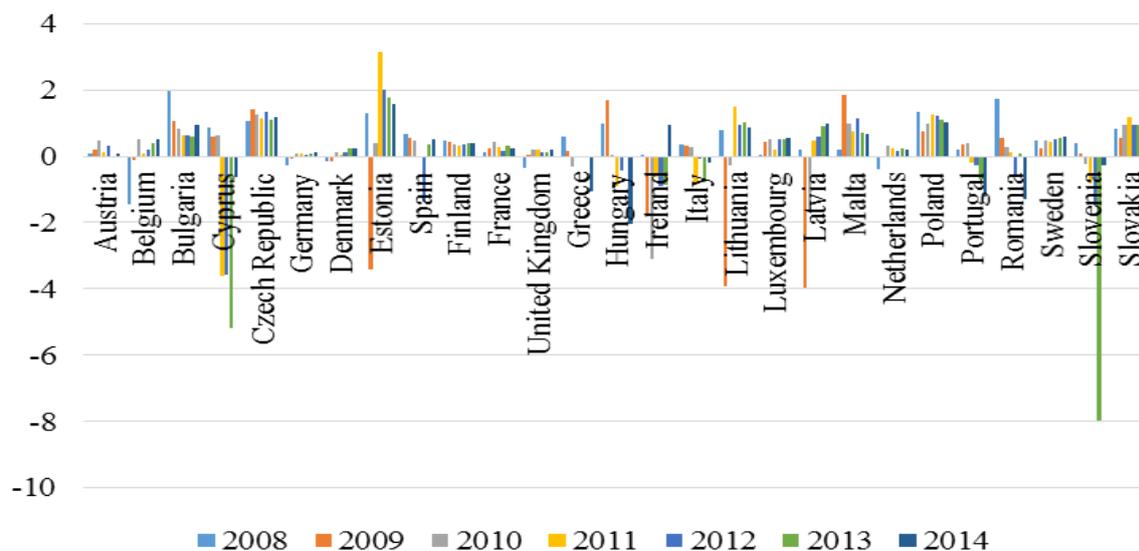
Source: NBP.

Figure 7: Loans for nonfinancial sector and housing loans of the Polish Banking Sector [in bill PLN]



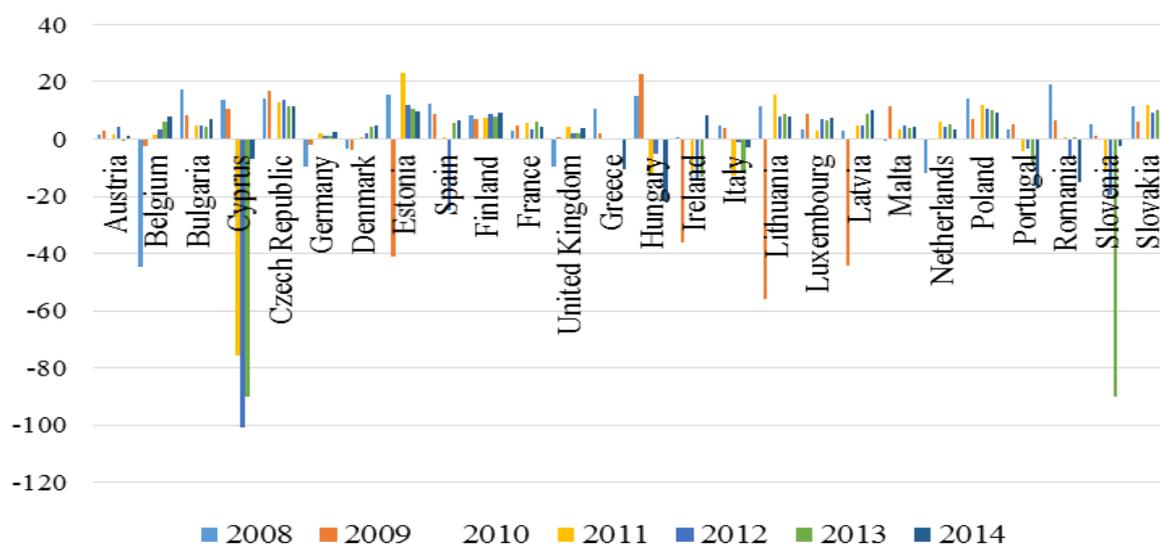
Source: NBP.

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



Source: ECB.

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



Source: ECB.

Table 2: Summary Statistics on Bank Characteristics (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			
<i>Dependent Variables:</i>								
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
<i>Independent Variables:</i>								
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

	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.

Table 4: Spearman's rank correlation coefficients for variables for Parent Banks

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_CTI	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 5. Empirical Results for Baseline Model

<i>Variables</i>	Estimate (1)	Estimate (2)	Estimate (3)	Estimate (4)	Estimate (5)
<i>LI.ROA</i>	0.7359047***	0.7206154***	0.614576***	0.613027***	0.576682***
Market structure					
<i>HHI</i>		-4.994079	0.9480281**	1.595917	-3.900502
<i>Size</i>	0.257475**	-	-	-	-
Market power					
<i>MP</i>	-	11.18935*	-	-	-
<i>ML</i>	1.017407	-	-0.0036206	-	-
<i>LA</i>	-	-	-	0.058173***	0.053436***
Foreign ownership					
<i>FO</i>	-0.0434477	0.0362766	-0.0019722	0.1282207**	0.372938**
<i>FO*CRI</i>	-0.0138528	-0.004424	-0.010934*	-0.0012158*	-
<i>FO*EuDCRI</i>	-	-	-	-	0.0204672*
Macroeconomics					
<i>GDP</i>	-	0.010461*	-	-	0.0028546**
<i>CPI</i>	-0.0016897	-	0.000649**	0.0496**	-
Bank-Specific Variables					
<i>LTA</i>	-	0.2678998***	-	0.058534**	0.2293875*
<i>DTA</i>	-0.0377529***	-	-0.0374935*	-	-
<i>CAR</i>	-	-	-0.001551***	-	-
<i>FXHL</i>	-	-1.508736	-	-0.780618**	-0.752328**
const	-6.80247*	-0.1833865	-0.0270513	-0.0270513	-1.35171
Hansen test	0.974	0.824	0.961	0.974	0.661
AR(1)	0.097	0.326	0.084	0.061	0.048
AR(2)	0.196	0.426	0.196	0.343	0.330
Time Period	2007Q4-2013Q2				
Number of obs	1231	1231	1231	1231	1231
Number of gr.	86	86	86	86	86

Source: author's calculations. ***/**/* indicate significance at the 1/5/10% level respectively. All variables were seasonally adjusted. AR(1) - Arellano-Bond test for AR(1) in first differences, AR(2) - Arellano-Bond test for AR(2) in first differences. Hansen test-the test for over-identifying restrictions in GMM dynamic model estimation.

Table 6. Impact of Situation in Parent Banks on Profitability of Foreign Banks in Poland:

Time Period:	2007Q4-2013Q2	Global Financial Crisis	the Eurozone Crisis
	Estimate (1)	Estimate (2)	Estimate (3)
<i>LI.ROAf</i>	0.8503813 ***	0.7812995***	0.7018803***
Macroeconomics - business cycle in parent country			
<i>parent_GDP</i>	0.009222*	0.008008**	0.0119602
Bank-Specific Variables in parent country			
<i>parent_Total_Capital_Ratio</i>	-0.0061702*	0.0137249	-0.0009048
<i>parent_Net_Loas_to_Assets</i>	0.0025147***	0.0121431***	0.002245
<i>parent_ROA</i>	0.0067614	0.0259831	0.0461367
const	-0.2597817	-0.4994779**	0.046968
Hansen test	0.638	0.253	0.974
AR(1)	0.097	0.218	0.071
AR(2)	0.196	0.554	0.171
Time Period	2007Q4-2013Q2	2008Q1-2010Q1	2010Q2-2013Q2
Number of observations	710	321	389
Number of groups	51	45	46

Source: author's calculations. ***/**/* indicate significance at the 1/5/10% level respectively. AR(1) - Arellano-Bond test for AR(1) in first differences, AR(2) - Arellano-Bond test for AR(2) in first differences. Hansen test-the test for over-identifying restrictions in GMM dynamic model estimation.