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International Banking and Bank Performance: The Case of Poland[1]

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The aim of this study is to examine differences in the determinants of profitability between domestic and foreign banks in Poland during the global financial crisis and the eurozone debt crisis. Empirical results based on panel data sets containing both micro-level and macro-level data provided the evidence of differences in the determinants of performance between domestic and foreign banks, and also between foreign subsidiaries and foreign institutions' branches, i.e. foreign currency loans were profitable mainly for foreign banks' subsidiaries. Furthermore, this paper found a positive correlation between the context of parent banks and the profitability of their affiliates mainly during the global financial crisis.

Keywords: bank profitability, Polish banks, foreign banks, foreign institutions' branches, domestic banks, financial crises.

Banki międzynarodowe a rentowność banków: na przykładzie polskiego sektora bankowego

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Celem opracowania jest zbadanie różnic w determinantach rentowności banków krajowych i zagranicznych w Polsce w czasie globalnego kryzysu finansowego z 2008 r. i kryzysu zadłużeniowego państw strefy euro. Wyniki empiryczne oparte na analizie danych panelowych zawierających dane na poziomie zarówno mikro, jak i makro wskazały na różnice w determinantach wyników między bankami krajowymi i zagranicznymi, a także między oddziałami zagranicznymi i oddziałami instytucji zagranicznych. Ponadto, w niniejszym dokumencie stwierdzono dodatnią korelację między rentownością banków-matek a rentownością ich spółek zależnych, głównie w czasie globalnego kryzysu finansowego.

Słowa kluczowe: rentowność banków, banki polskie, banki zagraniczne, oddziały instytucji zagranicznych, banki krajowe, kryzys finansowy.

JEL: F36, G2, G21, G34, L1

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1. Introduction

In this study, we investigate the differences in the determinants of profitability between domestic and foreign commercial banks in Poland. The profitability of banks is a subject of great interest in bank management, financial markets, bank supervision and among academics. This interest is driven by increasing globalization and consolidation within the banking sector and macroprudential policy. Also, the ownership structure is widely accepted in the finance literature as a determinant of bank performance.

It should be noted that the impact of a foreign bank is unambiguous. On the one hand, the pre-global financial crisis evidence suggests that foreign bank participation brought many benefits to developing countries including financial stability. On the other hand, the recent global financial crisis highlights the role of multinational banks in the transmission of shocks across countries. In addition, foreign banks can be a channel through which shocks in one country are transmitted and affect the supply of credit in another country (Claessens & Van Horen, 2013).

The aim of this study is to examine the differences in the determinants of profitability between domestic and foreign banks in Poland during the financial crisis – after the Lehman Brothers failure and the eurozone debt crisis. This paper distinguishes between determinants of profitability of foreign subsidiaries and branches. Finally, this paper attempts to determine if there is a link between the context of parent banks and the profitability of their affiliates. Furthermore, this paper provides a comprehensive analysis of determinants of bank performance in Poland and focuses on the impact of size, capitalization, foreign currency loans, intermediation and cyclical developments. Also, this paper controls the effect of the global financial crisis and the eurozone debt crisis in relation to profitability of commercial banks.

In order to carry out a quantitative assessment of the differences in the determinants of profitability between domestic and foreign banks in Poland during the global financial crisis and the eurozone debt crisis in Poland, this study uses panel data sets to combine micro- and macro-statistical data covering cyclical factors and the macroeconomic environment. Panel data consisted of quarterly data, combining data for Polish commercial banks and their parent banks, and information about the macroeconomic environment for the period of 2007Q4–2013Q4. We analysed profitability in the Polish banking sector using the return on assets ratios (ROA)[2]. The major contribution of this study to the literature is finding the differences in the determinants of profitability between domestic and foreign banks in Poland during the global financial crisis and the eurozone debt crisis.

This study consists of three parts and a summary. The first part is a broad literature review concerning the determinants of bank profit. The second part describes the changes in profitability within the Polish banking

sector. The third part presents data, empirical models, and the results of the analysis of panel data for the period 2007Q4–2013Q4. The summary provides an overview of the empirical results and the conclusions that we made.

2. Literature Review

The profitability of the banking sector is of interest not just at the individual bank level, but also at a broader macroeconomic level. Dramatic changes in regulation and technology have modified the ownership structure of the banking sector and have increased the presence of foreign banks (Anginer et al., 2016), and the Polish banking sector is no exception.

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 & Ongena, 2008). Also, a lot of studies focused on state ownership of banks. La Porta et al. (2002) stressed that a state bank follows a political rather than a social agenda.

The literature concerning foreign banks can be divided into two groups: concerning developed and emerging markets. Studies focusing on industrialized countries find that foreign-owned banks perform significantly worse than domestic banks or not differently from domestic banks (see, among others, DeYoung & Nolle, 1996). When studying foreign banks in transition and developing countries, many studies find that foreign banks perform better than domestic banks (Degryse & Ongena, 2008; Havrylchyk & Jurzyk, 2011). Others, however, find the opposite or no significant difference between domestic and foreign banks (Nikiel & Opiela, 2002; Claessens & Van Horen, 2013; Rumler & Waschiczek, 2010). However, in the transition period that began in the mid-1990s, foreign bank entry was a catalyst for change. In this view, the rapid transition of the banking sector can be attributed to foreign owners who brought modern technology, market-oriented decision making, independence from vested interests and competition (Bonin et. al., 1998, 2005; Bonin & Wachtel, 1999).

Also, most empirical studies in this area focused on increased participation of foreign banks in emerging markets, raising questions about their potentially stabilizing or destabilizing role during times of financial distress, and also have produced ambiguous results. Claessens and Van Horen (2013) found that foreign banks might have higher capital and more liquidity, but they have lesser profitability than domestic banks. Popov and Udell (2012) found evidence of the international transmission of the crisis shock to transition countries and showed that in transition countries, firms' access to credit during the crisis was affected by the balance sheet conditions of foreign parent banks. Furthermore, Cull et al. (2017) found that foreign-owned banks are more efficient than domestic banks, promote competition

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in host banking sectors, and stabilize credit in the case of idiosyncratic shocks. Finally, Allen et al. (2017) examined the interactions of bank lending dynamics with domestic, foreign, and global crises along with changes in ownership in the CEE banking sector. They found that the impact of the ownership structure on banks' lending activities in CEE was conditional upon the type of crisis.

A number of studies examined the influence of the market structure on bank performance based on the Market Power (MP) hypothesis. The MP hypothesis, which is sometimes also referred to as the Structure-Conduct-Performance (SCP) hypothesis, asserts that increased market power yields monopoly profits. A special case of the MP hypothesis is the Relative-Market-Power (RMP) hypothesis, which was created by Smirlock (1985), who posited that there is no relationship between concentration and profitability, but rather between the bank market share and bank profitability. A positive relationship between concentration and profitability, which confirms the traditional SCP hypothesis, was reported by Demirguc-Kunt and Huizinga (1999) and Goddard et al. (2004). However, Mirzaei et al. (2013) and Fernández de Guevara (2004) confirmed the Relative-Market-Power (RMP) hypothesis. Finally, for the Polish banking sector empirical results find no evidence to confirm the SCP hypothesis, but find evidence confirming the RMP hypothesis (Pawłowska, 2016).

Also, the majority of studies analysing the determinants of bank performance are focused on selected microeconomic factors. Many authors find a strong, positive correlation between a bank's capitalization and its profitability (Demirgüç-Kunt & Huizinga, 1999; Bikker & Hu, 2002; Goddard et al., 2004). Some studies look at the influence of disintermediation tendencies on bank profits (Carbó & Rodríguez, 2007; Rossi et al., 2009). On the other hand, 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 (e.g. Albertazzi & Gambacorta, 2009; Bikker & Hu, 2002; Demirgüç-Kunt & Huizinga, 2000; Athanasoglou et al., 2008). Furthermore, the global financial crisis and low interest rates in major advanced economies caused the intensification of research concerning how monetary policy affects bank profitability (cf. Borio et. al., 2015). The results suggest that low interest rates erode bank profitability.

3. Economic Factors and Profitability of Banks

Banks' role in the Polish economy grows systematically. This is confirmed by a growing share of the sector's assets in the GDP from 55% in 1999 up to 86% in 2013.

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, technological processes, and the real economy. After

Poland's accession to the EU, there was a clear improvement in profitability both with return on assets (ROA) and return on equity (ROE). This improvement in bank profitability was facilitated by, among others, a decrease in the share of non-performing loans in assets[3]. The global financial crisis has 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 (see Figure 5 in the Appendix).

The turbulence of the global financial market in 2008, which was reflected at the Polish level as lower confidence between financial institutions, led to obstacles in liquidity management and risk hedging. A decline of mutual trust amongst market participants created a situation where banks, uncertain of the financial situation of their contractors, preferred to invest all available funds in central banks. However, the situation of the Polish interbank market can be considered quite good in comparison to the disturbances occurring in other countries. The WIBOR 3M rate, which is a reference rate for the majority of domestic currency loans, increased from 5.7% at the end of 2007 to 5.9% at the end of 2008 (see Figure 1 in the Appendix). It should be noted, however, that the group of Polish commercial banks was not homogeneous during the first part of the crisis. There was a strong deterioration in the financial results of several banks that, in previous periods, were characterized by increasing market shares (particularly in the segment of household loans). These banks had a negative effect on the performance of the entire group (however, some banks reported an improvement in financial results as compared to 2008)[4]. In the period 2010–2013, the profitability of Polish commercial banks improved again.

Since the late 1990s, Poland like the other post-communist countries has been playing the role of a host country for banks from a number of countries in Europe. As of the end of 2013, 41 commercial banks and 28 branches of credit institutions operated in Poland. The share of banks with predominantly foreign capital in Poland was approximately 63%, whereas it was approximately 15% at the end of 1997. However, the share of banks controlled by domestic investors was approximately 37% (see Figures 2 and 3 in the Appendix)[5]. Domestic investors controlled 10 commercial banks and the Treasury controlled 4 commercial banks; foreign investors controlled 31 commercial banks and all branches of credit institutions. Investors from 17 countries held the controlling interest. The parent financial institutions of Polish banks were located mostly in Western Europe (Austria, Belgium, Greece, Germany, France, Italy, Netherlands, Portugal, and Spain) and in the United States (cf. Figure 4 in the Appendix).

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, and this reform included

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systemically important banks (G-SIFIs). The fact that some of the banks on the list of G-SIFIs are also parent banks of Polish banks is significant for their affiliates (e.g., Unicredit Group and Crédit Agricole Group are parent banks in the Polish banking sector)[6]. There are arguments in favour of the hypothesis that the problems of foreign parent institutions were effectively transmitted to the Polish banking sector during periods of financial crisis and the euro debt crisis. In fact, some acquisitions of subsidiaries and branches in the Polish market were forced by financial turbulence in the parent banks. The examples of this are the Allied Irish Bank's forced selling transaction of the fourth largest bank in Poland in 2011, the Greek EFG Eurgasias Group selling the fifteenth largest bank in 2012, the Belgian KBC group selling the seventh largest bank in Poland in 2012, and the American International Group's trading of a smaller bank in 2010 (cf. Pawłowska et al., 2015).

4. Data and Model Specification

In order to test the hypothesis that the ownership structure has an impact on bank performance in Poland, this study examined quarterly data covering the period of the financial and debt crises (2007Q4–2013Q4). 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)[7]. A similar, comprehensive study was performed by Pawłowska (2016). However, in that paper the time period was prolonged, and also this paper takes into account not only the differences in the determinants of performance between domestic and foreign banks but also between foreign subsidiaries and foreign institutions branches.

Additionally, the panel data set has been extended by the data from the Bankscope database[8], which is a source of valuable information about the foreign parent institutions of Polish affiliates. Macroeconomic data on the growth of GDP and inflation in Poland came from the CSO (Central Statistical Office), and data on WIBOR came from Bloomberg. The panel also included macro-level data from Eurostat concerning GDP growth in the parent banks' countries.

In order to carry out a quantitative assessment of the effect of the market structure on the profitability of banks in the Polish sector, the Generalized Method of Moments (GMM) estimator was used. The GMM estimator was proposed by Arellano and Bond (1991) and generalized by Arellano and Bover (1995) and Blundell and Bond (1998)[9]. This paper used the system GMM procedure, which can fit two closely related dynamic panel data models, the Arellano-Bond (1991) estimator and the Arellano-Bover (1995) estimator, fully developed in Blundell and Bond (1998). Moreover, we used the Sargan test of over-identifying restrictions, which tests the overall strength of the instruments for a one-step estimator (Arel-

lano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998), and we used the Arellano-Bond tests for AR(1) and AR(2) in the first differences. We also performed model estimation separately to avoid any alignment of variables.

4.1. The Baseline Model

In order to carry out a quantitative assessment of the determinates of banking profitability in the Polish sector during the global financial crisis and the eurozone debt crisis, a quarterly data set was used. The data set combines micro- and macro-statistical data covering cyclical factors and the macroeconomic environment and was based on data from 2007Q4–2013Q4. The following baseline model with ROA as the dependent variable was calculated as follows:

$$ROA_{it} = \alpha + a_0\, ROA_{it-1} + a_1\, market\ power_{it} + \\ + a_2\, business\ cycle_t + \sum_{j=1}^{N} b_j oth_{it} + \varepsilon_{it} \tag{1}$$

where ROA_{it} denotes the return on assets ratio for each bank i and for each quarter t[10].

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

- The share of bank assets in the total assets (MP_{it}) for each bank i and each quarter t[11].

Also, as the measure of relative market power, the model also tested the effect of the size of the bank on profitability, which was defined as follows:

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

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

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

The model also tests the impact of *the cost of the banks self-financing* defined as:

- the 3-month WIBOR ($WIBOR_t$)[12] quarterly average for each quarter t.

In regressions, we 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 (core-capital to risk-weighted assets, CAR_{it}) as an indicator of a bank's risk behaviour (the higher the capital ratio, the greater the risk aversion) for each bank i for each quarter t.
- The share of foreign currency housing 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.

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

In the case of the analysed changes in the determinates of profitability in the Polish banking sector, we have calculated separate regressions for all commercial banks, for foreign banks subsidiaries, for branches of credit institutions, and for domestic banks. Therefore, in this respect, foreign-owned banks were divided into two groups: foreign banks' subsidiaries and credit institutions' branches. This model also controls the effect of the global financial crisis and the eurozone debt crisis in relation to profitability and foreign ownership. Therefore, the full sample was split into three intervals: (1) the global financial crisis, (2) the eurozone debt crisis (the sample begins in 3Q 2010 and ends in 4Q 2013), and (3) the whole analysed period (2007Q4–2013Q4).

Tables 3–5 in the statistical Appendix present the results of regressions using a one-step GMM estimator. For each of the estimations, we also reported the Sargan test results at the bottom of the table as well as the Arellano-Bond tests (AR(1) and AR(2)). The model seemed to fit the panel data reasonably well, as the Sargan test showed no evidence of over-identifying restrictions. Table 3 presents the results for subsidiaries of foreign institutions and for credit institutions' branches. Table 4 presents the results for domestic banks and for all foreign banks. Table 5 presents the results for all commercial banks.

In Table 5 in the Appendix, a positive and significant coefficient (a_1) was found for relative size (LA) in regressions 2, 4, 6. It means that the relative market power—measured in terms of bank level data as the log of total assets of (LA)—had a positive and significant influence on the profitability indicators of subsidiaries of foreign institutions in this study. However, relative market power—measured in terms of bank level data as a share in total assets (MP)—had a insignificant influence on the profitability indicators in this study. This results may confirm the RMP hypothesis for Polish banks.

Of the microeconomic control variables, we found that the core capital ratio had a significant and negative influence on bank profitability mainly in domestic banks (Tables 4 and 5). However, for subsidiaries of foreign institutions, we found a significant and positive influence of the core capital ratio on bank profitability mainly during the eurozone crisis. We found that foreign currency lending had a significant and negative influence on bank profitability mainly for domestic banks. However, we found positive results for subsidiaries of foreign banks during the first part of the crisis (regressions 1 in Table 5). Furthermore, the results indicate a positive correlation between intermediation (i.e., grater loans in total assets) and bank profitability mainly for subsidiaries of foreign banks (Table 4). However, our results showed a negative coefficient between the ratio of total deposit to total assets and profitability for branches of foreign institutions (Table 5).

Generally, this paper found a positive and significant coefficient (a_2) for all groups of banks. Those findings indicate positive correlations between GDP growth and the profitability of banks throughout the entire period of analysis. This means that the profitability of banks is procyclical. However, inflation (*CPI*) and the cost of the banks' self-financing (WIBOR) were insignificant.

The results of comprehensive analyses have confirmed differences between determinants of profitability of foreign and domestic banks, and between foreign banks' subsidiaries and foreign institutions' branches.

4.2. Effect of Parent Banks' Situation on Profitability of Their Affiliates in Poland

Furthermore, this paper tested the effect of the parent banks' condition on the profitability of their affiliates during the global financial crisis and the eurozone debt crisis. In this case, we estimated additional regressions based on data set using the GMM estimator. This model also controls for the effect of the global financial crisis and the eurozone debt crisis in relation to profitability and foreign ownership. The ROA of banks with a majority of foreign capital was used as the dependent variable in this model. Independent variables were taken from Bankscope and from Eurostat, and the following model with ROA as the dependent variable was calculated as follows:

$$ROAf_{it} = \alpha + a_0\, ROAf_{it-1} + a_1\, business\ cycle\ in\ parent\ country_{it} + \\ + \sum_{j=1}^{N} b_j oth_{it} + \varepsilon_{it} \qquad (2)$$

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

This model tested the effect of business cycles in the parent country on foreign bank profitability during the crisis. The variable *business cycle* was defined as GDP growth in the parent country, and the measure of this growth was taken from Eurostat (*parent_GDP*) for each bank with a majority of foreign equity i for each quarter t.

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

- *parent_Total_Capital_Ratio*—The capital ratio of foreign parent institutions of Polish affiliates for each bank with a majority of foreign equity i in each quarter t.
- *parent_Net_Loas_to_Assets*—Net loans to assets ratio of foreign parent institutions of Polish affiliates for each bank with a majority of foreign equity i for each quarter t.
- *parent_CTI*—cost to income ratio of foreign parent institutions of Polish affiliates for each bank with a majority of foreign equity i for each quarter t.

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- *parent_ROA*—ROA ratio of foreign parent institutions of Polish affiliates for each bank with a 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, c_j are the regression coefficients.

Also like in the baseline model, the full sample was split into three intervals: (1) the global financial crisis, (2) the eurozone debt crisis (the sample begins in 3Q 2010 and ends in 4Q 2013), and (3) the whole analysed period (2007Q4–2013Q4). For each period, we constructed regressions for subsidiaries, branches and for all foreign banks.

Table 6 in the statistical Appendix presents the results of separate regressions for foreign banks subsidiaries, for branches, and for all foreign banks for three time periods using a one-step GMM estimator. For each estimation, we reported the Sargan test results at the bottom of the table as well as the Arellano-Bond tests (AR(1) and AR(2)). The model seems to fit the panel data reasonably well because the Sargan test shows no evidence of over-identifying restrictions.

Table 6 in the Appendix reports the positive coefficient (a_1) (estimations 1 and 3) for foreign banks' subsidiaries. This means that GDP growth in the parent country of a bank's subsidiaries operating in Poland had a significant and positive effect on its profitability in Poland for the entire period of the analysis and also for the period of the global financial crisis. The negative effect of the parent total capital ratio (*parent_Total_Capital_Ratio*) may mean that a higher capital ratio on average did not prevent higher profitability (estimations 1 and 3). This result is also relevant to the current economic policy debate about future regulatory requirements for the banking sector. Also, the ROA ratio of foreign parent institutions of Polish affiliates (*parent_ROA*) and the cost to income ratio (*parent_CTI*) have a positive influence on the profitability of foreign bank subsidiaries operating in Poland for the period of the global financial crisis. In estimation 2 (during the eurozone crisis), most of the variables were insignificant. Only the ratio of net loans to assets of foreign parent institutions of Polish affiliates (*parent_Net_Loas_to_Assets*) has a negative influence on the profitability of a bank operating in Poland. This means that disintermediation tendencies in European banks have a negative effect on the profitability of their affiliates. In estimations 4 and 6 (for foreign institutions' branches), all of the variables were insignificant. Only during the eurozone crisis, the cost to income ratio (*parent_CTI*) has a positive influence on the profitability of foreign institutions' branches operating in Poland (estimation 5).

In estimations 2 and 6 for the global financial crisis, all of the variables were insignificant (for all foreign banks in Table 6 in the Appendix). Only during the eurozone crisis, the cost to income ratio (*parent_CTI*) has a positive influence on the profitability of foreign banks operating in Poland. On the other hand, the ratio of net loans to assets of foreign parent institutions

of Polish affiliates (*parent_Net_Loas_to_Assets*) has a negative effect on the profitability of their affiliates.

To sum up, the results of the above estimations for subsidiaries, branches and for all foreign banks for three time periods demonstrated that the economic situation of international parent banks had an effect mainly on the profitability of Polish subsidiaries during the global financial crisis. These results are in line with the paper by Pawłowska, Serwa, and Zajączkowski (2015) concerning the intragroup links between banking institutions after the Lehman Brothers failure, and confirm these links in the context of the profitability of parent banks.

5. Conclusions

This paper provides evidence to support the hypothesis that the form of ownership had an impact on bank profitability of Polish commercial banks during the global financial crisis and the eurozone debt crisis. The results of comprehensive analyses have confirmed differences between determinants of profitability of foreign and domestic banks and between foreign banks' subsidiaries and foreign institutions' branches, and links between foreign banking institutions after the Lehman Brothers failure.

Of the microeconomic control variables, we found that the core capital ratio and foreign currency loans had a significantly negative influence on bank profitability for domestic banks. For subsidiaries of foreign institutions, we found a significant and positive influence of foreign currency loans mainly during the second part of the crisis. These results may show that foreign currency loans were profitable mainly for foreign banks' subsidiaries. However, for all commercial banks, this paper demonstrates generally a positive correlation between profitability and the size of banks. We also found a positive correlation between intermediation and profitability of foreign banks' subsidiaries. These results may show that business models based on strong lending positions were a stabilizing factor in the current financial crisis for foreign banks' subsidiaries. Finally, as in other countries, bank profitability is strongly influenced by cyclical developments, and this paper found a positive correlation between GDP growth and bank performance. Finally, this paper found a positive correlation between the context of parent banks and the profitability of their affiliates for the entire period of analysis mainly for foreign banks' subsidiaries during the first part of the crisis (global financial crisis). Also, this paper found a positive correlation between the macroeconomic situation in the parent country and the profit of their affiliates in Poland and in this context provides valuable insights for banking supervisors.

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Endnotes

[1] This paper presents the personal opinions of the author and does not necessarily reflect the official position of the National Bank of Poland.

[2] To determine the robustness, additional estimations were calculated with the return on equity (ROE) (see also Pawłowska, 2016).

[3] Since Poland's accession to the EU, the classification of non-performing loans has become less restrictive. Sub-standard receivables from one to three months changed to three to six months, doubtful receivables from three to six months changed to six to twelve months, and lost receivables from above six months to above twelve months. See NBP (2004).

[4] Polish Financial Supervision Authority, 2014.

[5] As of the end of 2015, the share of banks with predominantly foreign capital in Poland was approximately 59% and the share of banks controlled by domestic investors increased in the sector's total assets up to 41%. As at the end of 2015, domestic investors controlled 15 commercial banks (the Treasury controlled 5 commercial banks); foreign investors controlled 26 commercial banks and all branches of credit institutions. Polish Financial Supervision Authority, 2016.

[6] Criteria for the designation of G-SIFIs: size and international link, 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 effect on the financial system and the economy).

[7] The numbers of banks fluctuated in the sample due to acquisitions, liquidations, and new banks entering the market. In 2013, the assets of branches of credit institutions accounted for 1.4% of assets of the financial system (without the NBP). See Figure 2 in the Appendix.

[8] 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.

[9] The 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] 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 (see also Pawłowska, 2016).

[11] In this model, we not take into account concentration indices. Pawłowska (2016) finds that concentration has an insignificant impact on profitability in the Polish banking sector.

[12] Quarterly average based on Thomson Reuters database.

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Appendix

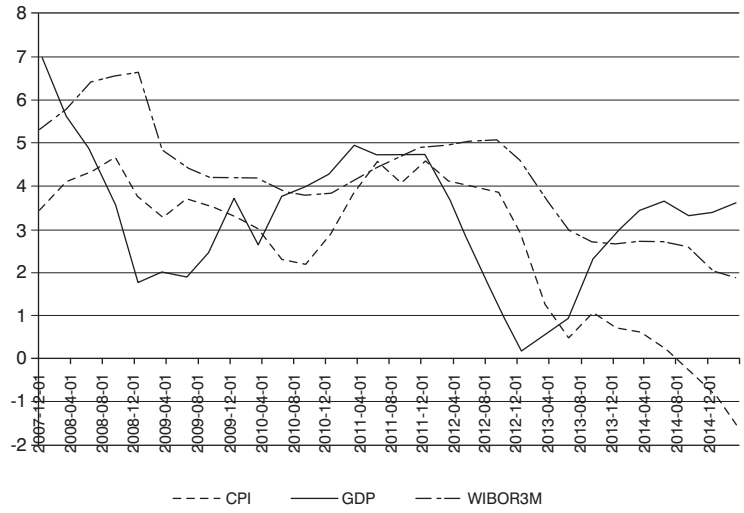

Fig. 1. GDP growth, inflation rate CPI (yoy) and WIBOR 3 month – quarterly (%). Source: PFS and CSO and Bloomerg.

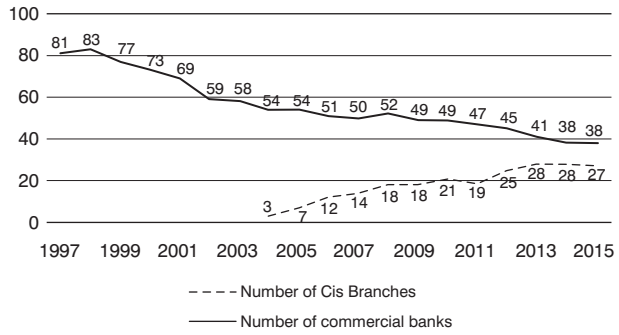

Fig. 2. Number of commercial banks and foreign credit institutions' branches. Source: NBP and PFS.

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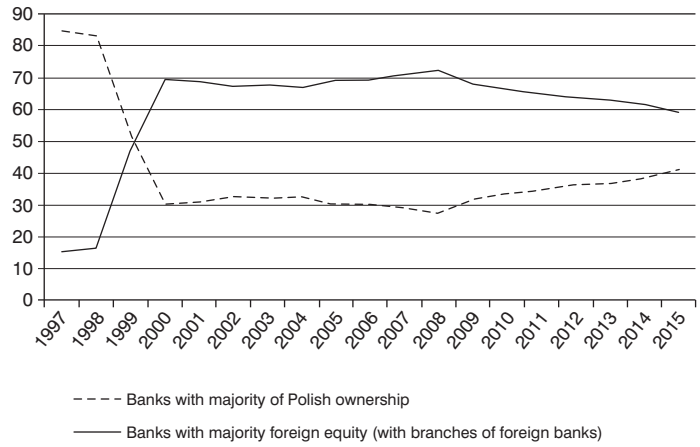

Fig. 3. Share of Polish ownership and foreign investors (in assets) in the Polish banking sector (%). Source: PFS.

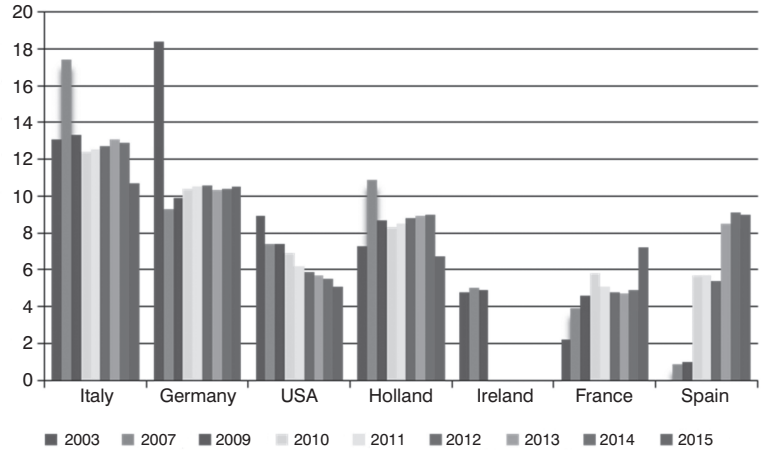

Fig. 4. Share of foreign investors in assets of the Polish banking sector by country of origin (%). Source: PFS.

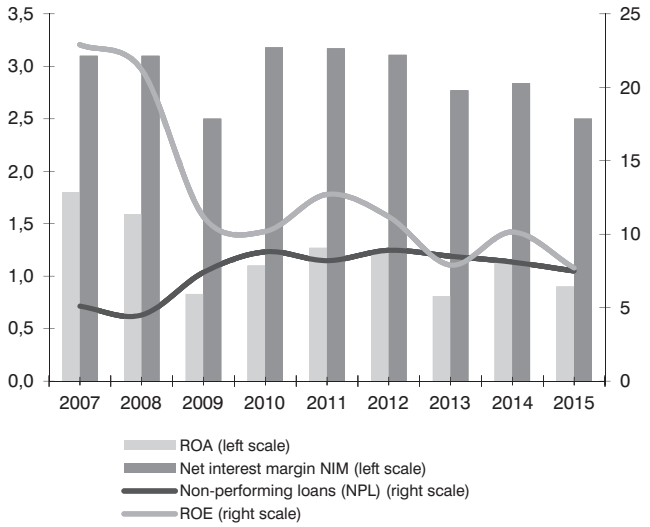

Fig. 5. Banking sector's profitability indicators in Poland for all commercial banks (%), yearly data. Source: NBP.

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	ROA	MP	LA	LTA	DTA	Tier1	FXH	GDP	CPI	WIBOR 3M
ROA	1									
MP	0.0123	1								
LA	0.0183	0.9979*	1							
LTA	0.1549*	–0.3979*	–0.4006*	1						
DTA	–0.0742	0.2865*	0.2946*	–0.7524*	1					
Tier1	0.3373*	–0.5157*	–0.5075*	0.0307	0.0057	1				
FXH	–0.1137*	0.7254*	0.7260*	0.0844	–0.1540*	–0.5934*	1			
GDP	–0.0110	–0.0112	–0.0203	–0.0142	0.0253	0.0051	–0.0060	1		
CPI	0.0230	0.0050	0.0104	0.0392	–0.0158	–0.1027*	0.0200	0.4511*	1	
WIBOR 3M	–0.0397	–0.0019	0.0016	0.0550	–0.0488	–0.1407*	0.0144	0.1528*	0.8063*	1

*/ indicates significance at the 10% level.

Tab. 1. Spearman's rank correlation coefficients for all variables for all commercial banks in Poland. Source: Author's calculations on the basis of Bankscope and Bloomber CSO data.

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

*/ indicates significance at the 10% level. ROAf donates ROA for foreign bank in Poland.

Tab. 2. Spearman's rank correlation coefficients for all variables for parent banks: subsidiaries of foreign institutions and credit institutions' branches. Source: Author's calculations on the basis of Bankscope and Eurostat data.

Subsidiaries of Foreign Institutions						
	Global Financial Crisis		**The Eurozone Crisis**		**The Whole Period**	
Variables	Estimate (1)	Estimate (2)	Estimate (3)	Estimate (4)	Estimate (5)	Estimate (6)
L1.ROA	0.307***	0.304***	0.512***	0.435***	0.348***	0.431***
Market Power						
MP	0.866	–	0.393	–	–	0.461
LA	–	0.067***	–	0.019***	0.027***	–
Bank-Specific Variables						
LTA	0.085**	0.081**	0.067***	0.079***	0.077***	0.063***
DTA	0.004	0.019*	0.001	0.001	0.002	0.002
CAR	–0.004**	0.009	0.063***	0.0691***	0.018*	0.003
FXHL	0.132*	–0.084	–0.016	–0.02	–0.019	0.003
Macroeconomics						
GDP	0.002**	0.002**	0.001*	0.001*	0.001**	0.001*
WIBOR	–	0.001	0.001	–	0.001	–
CPI	0.001	–	–	0.001	–	0.001
Time Period	2007Q4-2010Q3		2010Q4-2013Q4		2007Q4-2013Q4	
Sargan test	0.068	0.610	0.001	0.001	0.001	0.001
AR(1)	0.113	0.142	0.000	0.000	0.408	0.646
AR(2)	0.053	0.886	0.033	0.020	0.001	0.001
No. of Obser.	266	266	430	430	696	696
Number of gr.	41	41	38	38	42	42
Credit Institutions' Branches						
	Global Financial Crisis		the Eurozone Crisis		the Whole Period	
Variables	Estimate (7)	Estimate (8)	Estimate (9)	Estimate (10)	Estimate (11)	Estimate (12)
L1.ROA	0.445**	0.483**	0.015	–0.034	0.064	0.076
Market Power						
MP	–16.096	–	–5.466	–	–	–12.085
LA	–	0.035	–	0.049*	0.021	–
Bank-Specific Variables						
LTA	–0.262	–0.302	0.032	–0.032	–0.032	–0.026
DTA	–0.201**	–0.198**	0.049	0.032	–0.051	–0.055
FXHL	2.882	3.576	0.068	–0.041	–0.167	–0.424
Macroeconomics						
GDP	0.013	0.012	0.02*	–	–0.001	0.02*
WIBOR	–0.017	–0.016	–0.002	0.004	–0.016	
CPI				–0.001		-0.013
Time Period	2007Q4-2010Q3		2010Q3-2013Q4		2007Q4-2013Q4	
Sargan test	0.000	0.000	0.926	0.547	0.011	0.032
AR(1)	0.741	0.982	0.062	0.783	0.766	0.436
AR(2)	0.419	0.589	0.002	0.491	0.193	0.145
No. of Obser.	126	126	265	265	391	391
Number of gr.	21	21	30	30	32	32

***/**/* indicate significance at the 1%/5%/10% levels 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. The Sargan test—the test for over-identifying restrictions in GMM dynamic model estimation.

Tab. 3. Empirical results for banks with foreign affiliates – subsidiaries of foreign institutions and credit institutions branches: baseline model

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Domestic banks						
	Global Financial Crisis		**The Eurozone Crisis**		**The Whole Period**	
Variables	Estimate (1)	Estimate (2)	Estimate (3)	Estimate (4)	Estimate (5)	Estimate (6)
L1.ROA	0.69***	0.70***	0.41***	0.37***	0.41***	0.34***
Market Power						
MP	0.35		0.35	–	–0.17	–
LA	–	0.025	–	0.025	–	0.010
Bank-Specific Variables						
LTA	0.05	0.053	–0.029	–.006	0.003	0.001
DTA	0.048**	0.049**	|–0.11***	|–0.12***	–0.014	–0.015
CAR	–0.025	–0.025	–0.073***	–.06***	–0.060**	–.041**
FXHL	–0.10	–0.099	–0.06**	–0.221**	–0.22**	–0.22**
Macroeconomics						
CPI	–	–0.015	–	–	–	
GDP	–0.000	0.01*	–	0.002	0.001	0.001*
WIBOR	–0.001	–	0025	–0.001	–	–0.001
Time Period	2007Q4-2010Q3		2010Q3-2013Q4		2007Q4-2013Q4	
Sargan test	0.213	0.224	0.261	0.274	0.261	0.209
AR(1)	0.061	0.326	0.084	0.061	0.048	0.026
AR(2)	0.196	0.426	0.196	0.343	0.070	0.030
No. of Obser.	80	80	115	115	195	195
Number of gr.	12	12	11	11	12	12
Banks with Foreign Affiliates: All Banks						
	Global Financial Crisis		The Eurozone Crisis		The Whole Period	
Variables	Estimate (7)	Estimate (8)	Estimate (9)	Estimate (10)	Estimate (11)	Estimate (12)
L1.ROA	0.526***	0.632***	0.086*	0.042	0.129***	0.141***
Market Power						
MP	4.133	–	3.882	–	–0.034	–
LA	–	0.065*	–	0.038*	–	0.019
Bank-Specific Variables						
LTA	–0.348	–0.467	0.053	–0.003	–0.051	–0.04
DTA	–0.201***	–0.203***	0.054	0.035	–0.061*	–0.062*
CAR	–	–	–	–	–	–
FXHL	0.896	0.717	–0.083	–0.235	0.026	–0.058
Macroeconomics						
CPI	–	–	–	–0.001	–	–0.005
GDP	0.004	0.003	–0.009*	–	0.001	–
WIBOR	–0.007	–0.007	–0.001	0.003	–	–
Time Period	2007Q4-2010Q2		2010Q3-2013Q4		2007Q4-2013Q4	
Sargan test	0.000	0.000	0.000	0.000	0.000	0.000
AR(1)	0.548	0.263	0.270	0.519	0.013	0.052
AR(2)	0.104	0.392	0.000	0.000	0.022	0.023
No. of Obser.	392	392	697	697	1089	1089
Number of gr.	62	62	67	67	73	73

***/**/* indicate significance at the 1%/5%/10% levels 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. The Sargan test—the test for over-identifying restrictions in GMM dynamic model estimation.

Tab. 4. Empirical results for domestic banks and all foreign banks: baseline model

	Global Financial Crisis		The Eurozone Crisis		The Whole Period	
Variables	Estimate (1)	Estimate (2)	Estimate (3)	Estimate (4)	Estimate (5)	Estimate (6)
L1.ROA	0.493***	0.607***	0.1**	0.074*	0.154***	0.145***
Market Power						
MP	0.112	–	–0.393	–	–0.788	–
LA	–	0.068*	–	0.022	–	0.014
Bank-Specific Variables						
LTA	–0.313**	–0.441***	0.027	0.013	–0.046	–0.051
DTA	–0.159***	–0.159***	0.05	0.047	–0.054*	–0.053*
FXHL	1.249	1.064	–0.296	–0.428	0.123	–0.033
Macroeconomics						
GDP	0.003	0.002	–0.003	–0.003	0.001	0.001
WIBOR	–0.008	–	–	–0.005	–	–
CPI	–	–0.009	–0.006	–	–0.001	–0.002
Time Period	2007Q4-2010Q2		2010Q3-2013Q4		2007Q4-2013Q4	
Sargan test	0.001	0.001	0.001	0.001	0.000	0.000
AR(1)	0.621	0.191	0.276	0.587	0.017	0.004
AR(2)	0.057	0.323	0.002	0.003	0.023	0.018
No. of Obser.	472	472	812	812	1284	1284
Number of gr.	74	74	78	78	85	85

***/**/* indicate significance at the 1%/5%/10% levels 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. The Sargan test—the test for over-identifying restrictions in GMM dynamic model estimation.

Tab. 5. Empirical results for all commercial banks in Poland: baseline model

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Foreign Banks Subsidiaries: Parent Banks			
	Global Financial Crisis	the Eurozone Crisis	the Whole Period
Time Period	2007Q4-2010Q2	2010Q3-2013Q4	2010Q3-2013Q4
	Estimate (1)	Estimate (2)	Estimate (3)
L1.ROAf	0.183**	0.057**	0.167**
Macroeconomics – *business cycle in parent country*			
parent_GDP	0.001**	–0.001	0.001**
Bank-Specific Variables *in parent country*			
parent_CTI	0.001**	–0.001	–0.001*
parent_CAR	–0.001*	–0.001	–0.001
parent_LTA	0.001	–0.001*	0.001
parent_ROA	0.001*	0.001	0.025*
Saragan test	0.034	0.974	0.045
AR(1)	0.977	0.071	0.999
AR(2)	0.059	0.171	0.049
Number of obser.	461	461	461
Number of groups	29	29	29
Foreign Banks Branches: Parent Banks			
Time Period:	Global Financial Crisis	The Eurozone Crisis	The Whole Period
	Estimate (1)	Estimate (2)	Estimate (3)
L1.ROAf	0.094	0.094	0.114**
Macroeconomics – *business cycle in parent country*			
parent_GDP	0.008	0.007	0.001
Bank-Specific Variables *in parent country*			
parent_CTI	0.001	0.003*	0.001
parent_CAR	–0.007	–0.007	–0.001
parent_LTA	–0.007	–0.007	–0.001
parent_ROA	–0.074	0.074	0.001
Saragan test	0.025	0.056	0.974
AR(1)	0.999	0.962	0.071
AR(2)	0.049	0.515	0.171
Number of obser.	265	143	461
Number of groups	20	19	29
All Foreign Banks			
Time Period:	Global Financial Crisis	The Eurozone Crisis	The Whole Period
	Estimate (1)	Estimate (2)	Estimate (3)
L1.ROAf	0.121**	0.183**	0.057*
Macroeconomics – *business cycle in parent country*			
parent_GDP	0.003	0.007	–0.001
Bank-Specific Variables *in parent country*			
parent_CTI	0.001	0.002*	–0.001
parent_CAR	–0.001	–0.004	–0.001
parent_LTA	0.001	–0.006*	–0.001*
parent_ROA	–0.028	0.045*	0.001
Saragan test	0.001	0.034	0.974
AR(1)	0.562	0.977	0.071
AR(2)	0.949	0.059	0.171
Number of obser.	838	461	461
Number of groups	55	29	29

***/**/* indicate significance at the 1%/5%/10% levels 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. The Sargan test—the test for over-identifying restrictions in GMM dynamic model estimation.

Tab. 6. Impact of the situation in parent banks on profitability of foreign affiliates in Poland