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COMPETITION AND CONCENTRATION IN THE POLISH BANKING SECTOR AFTER THE GLOBAL FINANCIAL CRISIS OF 2008

Abstract

The aim of this paper is to investigate the level of competition in the Polish banking sector. The analysis of concentration ratios and competition measures showed that as a result of the consolidation process, the level of competition in the Polish banking sector decreased. Moreover, it was pointed out that despite the generally favorable situation, the regulatory requirements observed in recent years are a significant challenge for banks in order to maintain their competitive position on the market. In addition, it seems that the greatest challenge now is the inability to reconcile pressure on short-term profits along with long-term development strategies.

Keywords: competition, concentration, mergers and acquisitions, market structure

Introduction

The recent global financial crisis of 2008 has revived interest in the issue of competition among banks – in both its assessment as well as its determinants. However, yet there seems to be no consensus among researchers about the role of competition in the banking sector. On the one hand, some economists believe that the excessive growth of competition and financial innovations in the markets led to the global financial crisis, which demonstrates its negative impact. On the other hand, competition in the banking sector, similarly to other sectors of the economy, is a positive phenomenon as long as appropriate regulations and proper supervision are in place.

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Admittedly, the rise in the market power of banks and the decline in competition lead to the existence of "too-big-to-fail" banks (TBTF) and an increase in systemic risk.[1]

Changes in competition in the banking sector take place mainly through two channels: transformations in the market structure, such as mergers and acquisitions, and the financial regulation channel. The former result in changes in concentration, while the latter leads to, among others, reducing or increasing entry barriers to a given market and to changing the product range. The transformations observed in the banking market influenced the level of competition in two ways. While mergers and acquisitions enhanced concentration, which in turn weakened competition, deregulation and liberalization of financial markets undermined entry and exit barriers, which resulted in increased competition. The objective of numerous studies is to find an answer to the question whether, despite the process of consolidation and the emergence of ever-larger banks, competition is growing due to the development of new technologies and new banking products (see Pawłowska 2014). The subject of the research is also the impact of the implementation of prudential regulations resulting from Basel III in response to the financial crisis of 2008 on the level of competition.[2]

One should recognize the importance of the distinction between the concept of competition in terms of competition between banks and the concept of the competitiveness of banks. Competition concerns the structure of the entire market in which the entity operates, in contrast to competitiveness, which is associated with the characteristics of individual entities in this market. Competitiveness can also be understood as an ability to achieve long-term and sustainable growth by maintaining high efficiency. In order to measure competition in the banking sector, the production function adapted to banking technology is used, while efficiency indicators (e.g. Pawłowska, 2014; Bikker and Spierdijk 2017) are often employed to analyse competitiveness.

The aim of the present article is to analyse the level of concentration and competition in the Polish banking sector after the 2008 financial crisis. In addition, it proves the thesis that since 2009 the market power of banks in Poland has risen. The empirical results of assessing competition in the Polish banking sector presented in the article concern both the period before the 2008 crisis as well as the modern period. To measure competition, in addition to traditional concentration indicators, the following measurement methods were used: H statistics, the Lerner index and the Boone's approach.

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[1]   L. Laeven, L. Ratnovski, H. Tong, *Bank size, capital, and systemic risk: Some international evidence*, "Journal of Banking & Finance" 2016, Vol. 69, pp. 25–34.

[2]   A. Leroy, Y. Lucotte, *Is there a competition-stability trade-off in European banking?* "Journal of International Financial Markets, Institutions and Money" January 2017, Vol. 46, pp. 199–215.

1. The theory of competition in the banking sector

In order to be able to characterize the theory of competition in relation to the banking sector, one should first describe the theory of competition for non-financial corporations. The economic theory dealing with market organization and competition of enterprises in the English-language literature is referred to as Industrial Organization (IO). The focus of the theory of IO is to study the behaviour of enterprises under the conditions of certain restrictions imposed by consumers and competitors. The new empirical theory of competition (New Empirical Industrial Organization – NEIO) was created as an economic subdiscipline based on IO criticism.[3] The above theories provide information about competition, the effects of different market structures and competition policy. The traditional IO theory includes the paradigm of structure-conduct-performance – SCP – describing the relationship between the structure of the market, the conduct of action and the performance as well as the theory defined as the hypothesis of the so-called efficient structure of the market (efficient structure hypothesis – ESH). Both the SCP paradigm and the ESH theory have been applied to the theory of competition research in the banking sector and are widely used in empirical studies of the banking sector.

The SCP paradigm, based on testing the relationship between the structure of the market, the tactics of the company's operation and its outcome was developed by Bain (1951). Therefore, the literature often refers to it as the Bain research programme or the Bain paradigm. According to this approach, the bank's performance (market performance) depends on the behaviour and tactics (market conduct), which are conditioned by the basic market structure, defining its level of competition. This approach is grounded on the assumption that higher concentration is accompanied by lower competition between entities. The above theory is related to the belief that in a more concentrated system the probability of collusion is greater. Collusion on the market leads to higher prices (an increase in margins) for consumers and higher profitability of operations for enterprises (banks). A special variation of the SCP model is the relative market power hypothesis (RMP) proposed by Smirlock (1985). Smirlock (1985) assumed that there is no relationship between concentration and profitability, but rather between the market share of a particular entity and the bank's profitability. He also stated that only banks with large market shares and well-diversified products are able to use their market power. However, subsequent

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[3]   S. Martin, *Industrial Economics, Economic Analysis and Public Policy*, Macmillan Publishing Company, New York, Collier Macmillan Publishers London, 1989, pp. 3–4.

results of analyses based on the SCP paradigm showed that the relationship between the market structure and the bank's behaviour is even more complex.

The theory based on the efficient structure of the market (*the efficiency structure hypothesis* – ESH) proposes an efficiency-based approach (e.g. Demsetz 1973). According to ESH, more effective banks have lower operating costs and, therefore, achieve higher profits. Taking these assumptions into account, the bank's increasing efficiency leads to increased concentration. According to ESH, concentrated markets are those markets on which highly effective banks operate. It should be noted, however, that the ESH theory has been criticized by some economists who have demonstrated that it has feeble theoretical and empirical grounds since concentrated markets are relatively less effective.

The theoretical bases that fail to support the ESH hypothesis were described by Hicks (1935). In the literature, the Hicks hypothesis is known as the 'quiet life hypothesis' (QLH). In line with QLH, banks with more market power using a privileged position have lower cost-effectiveness since, due to a lack of competition, they do not have to reduce costs to maintain their dominant position.

Both in the SCP and in the ESH models, measures of the concentration level (i.e. CRk[4] and Herfindahl-Hirschman indexes – HHI[5]) are used to measure competition between banks.

2. Methods of measuring competition in the banking sector

On the basis of the criticism of the traditional IO theory, the trend of a new analytical theory of competition (New Empirical Industrial Organization – NEIO) began to develop. According to NEIO, the intensity of competition should be assessed taking into account both the degree of concentration and the scope of entry into a given branch, defined by dynamic entry barriers. Therefore, applying exclusively the structural measures of concentration to gauge the level of competition is abandoned. Competition research in the banking sector based on the new NEIO competition theory makes use of not only the widely used measures of Panzar and Rosse (P-R) and the Lerner index but also the so-called Boone index, proposed by Boone (2000), which is based on the ESH hypothesis.

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[4]   CRk denotes the market share of the largest banks in: gross loans, net assets, and asset deposits.

[5]   The Herfindahl-Hirschman index (HHI) is calculated as the sum of squares in the market share of individual commercial banks (e.g. in net assets). The index reaches values from 0 to 1 and the higher the index value, the greater the concentration of the market.

The Panzar and Rosse (P-R) approach is used to measure competition in the banking sector and facilitates the division of the organizational and production structures of the market into monopoly or oligopoly, monopolistic competition and perfect competition (e.g. Pawłowska 2014, Bikker et al.2007 and Bikker, Spierdijk 2017). Panzar and Rosse defined the measure of competition marked with H. The estimated H statistics assumes values from a range. A higher value of the H statistics means a higher level of competition. Another measure used in the analysis of competition in the banking sector is the Lerner index (1934), which measures the so-called monopoly margin. According to the Lerner index, the market power of the monopoly depends on the price elasticity of market demand. The Lerner index takes values from the range (0, 1). A growing value of the Lerner index, as opposed to the H statistics, indicates a decrease in competition and an increase in the market power of the bank.

The Boone approach is based on the hypothesis of the so-called effective market structure (ESH), grounded on the assumption that more effective banks (with lower marginal costs) have greater market power and therefore achieve higher profits. The strength of the effect is correlated with the level of competition. The measure of the competition level is a parameter that reaches values less than zero. The higher the level of competition, the higher the absolute value of the negative parameter for the Boone index (Leuvensteijn et al. 2007).[6]

A detailed description of competition assessment using the above methods (H statistics, Lerner index and Boone index) has been presented in the attachment to this study.

However, in addition to the above-mentioned measures of competition, the measures of concentration (CRk indicators and Herfindahl-Hirschman indexes) are still widely used to measure competition in the banking sector, due to the ease of their estimation.

3. Competition versus concentration: literature review

A significant issue regarding the banking sector, widely described in the literature, is the relationship between the consolidation of the banking system and competition. However, the general relationship indicating that a greater market share

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[6]   M. Leuvensteijn, J.A. Bikker, A. Rixtel, C.K. Sørensen, *A new approach to measuring competition in the loan markets of the euro area*, EBC Working Paper Series June 2007, Vol. 768, pp. 3–5.

determines greater market power and less competition is not obvious, and many authors note that the intensity of competition may, however, be different for markets with the same level of concentration.

Referring to empirical analyses of the relationship between concentration growth and competition, many papers state that there are no clear links in the banking sectors of developed economies between the increase in the system concentration and the level of its competition (Claessens and Laeven 2004, Hempell 2002). Regulations that reduce the freedom to provide services turn out to be more relevant.

Gelos and Roldos (2002), analyzing the level of competition in transition economies, have come to similar conclusions and found that despite the decline in the number of banks in the analyzed period, the level of competition did not decrease because the effects related to consolidation in the analyzed countries (including Poland) were neutralized by the possibility of foreign banks' entry, which was due to low entry barriers. Similar conclusions about the Polish banking sector have been reached by, among others, Yildirim and Philippatos (2007) or Pawłowska (2014).

In the literature, there are also analyses that were made after the financial crisis, pointing out that the HHI concentration index in many papers, used as a measure of competition, is not its appropriate measure (e.g. Boss et al. 2017). In many studies concerning the competition of the Russian banking sector,[7] the HHI index is also criticized, and the Linda index is proposed as the correct measure of competition assessment.[8]

Crucial determinants of the competition, apart from changes in concentration, are also developments in the ownership structure and regulatory changes (see e.g. Cetorelli 2004, La Porta et al. 2000). However, the authors of many papers that emerged after the financial crisis claim that the type of property does not affect decisions taken by banks and does not determine the level of competition (e.g. World Bank Report 2013). In the long run, however, the state plays a significant role, especially in ensuring financial supervision, facilitating healthy competition through appropriate regulatory policy and through strengthening the financial infrastructure.

It should be noted that empirical studies on the direction of changes in the level of competition over time in the EU generally have shown increased competition before the crisis despite increased concentration in the banking sectors of Central and Eastern Europe (see, e.g. Pawłowska 2014, Clerides et al. 2013, Miklaszewska

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[7]   T.V. Kotsofana, P.S. Stazhkova, *Comparative analysis of the use of concentration indicators on the example of banking sector of RF*, Vestnik of Sankt-Petersburg State University. Series Economics 2011, Vol. 4, pp. 30–40 (version available in Russian).

[8]   R. Linda, *Methodology of concentration analysis applied to the study of industries and markets*, Commission of the European Communities Brussels, 1976.

et al. 2013, Lapteacru 2014). The results regarding the eurozone are already ambiguous (see Bikker et al. 2012, Weill 2013, Bikker and Spierdijk 2017).

4. Changes in the structure of the Polish banking sector

Before the financial crisis, the structure of the Polish banking system was largely shaped by the earlier privatization policy focused on attracting foreign investors. Hence, one could observe an increase in foreign capital and an increase in concentration due to, among others, intensification of the merger and acquisition process on the global scale and the emergence of the euro area. The financial crisis triggered another wave of cross-border mergers and acquisitions, which was also reflected in the Polish banking system due to the situation of mother banks (see Schoenmaker 2010).

Changes in the structure of the Polish banking sector were mainly the result of the acquisition of banks threatened with bankruptcy by other banks or by government institutions; for instance, Fortis acquired BNP Paribas, and the strategic investor of AIG Bank Polska was changed.

Consolidation in the Polish banking sector resulted in a decrease in the number of banks, yet there was an increase in the number of branches of credit institutions. Despite the crisis in 2008, Alior Bank and Allianz Bank Polska began its operation (see Figure 1).

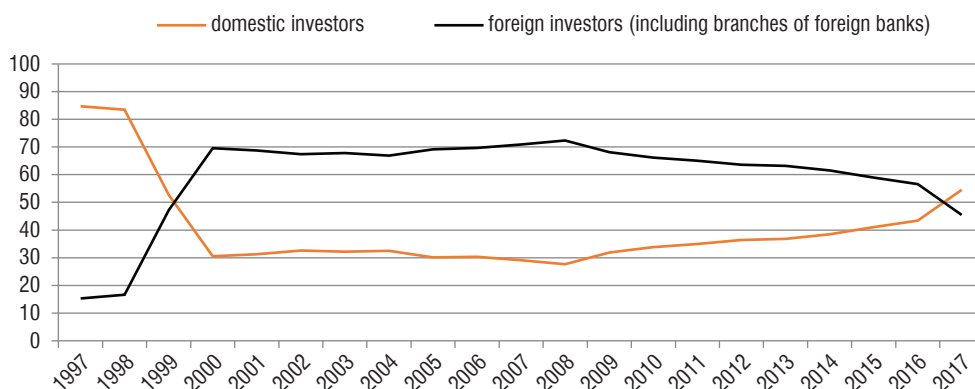**Figure 1. The number of banks and branches of credit institutions**
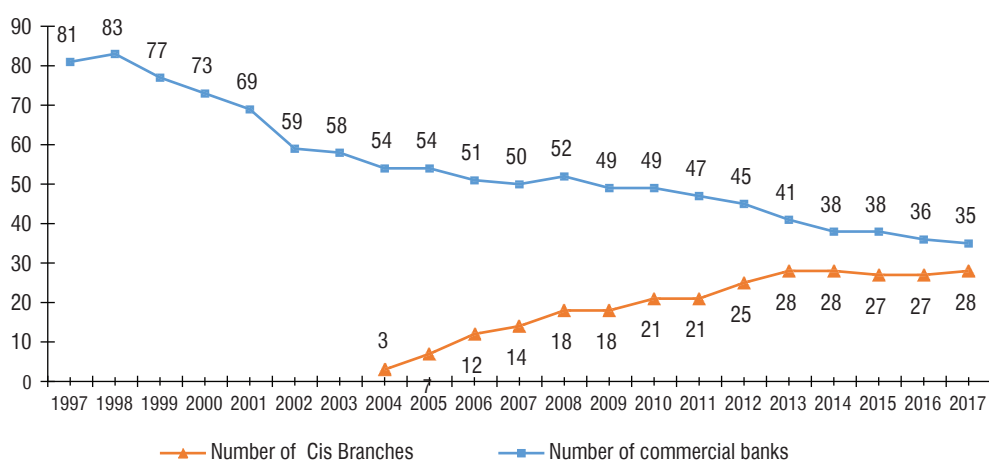
Source: Own elaboration based on KNF (Polish Financial Supervision Authority) (2015, 2016, 2017, 2018) and Pawłowska (2014).

In 2017, the ownership structure of the Polish sector recorded a significant increase – over 50% – in the share of assets of banks controlled by domestic investors, which occurred as a result of the takeover of Pekao SA Bank by PZU SA and PFR SA.

As a result, for the first time since 1999, the share of domestic investors in assets of the banking sector was higher than the share of foreign investors (at the end of 2017 it amounted to 54.5%).[9] In 2017, the largest shareholder in the Polish banking sector were German investors (see Figure 3).

Figure 2. Ownership structure (share in the sector's assets in %)

Source: Own elaboration based on KNF (Polish Financial Supervision Authority) (2015, 2016, 2017, 2018) and Pawłowska (2014).

While analysing the volatility of CR5 concentration indicators in the Polish banking sector, one may observe that for the periods 1998–2001 and 2011–2016 these indicators show an increasing trend. The increase in concentration ratios was fuelled by mergers and acquisitions carried out by large banks (see Figures 4 and 5). The drop in concentration ratios was caused by a slowdown in the consolidation process and slower development of large banks. In 2017, the share of 5 largest banks in the assets of non-financial sector decreased slightly and at the end of 2017 amounted to 47.1%.

It seems noteworthy that the values of concentration ratios for assets place the Polish banking sector in the 21st position, well below the EU average (62%).[10] However, this state of affairs may change due to an increasing intensity of mergers and acquisitions.

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[9] Cf. KNF (Polish Financial Supervision Authority), *Information about banks' situation in 2017*, Warszawa 2018.
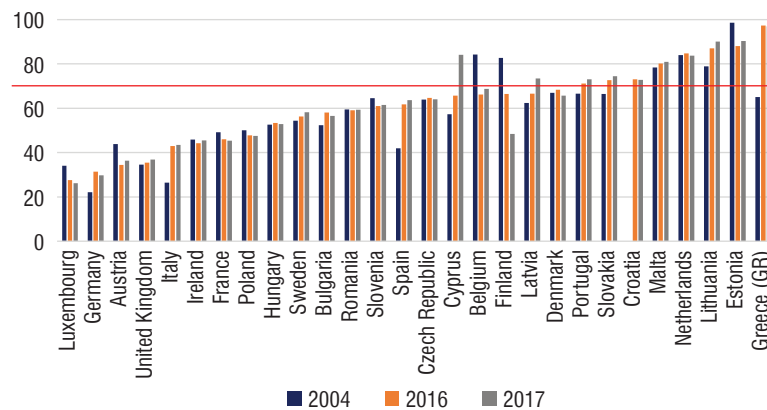
[10] Values of CR5 indicator for EU countries as of the end of 2016 (data from the ECB Statistical Data Warehouse).

Figure 3. Share in the sector's assets by the country of origin of foreign capital (in %)
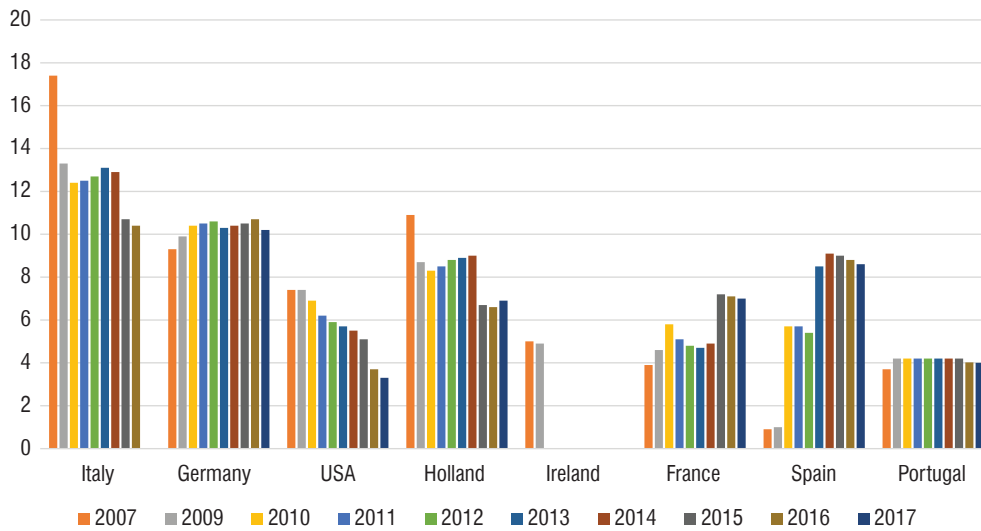
Source: Own elaboration based on KNF (Polish Financial Supervision Authority).

**Figure 4. CR5 concentration rate in the EU (in %)**

Source: Own elaboration based on ECB data. Note: horizontal red line denotes the EU average.

In order to improve their competitive position, banks operating in Poland are continuing their efforts to increase efficiency through optimization of their employ-ment and sales network. This process is enhanced by acquisitions and mergers as well as the development of electronic banking. It is worth highlighting that commer-cial banks in Poland, despite rising costs, still achieve high financial results. In 2017, the net financial performance of the banking sector was slightly lower than in 2016,

but there was an increase in interest income, with a simultaneous decrease in interest expenses. The observed changes translated into an improvement in the interest margin (from 2.29 in 2016 to 2.44 in 2017), but the remaining basic performance measures slightly deteriorated. In particular, the cost index increased (from 55.97 to 56.36) whereas ROA (from 0.84 to 0.78) and ROE (from 7.76 to 7.07) recorded a fall (see Figure 3).

Figure 5. CR5 concentration ratio in the Polish banking sector in the years 1997–2017 EU (in %)
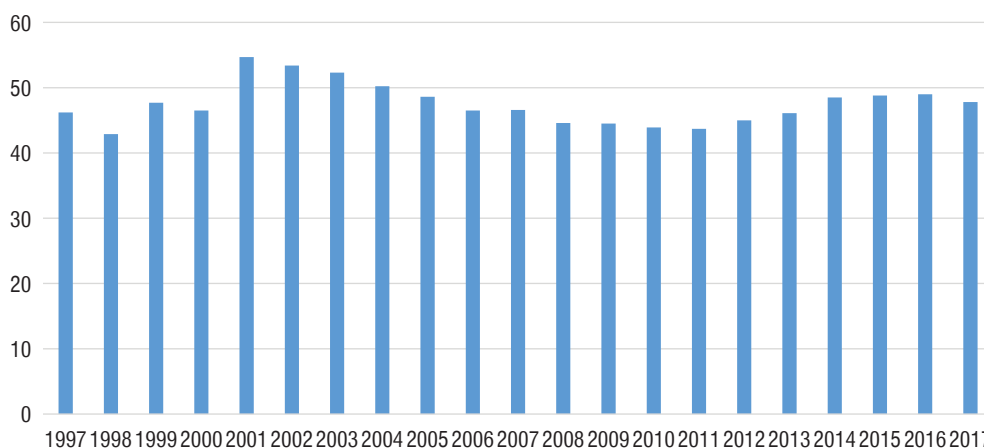
Source: Own elaboration based on NBP (Polish National Bank) and KNF (Polish Financial Supervision Authority).

It should be noted that throughout the financial crisis, the profitability of banks in Poland measured with ROA and ROE remained at a very high level as compared to the profitability of banks in EU countries, only with a decline in the performance of commercial banks in the fourth quarter of 2008,[11] which was continued in 2009. Since 2010, their profitability has improved. Despite the generally favourable situation, the decline in revenue in some areas observed in recent periods and the increase in regulatory requirements pose a challenge for some banks and force them to take actions that will provide them with an adequate level of profitability.[12]

The Polish banking sector is characterized by a moderate increase in the scale of operations. In 2017, the relation of the balance sheet total to GDP amounted

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[11] In the whole 2008, banks achieved net financial results better than in 2007 (see the Polish Financial Supervision Authority, *Report on the condition of banks in 2009*, Warszawa 2010, p. 350).
[12] Cf: KNF, *Informacja o sytuacji banków w 2017 r.,* Warszawa 2018, p. 6.

to approx. 90%. The main areas of growth on the asset side are loans to the non-financial sector and debt instruments.

The capital position of banks is growing in line with the recommendations of the Basel Committee on Banking Supervision, and in 2017 a further strengthening of the capital base was noted.[13]. The Polish banking sector is also characterized by a low level of leverage, with banks still reducing it.[14]

The financial crisis brought about a number of regulatory measures (see Zaleska 2018),[15] in particular related to the introduction of uniform regulations for the banking sector in the whole EU, including Poland (CRD IV package).[16] In addition, in the banking sector a directive was implemented for retail banks to standardize the payment services market of the Payment Services Directive (PSD2),[17] and for the investment banks and asset managers, the Markets in Financial Instruments Directive (MiFID2)[18] was implemented, which is the basis of the EU regulation aimed at improving the competitiveness of EU financial markets and protecting investors by creating a single market for investment services and activities as well as ensuring a high level of their harmonization.

5. Results of assessing the level of competition in the Polish banking sector

Upon analysis of the level of competition in the Polish banking sector, one may identify specific determinants that affected its impact, such as: ownership transformations in the 1990 s, increased concentration due to increased mergers and acquisitions

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[13] In 2017, the net financial result of the banking sector amounted to 13,600 million PLN and was 2.1% lower than in 2016. All commercial banks and almost all cooperative banks met the regulatory requirements, cf. KNF, *Information on the condition of banks in 2017*, Warszawa 2018, pp. 10–11.

[14] Cf. NBP, *Raport o stabilności sektora bankowego*, Warszawa 2018.

[15] M. Zaleska, Nadzór Mikroostrożnościowy, [in:] M. Zaleska (Ed.), *Świat bankowości,* Difin, Warszawa 2018, pp. 69–80.

[16] The EU has already introduced: Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on the conditions for the admission of credit institutions to operations and prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC and Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms, amending Regulation (EU) No. 648/2012.

[17] Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, (Payment Services Directive 2).

[18] *Markets in Financial Instruments Directive II*, Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU.

caused by the emergence of the euro area, Poland's accession to the EU and related regulatory changes, progress in information technology and, finally, product innovations in the financial sector. After 2008, the main determinant of competition in the Polish banking sector proved to be external factors caused by the global crisis, followed by the debt crisis in the countries of the euro area as well as regulatory amendments that appeared in response to it. Apart from the institutional changes, modifications to prudential regulations or modern technologies, the level of competition in the Polish banking sector was also influenced by the situation in the real sphere in line with the business cycle.

This part of the study presents the results of assessing competition in the Polish banking sector against the backdrop of the average level of competition in banks of the euro area. Three competition measures described in the second part were applied to analyse changes in the competition level: the Lerner index, the Boone index and H statistics. The presented analysis uses the research sent and indicators published by the World Bank and the Federal Reserve Bank of St. Louis).[19]

Figure 6. Values of the Lerner index and the Boone indicator
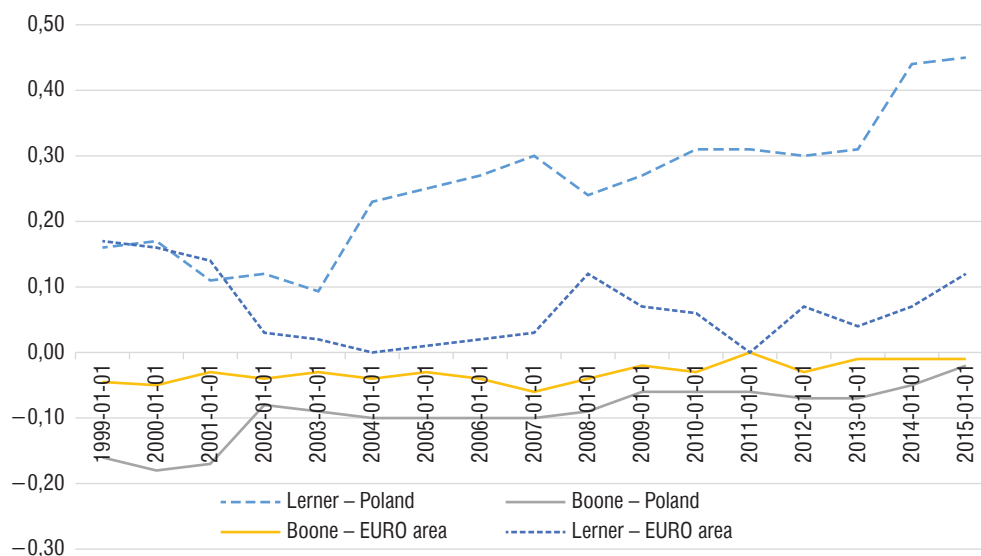
Source: Own elaboration based on Federal Reserve Economic Data[20] and the World Bank.Cf. Pawłowska (2014), pp. 142–147.

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[19] The analysis ends in 2015, due to the availability of data on measures of the competition level estimated on the basis of individual banks' data from the BankScope database.

[20] https://fred.stlouisfed.org

Figure 6 illustrates the results of competition assessment using the Lerner index and the Boone indicator in the years of 1999–2015. The analysis of the value of the above indicators generally shows a drop in the market power of banks in Poland in the years preceding Poland's accession to the EU and in the period prior to the 2008 financial crisis, which meant increased competition on the market. In the years 2013–2015, the above measures indicate an increase in market power and a decrease in the level of competition.

The values of H statistics for the Polish banking sector and for banks in the euro area, estimated using Panzar and Rosse (P-R), indicate monopolistic competition (see Figure 7). H statistics for the Polish banking sector shows a drop in the level of competition during the crisis and a slight increase in the years 2014–2015.

Figure 7. Values of H statistics
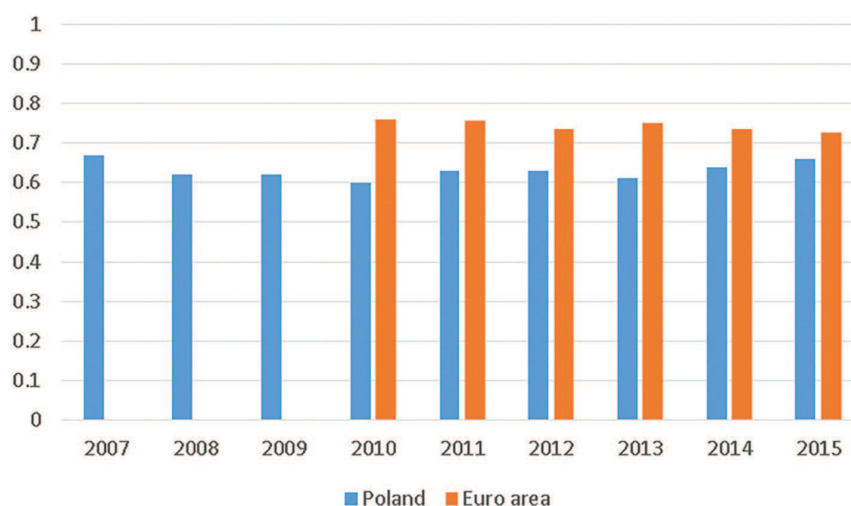
Source: Own calculations and the data from Federal Reserve Economic Data[21] and the World Bank. Cf. Pawłowska (2014), pp. 142–147.

It is worth highlighting that the presented measures of the level of competition after the financial crisis point to different directions of competition development. On the one hand, the values of the Lerner index demonstrate a decrease in competition after 2009. On the other hand, the values of H statistics indicate a drop in competition after 2009, and yet another slight increase in the level of competition after

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[21] https://fred.stlouisfed.org

2014. The results of the CR5 concentration, however, indicate an increase in market power after 2009.

One should bear in mind that the level of competition in the euro area is much higher than in Poland, as indicated by both the Lerner and the Boone indices as well as the H statistics (see Figures 7 and 8).

On the basis of the analysis of various measures of levels of competition, it can be stated that after 2009, the market power of the banks operating in Poland has increased. Moreover, the analysis of the values of competition and concentration measures shows that the level of competition in the Polish banking sector may decrease due to further mergers, which helped to prove the thesis that since 2009 the market power of the banks in Poland has increased.

Conclusion

The level of competition in the Polish banking sector was influenced by a variety of factors, including both the changes in the external environment as well as actions taken by the banks themselves in response to emerging threats and opportunities. The analysis of concentration ratios and competition measures has shown that as a result of the consolidation process, the level of competition in the Polish banking sector is declining. Moreover, it has been pointed out that despite the generally favourable situation, the regulatory requirements observed in recent years are a significant challenge for banks in order to maintain their competitive position on the market.

On the one hand, the consolidation of the Polish banking sector may cause an increase in market power and the ability to compete for Polish banks on the global market. On the other hand, however, it may lead to the monopolisation of the domestic market. It should be noted, though, that the presented measures estimate the level of competition on the market for all banking products, while the level of competition in individual market segments may prove different. Moreover, the question that remains open is what level of competition in the Polish banking sector will ensure long-term economic growth and how to reconcile pressure on short-term profits with long-term economic development strategies.

Appendix

The Panzar and Rosse approach (P-R)

Panzar and Rosse defined the measure of competition as the sum of the elasticities of the revenue function, known in the literature as Panzar and Rosse statistics, marked with the symbol H (equation 1).

$$H = \sum_{k=1}^{m} \frac{\partial R_i^*}{\partial w_{k_i}} * \frac{w_{ki}}{R_i^*} \qquad (1)$$

Where:

R_i – the function of the bank's i revenue

w_{ki} – vector with a dimension m of the bank's i input prices

* – equilibrium value

The estimated H statistics ranges from $(-\infty, 1)$. It underlies the distinction of the market organisational and production structures – monopoly or oligopoly, monopolistic competition and perfect competition. In the case of long-term equilibrium, perfect competition is characterized by H statistics equal to one. Under monopolistic competition, H statistics assumes values range from the zero to one $(0, 1)$. Finally, zero or a negative value of H statistics means the existence of a monopoly. A growing value of H statistics denotes a growing level of competition in the banking sector (see: Pawłowska 2014). The standard H estimation procedure involves the use of the so-called individual fixed effects (FE)[22] in regression on panel data for individual corporate banks, but it is recommended to employ the GMM estimator as well.[23] The dynamic version of the panel model eliminates the need to fulfill the assumption of the Goddard and Wilson market equilibrium (2009).

The Lerner index

The Lerner index assesses the so-called monopoly margin. According to the Lerner index, the market power of a monopolist depends on the price elasticity of the market demand in accordance with the following equation:

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[22] The fixed effects model. It takes into account the influence of all the factors unchanged in time, specific for each unit i.

[23] Estimation of the model using the GMM (Generalized Method of Moments) estimator requires the use of appropriate estimating instruments for explanatory variables that are uncorrelated with an individual random effect.

$$L = \frac{1}{|e|} = \frac{p - MC}{p} \qquad (2)$$

where: p – market price, MC – marginal cost, e – price elasticity of demand.

In the case of perfect competition, rice p equals MC, the Lerner index = 0 (enterprises in the perfect competition have no market power). Positive values of the Lerner index indicate the existence of market power. The higher the value, the greater the market power of the company/bank and the less the competition in the market. In the case of a monopoly, the Lerner index is L = 1 / e, where e stands for the price elasticity of demand. The Lerner index never exceeds 1 because the marginal cost is always non-negative. The Lerner index ranges from 0 to 1. A growing value of the Lerner index as opposed to the H statistics indicates a decline in competition and an increase in the market power of the bank.

The assessment of the Lerner index in the banking sector is based on the monopolistic banking model by Monti and Klein, and is extended to the case of Cournot's imperfect competition, according to which the sensitivity of interest rates on deposits and loans to changes in interbank rates (influenced by the central bank's policy) depends on the number of banks (see Freixas and Rochet 2008, pp. 72–73).

Boone's indicator

The Boone's approach is based on the so-called hypothesis of an efficiency structure hypothesis (ESH), stating that more effective enterprises (with lower marginal costs) have greater market power and therefore achieve higher profits. The effect is the stronger, the higher the level of competition. This dependence can be stated in the following equation:

$$\ln s_{it} = \alpha_t + \beta \ln MC_{it} \qquad (3)$$

Where: s_{it} – stands for market power of the firm, defined as the firm's i (bank's i) share in the market in period t,

MC_{it} – the marginal cost of the firm/bank i in period t

β – estimated Boone's indicator.

The measure of the competition level is a β parameter that reaches values less than zero. The higher the competition level, the higher the absolute value of the negative β parameter that defines the Boone indicator.

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Legal acts

1. Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC as well as Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012.

2. Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market (Payment Services Directive 2).

3. Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU.