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EVOLUTION AND CURRENT STATUS OF THE COMPETITIVE ENVIRONMENT IN THE SERBIAN BANKING SECTOR: CONCENTRATION INDICES ANALYSIS

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ABSTRACT

This paper analyzes the degree of concentration and competition in the Serbian banking sector during the 2010-2017 period and in its current state, by considering the financial statements of banks for the years 2016 and 2017. For this purpose, both traditional concentration indicators (concentration ratio CRn and the Herfindahl-Hirschman index), and the relatively rarely used Linda indices have been used. The degree of concentration has been calculated based on five variables: total assets, deposits, capital, operating income of banks, and loans. The degree to which these indicators are compliant with the basic antitrust regulations has been illustrated. It has been demonstrated that in the current case of a relatively large number of banks operating in Serbia, the existing degree of concentration is relatively low. This provides suitable conditions for the development of healthy competition among them. However, the approximation of the indices to moderate concentration within the period analyzed warns of the appearance of oligopoly.

Keywords: concentration, competition, banking sector, Serbia, Linda indices, Herfindahl-Hirschman index, concentration ratio, antitrust policy

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INTRODUCTION

The last few decades have seen considerable attention being put towards the analysis of the development of competition, not only in the so-called real economy but in other branches as well. Among these other branches, which are infrastructural, both on a state level and in the context of the international economy, the banking sector is of particular interest. Its importance has been growing not only in the countries of the former socialist world, which is largely due to increased role of the market and the consequent deregulation in this and other sectors, but also in developed countries, where deregulation and liberalization processes have also taken place, followed by the integration (mergers and acquisitions) of banks. At the same time, the developed financial markets, especialy the European ones, have become more market-oriented (Rajan & Zingales 2003).

In modern economic theory, it is assumed that in order to create an efficient market system within all segments of the economy, especially within the banking sector, it is necessary to provide a competitive environment. Competition in the banking sector is one form of market competition. It appeared later than competition in industry, but it is characterized by high intensity and a great diveristy of forms and methods of competition. The main characteristics of bank competition are described in detail in Korobova (2006, 76–100).

At its most primal level, competition is defined as rivalry. In economic theory, it is routinely attributed to be a cause of improved firm-level efficiency, lower prices, increased quality, accelerated innovation, and the more rapid development of new services etc. Competition and its consequences have been a subject of theoretical consideration for more than three hundred years, since the writings of the mercantilists in the 17th century. Contrary to the mercantilists, who believed that competition occurred between nations via international trade, the physiocrats and Adam Smith put the focus more on the atomistic competition between firms. In the subsequent years, economists have honed, refined, and parsed the notion of competition. They have conceptualized “perfect competition”, a model that provides students of economics with a standard introduction into the equilibrium tendencies of markets characterized by perfectly free entry, atomistic firms selling a homogeneous product or service, and perfectly informed buyers and sellers. By the mid-20th century, it was recognized that many modern markets had characteristics that strained the then-standard image of perfect competition. Economists then began to develop models of imperfect competition that may more accurately take into account the structural aspects of modern markets. However, no general theory of imperfect competition has arisen that captures, or anticipates, the general economic behavior of firms in modern markets.

The contrast between the model of perfect competition and the structure of many modern markets led to a debate about the concept of competition and the appropriate policy toward competition. In this discussion, John Maurice Clark (1940) discovered a new and promising pathway. He argued for a new concept of competition, because models of imperfect competition, while “current”, were in “an unformulated state” for applications of economic policy. He noted that scrutinizing the model of perfect competition had led economists to realize that “perfect competition” does not and cannot exist and has presumably never existed for reasons quite apart from any inescapable tendency toward collusion. Clark’s definition of competition provides the core of theory of *workable competition*, a term that he and others

used interchangeably with *effective competition*. The concept of workable or effective competition appeared from the understanding that the abstract model of perfect competition is an unattainable ideal that does not create practical bases for the formulation of competition policy. Workable or effective competition considers competition as a dynamic process. The concept consists of a set of relevant criteria that are supposed to reflect the competitiveness of the market. Therefore, it can serve as a basis for formulating a real competition policy, especially the policies embodied in antitrust laws. These criteria are usually derived from the general analytical scheme, *structure-behavior-result* (SBR), a model that was first described in the 1930s by Edward Mason and developed by Joe Bain in the 1950s and by Michael Porter in the 1980s. Finaly, also in the 1980s, the McKinsey Company proposed its own, expanded version of the model, adding an element of dynamism to the static concept.[1]

SHORT REMARKS ON THE EVOLUTION OF COMPETITION IN BANKING

The development of competition in the banking sector was not linear, it has exhibited various significant breaking points. Even though some sort of rudimentary competition could be found in the first medieval banks, real competition hardly appeared before the beginning of the 20th century. Changes were brought brought about later in that century, when banks entered competition even in seemingly non-profit activities. However, the development of competition has not always been smooth; it has often suffered from limitations, even in the most developed countries, such as the USA. There have been diverse forms of limiting competition and two of them deserve to be highlighted. The first one is a prohibition on opening new branches in other states or even in particular countries as a whole. This was a way of limiting the size of banks, confining them to only certain geographical regions. These prohibitions and limitations were abolished in 1994. The second form of limiting competition arose from the Glass-Steagall Act, adopted in 1933 as a reaction to the crisis that took place between 1929 and 1933, when commercial banks' bad investments caused many of them to collapse. Among other provisions, this act established a clear division between traditional banking activities and investment activities, while limiting their right to handle stocks. At the same time, it prohibited companies trading stocks to provide traditional banking services, that is forbidding non-banking entities from carrying out banking activities, which was a means of protecting banks from the competition of non-banking entities. The Glass-Steagall Act was abolished in 1999. There have, however, been other forms of restraints, such as the famous Regulation Q. Regulation Q was used by the Federal Reserve Bank to impose restrictions on the payment of interest on 30 day term deposits, i.e., to limit the interest rate on 30 to 90 day term deposits to 1%. This Regulation remained in effect until 1986 and enabled the Federal Reserve to define the maximum interest that banks were allowed to pay to savings accounts. The abolition of these and other restrictions, as a part of the great wave of deregulation in the last decades of the 20th century, led to an increase in competition in other markets, primarily but not only in the Western European ones.

[1] For a more detailed consideration of the evolution of competition and appearance of the concept of workable competition, see Delp & Mayo (2017).

During the 20th century, banking activities underwent two big structural transformations, which also affected competition in this sector (Korobova 2006, 97). Before the First World War, the backbone of large private banking operations were industry loans and stock exchange activities. Small industrial and agricultural enterprises were catered to mainly by credit cooperatives. Savings cooperatives were strictly limited to savings-related operations and to using deposited savings as long-term loans.

The first important structural transformation in banking took place after the First World War and is related to the wave of rationalization in banking, which was caused by an extraordinary increase in cashless transactions. This was when Western banks saw the appearance of punch card machines and started keeping client records for separate accounts. Thanks to this, banks managed to penetrate new client circles, which is one of the causes of the increase of concentration in the banking sector. Many small private and provincial banks were acquired by bigger ones, but various large banks also merged.

The other important structural transformation of the banking sector was associated with the massification of bank activities. This started in Western Europe in the 1960s, when the main source of resources for all creditors became the savings deposits of the population. Until then, large commercial banks only catered to enterprises and high-income individuals, while the general population only had access to savings banks. The situation started changing along with an increase in general income, which caused the general population to became desirable as clients. This was also possible thanks to the introduction of cashless salary payments. This development particularly benefitted savings banks, which were best connected to the "ordinary people". However, large banks also wanted their share of new clients, and therefore started allowing the general population to open accounts. It was then important to make millions of account owners into real banking clients, which was done by providing them with help in learning how to make cashless transactions, and especially by offering a wider range of consumer loans. Besides that, commercial banks and banking groups started founding investment companies that offered the possibility of investing in stocks. This was actually the first attempt of the banks to market their services. The massification of all the financial-credit institutions' activities led to the minimization of differences among banking groups, as well as to the universialization of banking activities, which all resulted in intensified competition.

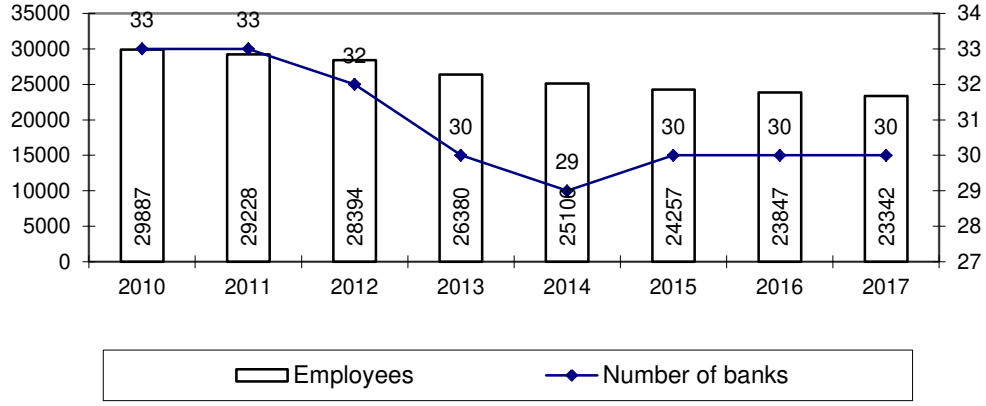
The 1960s saw the beggining of another process, which significantly affected competition in European banking markets, namely, the liberalization of the state-regulated activities of commercial banks. The 1980s were characterized by a further increase in competition, as well as by tendencies toward globalization, a process which was starting to affect various sectors. Globalization derives from a general internationalization of financial markets (Korobova 2006). This process spread to developing countries at the end of the 20th century. All this led to a futher increase in competition. Some of the most important characteristics of this process were: universalization of banking activities, formation of financial conglomerates, penetration of non-banking structures into the banking market, expansion of the regional and national aspects of credit institution activities, globalization of banking competition, the ever-more-important non-price competition, and the liberalization of state regulation of competition (Korobova 2006, 99).

THE MODERN BANKING SECTOR IN SERBIA

The modern banking sector of Serbia is based on the transformation of the banking sector inherited from the Socialist Federal Republic of Yugoslavia (SFRY). Just like the entire domestic economy, the banking sector of the 1990s operated under the irregular and turbulent conditions of international sanctions, wars in the surrounding territories, and the hyperinflation that took place at the beginning of the decade and devaluated the capital of enterprises and banks. A large number of banks founded at the time (there were 110 banks in Yugoslavia in 1995), did not last long and often carried out business practices that were virtually or utterly illegal.

Since the political changes that took place in 2000, the Serbian banking sector has also undergone some significant changes. What were once the largest banks ceased to exist (they were liquidated[2]), some foreign banks entered the market, there were a few acquisitions, and so on. At present, there are 30 banks in the market, none of them holding a significantly outstanding market share. For small countries like Serbia, this is a considerable number, and it enables the development of competition. The enterance of foreign banks into the market and the processes of deregulation and liberalization have naturally created tougher competition. However, there appear to be no serious and consequential analyses of competition in the market in question.

Competition in the banking sector has not been of particular research interest in the past, although Serbia (as part of Yugoslavia), unlike other socialist countries, has had considerably well-developed market relationships, at least in the real sector. Therefore, the most extensive and comprehensive monograph (Begović et al. 2002) does not consider competition in this sector. Textbooks used in Serbian universities usually do not cover this topic[3] and neither do the most recent publications, such as the monograph edited by Colanovic (Čolanović 1998).



Source: Banking Sector in Serbia. Quarterly Report. (2010–2017).

Figure 1. Number of banks and employees in the Serbian banking sector 2010–I-IX 2017.

[2] The years 2001 and 2002 saw the liquidation of 23 banks, among them the four largest ones: Belgrade Bank, Beobank, Yugobank and Investbank, which together had made up about 60% of the banking sector.

[3] See, for example: (Ćirović 2001), (Đukić et al. 2003), (Hadžić 2009).

The number of banks and the number of employees in the banking sector in the period between 2010 and the third quarter of 2017 are illustrated in Figure 1. Both the bank and employee figures have decreased substantially over the present decade, by 10% and by more than 20%, respectively. However, both figures are still considerable for a relatively small financial market, such as the Serbian one. Out of the total number of banks, 8 are domestic while 22 are foreign. The domestic–foreign ratio in total assets is 23.3:76.7, while with respect to capital it is 20.6:79.4. The total number of business units (all forms of business network parts: corporate offices, banking subsidiaries, branch offices, counters and other business units) amounted to 1719 at the end of 2016 and 1671 at the end of the third quarter of 2017.

METHODS

Competition in general, and especially in the banking sector, is a complex process difficult to measure, since there is no generally adopted or best approach to measuring it, nor is there a unit indicator. Different approaches have been developed to measure the degree of competition in a market. They can be divided into direct and indirect approaches. Direct approaches are based on the degree of market power as the source of increases in market prices. Direct estimation assumes the existence of data about bank service prices and their marginal costs, which is often lacking. In such cases, we use the indirect estimation method, which can be either structural and nonstructural. The former is based on the paradigm "structure–behavior–result" and suggests using the degree of market concentration to measure the degree of competition. Nonstructural estimation denies the correlation between concentration and competition, especially in systems with low entry and exit costs (contestable markets, see Baumol 1982). Within this approach many different models examine the relationships between banks' performance depending on various exogenous factors (Panzar-Rosse and Boone models, as well as others).

Although we don't identify competition with concentration, our approach could formally be considered as structural. As this research is one of the first steps in the analysis of competition in the Serbian banking sector, we will not apply strictly structural approach. After all, concentration coefficients can also be used in the nonstructural approach. We can define concentration as it is defined in the OECD Glossary: "Concentration refers to the extent to which a small number of firms or enterprises account for a large proportion of economic activity such as total sales, assets or employment" (Khemani & Shapiro 1993), without considering different contexts observed by the Glossary.

Before carrying out an appropriate empirical analysis, one issue must be resolved. It concerns the variables related to banks and their business that are to be used. While in the case of manufacturing and other branches of the real economy this issue is more or less resolved, the situation is different in the banking sector: variables such as volume of production or sales cannot be used, other indicators are needed. These can be, for instance, attracting deposits (Berger & Hannan 1989), assets and deposits (Berger et al. 1999), assets, loans and deposits (Ljumović et al. 2014), deposits and loans to legal and physical persons (Kotsofana & Stazhkova 2011), deposits and loans to legal and physical persons, and assets (Raksha 2010), deposits, loans to legal and physical persons and capital (Lončar & Rajić

2012), assets, capital, loans, deposits, interest income and net profit (or loss) after tax (Miljković et al. 2013). A review of the literature on the use of concentration measures in the banking sector up to the beginning of the 2000s is given in Bikker & Haaf (2002b). Finally, the National Bank of Serbia's regular quarterly reports (*Bankarski sektor u Srbiji. Kvartalni izveštaj*, 2010–2017) give short surveys of concentration and competition in the banking sector, using nine financial balance variables: assets, loans (total), loans to population, loans to companies, deposits (total), deposits of population, income (total), interest income, income from fees and commissions. Noticably, the most frequently used variable is total assets, although its use does not exclude other variables. We will also not limit our research to using only one variable, rather we have chosen five indicators: operating income, total assets, capital, deposits and loans. This choice is based not only to theoretical reasons, but also on the sources accessible to the author: financial statements of banks available on the website of the National Bank of Serbia (*Bilans stanja/uspeha banaka* 2017; *Bilans stanja/uspeha banaka* 2018). In this paper we will analyze the data concerning the year 2016, but in certain cases we will refer to works pertaining to the previous years.

The second methodological question is the choice of concentration indicators (indices). Among the many indicators (see for instance Martić 1986), two have been used both by researchers and in the practical antimonopoly policy: coefficients of concentration, or concentration ratios CRn (the share of n largest companies in a certain market, where n mostly stood for 4) and HH index (Herfindahl-Hirschman index, or simply Herfindahl index, the sum of the squares of the shares of all participants in a market). Both indices are based on individual company shares in a market

$$s_i = \frac{Q_i}{Q} \tag{1}$$

where: Qi = volume of company production i, Q = total production volume in a branch of industry. Instead of the volume of production, other variables can be used, as often occurs even in analyses within the real economy sector, for example income or company assets, etc. Coefficients CRn are defined as the sum of n greatest shares, as follows:

$$CRn = s_1 + s_2 + \cdots + s_n = \sum_{i=1}^{n} s_i \tag{2}$$

and coefficients (indices) HH as the sum of share squares of all participants in a market:

$$I_{HH} = \sum_{i=1}^{m} (s_i)^2 \tag{3}$$

We will also use these indices. But, unlike the paper cited (Ljumović et al. 2014), where indices CR4 and CR8 were used, we will also use index CR3. We consider, and this has also been demonstrated on multiple occasions, that index CR8 is too high for Serbia and is therefore considered unusable for the purpose of our work.[4]

[4] Obviously, in the context of large countries and economies, an indicator of concentration can also be the coefficient CRn with a considerably higher n value. For instance, the study by Gordeev & Kladova (2015) used the indicator CR200, which is not only unimaginable but also unusable in the Serbian banking sector and other real economy sectors. Clearly, the use of this coefficient suggests not only a large market (large country), but also a homogenous national market where all participants have access to the market in all parts of the national

The advantages and disadvantages of indicators (2) and (3) are well presented in the literature, see for example Bukvich (2015). For the purpose of our calculations, we determined both of these indicators, but adjusted them slightly. In addition to that, considering their disadvantages, we have chosen one more index not yet used in the Serbian literature, but also rarely used in other countries, especially in the so-called transition economies. One of the examples of its uses (Kotsofana & Stazhkova 2011) refers to the Russian banking sector. This index (more precisely, system of indices) is calculated by following a general formula, which is developed into a specific formula for every value of m:

$$IL_m = \frac{1}{m(m-1)} \sum_{i=1}^{m-1} \frac{m-i}{i} \cdot \frac{CRi}{CRm-CRi} \tag{4}$$

This index was constructed by the EU Commission consultant Rémo Linda (1976). As with the index CRn, it is only calculated for the few (m) largest enterprises and, therefore, also analyzes the "nucleus" but not the "periphery" of the market in question. However, unlike the concentration ratio CRn, the Linda-index (L-index) focuses on the differences in the market "nucleus". In other words, the L-index has to be considered in combination with the concentration-ratio; it measures the "oligopolistic equilibrium" by giving information about the relative shares. We have already showed the advantages of the use of Linda-indices in Bukvich (2013), although this article was primarily illustrative, and in Bukvić (2017) and Bukvich (2017) for the banking sector specifically. The calculation of this index is recursive and demanding, although obviously, the use of personal computers renders the issue insignificant.

This index is calculated alternately (recursively). A particular formula for every m value (m = 2, 3, ...), is obtained by developing the general formula (4). The higher the m value, the more complex becomes the particular formula. We will present some examples, see formulas (5), (6), and (7).

The Linda index for the two largest companies (m = 2) will be equal to a half of the quotient (expressed in percentages) of their market shares:

$$IL_2 = \frac{1}{2} \cdot \frac{s_1}{s_2}. \tag{5}$$

In case m = 3, the Linda index is equal to the aritmetic mean of the the following two quotients multiplied by 1/m:

a) the quotient between the share of the largest company and the aritmetic mean of the shares of the second and third largest companies;
b) the quotient between the aritmetic mean of the shares of the two largest companies and the third largest one, i.e.,

$$IL_3 = \frac{1}{3} \cdot \frac{1}{2} \left[\frac{s_1}{(s_2+s_3)/2} + \frac{(s_1+s_2)/2}{s_3} \right]. \tag{6}$$

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market. In other words, the so-called relevant market is of great imoprtance. It is not difficult to assess how realistic such an assumption is.

In the case of four companies (m = 4), the Linda index is calculated as the aritmetic mean of the following three quotients multiplied by 1/m:

a) the quotient between the share of the largest company and the aritmetic mean of the next three largest companies;
b) the quotient between the aritmetic mean of the shares of the two largest companies and the aritmetic mean of the third and fourth largest companies' shares;
c) the quotient between the aritmetic mean of the three largest companies' shares and the fourth largest company's share:

$$IL_4 = \frac{1}{4} \cdot \frac{1}{3}\left[\frac{s_1}{(s_2+s_3+s_4)/3} + \frac{(s_1+s_2)/2}{(s_3+s_4)/2} + \frac{(s_1+s_2+s_3)/3}{s_4}\right] \quad (7)$$

In case of the following m values (m = 5, m = 6, etc.), the Linda index is determined in an analogous manner.

As we can see, the calculations are quite difficult and ardous. Obviously, the use of a computer makes this issue meaningles, even though popular statistical programs contain no functions for calculating these indices.

In the Serbian literature discussing this topic (Ljumović et al. 2014; Lončar & Rajić 2012; and Miljković et al. 2013) the Linda index is not used, however CRn, HH and other indices are, such as the reciprocity index, comprehensive concentration index or Horvath-index (CCI), Entropy-index (E-index) and the Gini-coefficient.[5] For our purposes, all other indices except the CRn index bear no importance.

CONCENTRATION AND COMPETITION IN THE SERBIAN BANKING SECTOR IN 2016 AND 2017

Unlike some empirical studies, which divide the banking sector into small, middle and large banks (see for example Bikker & Haaf 2002a), we will consider the whole sector as a homogenous unit. Clearly, this doesn't mean that in a theoretical sense we prefer such an approach. The main reason for our choice is obvious enough: regardless of the relatively large number of banks, the banking and financial markets in Serbia are small, by all relevant indicators: total bank assets on the 31st of December amounted to 3,241,505 million dinars in 2016 and 3,369,392 in 2017, while capital equaled 632,486 million dinars in 2016 and 667,116 in 2017 (using the exchange rate of 1 euro = 123.4723 dinars on December 31st, 2016 and 1 euro = 118.4727 dinars in 2017). Therefore, we don't find this division useful by any criteria in the context of our work.

[5] We deem it necessary to mention one exception. The Linda Index is mentioned in the work of Đuričin et al. (2008), which applied it alongside other concentration indices. However, it only stated one index value without specifying which one it was (i.e., how many leading enterprises were included in the calculation), although it can be deduced that four enterprises were concerned. Therefore, the interpretation of the results cannot be done in a clear and certain manner and is basically inadequate.

Table 1. Concentration indices in the Serbian banking sector in 2016 and 2017

Criterion	CR3	CR4	CR8	HH	CR3	CR4	CR8	HH
	2016				2017			
Total assets	39.6	47.4	69.4	813	38.5	47.0	70.6	813
Deposits and other liabilities	40.1	47.9	69.7	819	38.8	47.7	71.0	818
Capital	38.7	47.4	73.6	882	37.7	46.9	73.3	848
Operating income	36.8	44.6	67.9	764	34.8	43.4	69.0	762
Loans and receivables	36.9	45.3	67.9	763	37.5	46.2	70.2	787

Source: Calculated by the author based on Financial Statements, 2016 and 2017. http://www.nbs.rs/internet/cirilica/50/50_5.html.

The degree of concentration according to traditional indices is shown in Table 1. Coefficient CR3 has been chosen, which is used in antimonopoly practice in many countries, as well as CR4, which was often used in research in the former Yugoslavia, (for reference see Bukvić 1999 and Begović et al. 2002), and finally CR8. The Table also includes Herfindahl-Hirschman indices, since the author has had access to the financial statements of all the subjects, which is not always possible in similar analyses.

In case of both coefficients (CRn and HH), the limits between different degrees of market concentration are set arbitrarily. For instance, the USA has been using HH indices for market classifications since 1982. Until 2010, the limits were set at 1,000 and 1,800, and since 2010, they have been 1,500 and 2,500 (*Horizontal Merger Guidelines* 1997; *Horizontal Merger Guidelines* 2010). The antimonopoly authority in Russia uses the limits 45% and 70% for CR3, and 1,000 and 2,000 for HH to separate low, moderate, and high concentration of markets (*Federal'naya antimonopol'naya sluzhba*, 2016). The values of HH indices for all variants in our analysis are less than 1,000, so the market should be classified as one of low concentration. On the other hand, according to the CR3 index, it also belongs among non-concentrated markets, but if were to use the CR4 index, we would have to classify the market as a moderately concentrated one (except for the third variant, the capital, but in that case, the value of CR4 is practically on the limit between a non-concentrated and a moderately-concentrated market).

Table 2. Hirschman-Herfindahl indices for chosen indicators in the Serbian banking sector, 2010–I-IX 2017

Balance variable	2010	2011	2012	2013	2014	2015	2016	2017
Assets	629	660	678	741	794	796	813	812
Loans (total)	649	722	721	774	771	763	736	744
to population	687	684	687	714	715	729	728	747
to companies				788	779	782	768	765
Deposits (total)	720	714	726	777	818	816	817	825
from population	796	799	811	866	903	930	939	956
Income (total)	679	721	916	844	719	734	804	710
interest income	620	640	678	712	736	734	737	744
from fees and commissions	739	722	760	828	849	860	879	879

Source: Banking Sector in Serbia. Quarterly Report (2010–2017).

The indices of CRn and HH are also used by the National Bank of Serbia in the aforementioned reviews of concentration and competition presented in the Bank's quarterly reports. However, due to reasons unknown to the author of this work, they do not use indices CR3 and CR4, which are justified from the standpoint of a small market and a small number of participants in the market. They use indices CR5 and CR10 instead, considering the shares of five and ten largest banks, respectively. We deem the use of these indices inadequate and will not consider them. Instead, we can consider the results obtained from the report through the use of the HH index (see Table 2).

The HH indices in Table 1 illustrate different tendencies, i.e., decreases as well as increases, in 2017 (I-IX), in comparison with 2016. Credit index increased, while the active index remained the same. As shown in Table 2, there were no clear and consistent tendencies in index value changes in 2017 in comparison with the previous years.

All index values in Table 2 are lower than 1,000, therefore, according to all the indicators, the market should be classified as one of low concentration. This is constantly emphasized in the National Bank reports. However, there is an obvious growth trend in practically all values, with a significant increase in some cases. In this sense, even if we ignore the problem of arbitrary limits between the different market concentration types, there is hardly any room for the satisfactory reports and estimations that are constantly being reiterated ("The banking market in Serbia is still characterized by a satisfactory level of competition and a low concentration of activity") (*Bankarski sektor u Srbiji. Kvartalni izveštaj. 2010–2016*). The paper by Miljković et al. (2013), which analyzes the period between 2008 and 2012, demonstrated a growth trend of the HH index for all observed financial balance variables, with very small exceptions, only in certain years and for some variables, so it is safe to conclude that there is almost a ten-year-long growth trend of the HH indices in the Serbian banking sector. This should have been taken seriously and acted upon, however the National Bank of Serbia ignored the alarming signs. Taking into account the pronounced values of the concentration indices in 2017, a hypothesis can be made about shifts in this trend. However, it is still too early to make such a conclusion, as it is necessary to wait and obtain at least the 2018 results first.

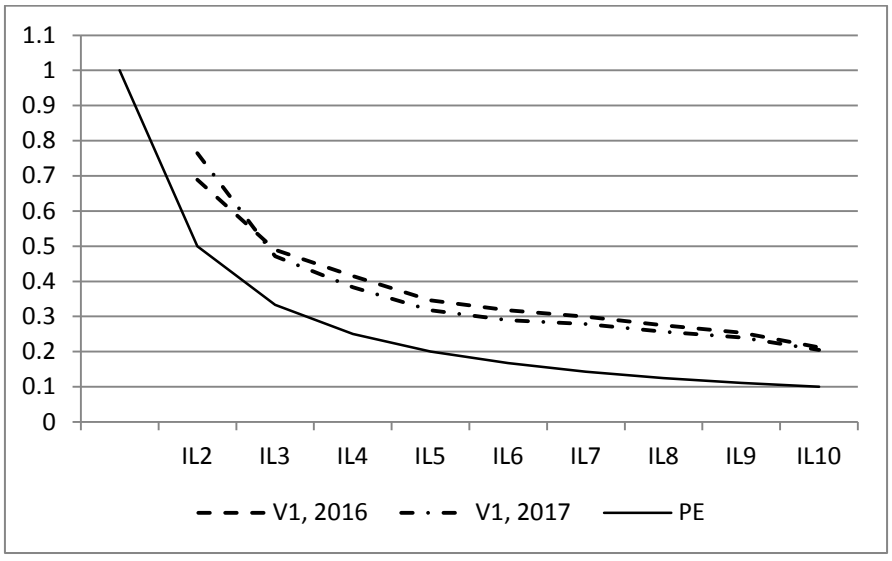
Table 3. Linda indices in selected indicators in the Serbian banking sector, years 2016 and 2017

IL	V1	V2	V3	V4	V5	V1	V2	V3	V4	V5	PE
	2016					2017					
											1
IL2	0.69	0.63	0.97	0.76	0.70	0.77	0.72	0.86	0.85	0.68	0.500
IL3	0.49	0.48	0.62	0.51	0.48	0.47	0.46	0.55	0.52	0.47	0.333
IL4	0.42	0.41	0.44	0.41	0.38	0.38	0.37	0.39	0.38	0.37	0.250
IL5	0.35	0.35	0.34	0.32	0.32	0.32	0.31	0.31	0.30	0.32	0.200
IL6	0.32	0.33	0.28	0.29	0.30	0.29	0.30	0.27	0.25	0.29	0.167
IL7	0.30	0.30	0.25	0.27	0.28	0.28	0.28	0.25	0.24	0.26	0.143
IL8	0.28	0.27	0.27	0.25	0.25	0.26	0.26	0.25	0.24	0.24	0.125
IL9	0.25	0.25	0.26	0.23	0.24	0.24	0.24	0.25	0.22	0.23	0.111
IL10	0.21	0.21	0.23	0.20	0.20	0.20	0.20	0.21	0.19	0.20	0.100

Source: Calculation by author based on Financial Statements. http://www.nbs.rs/internet/cirilica/50/50_5.html.

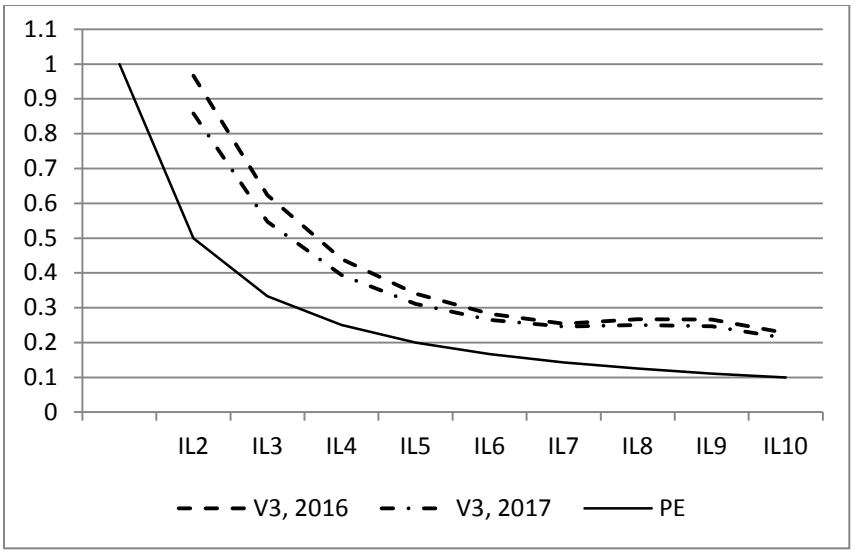
Clearly, other possible limits between markets of low, moderate and high concentration could result in a different classification. This is one of the main flaws in the use of the CRn and HH index. Therefore, other approaches to researching concentration and competition are also necessary. One of them is the Linda index. Unlike the previously mentioned ones, Linda indices are meant to reveal the existence of oligopolistic structures without using any arbitrarily established limits. In contrast, the index values indicate whether an oligopoly is present or not in a given market. In the case of a competitive market, the index value decreases (ILm+1 > ILm for all m). If this pattern is broken, it indicates that there is an oligopoly situation in a given market. In our case, only the third variant points to the existence of an oligopoly, which are the Linda indices calculated on the basis of the capital value (see Table 3). Besides the Linda indices (V1, V2, V3, V4, and V5, for five values in Table 1), it also shows the column (PE). This represents the so-called perfect equilibrium curve, which is the situation of perfect equality among the participants in a marketplace. The shares of such perfect competitors are the same to one another, and equal to the value 1/n (n = number of participants in market).

The 1/n series is constantly decreasing, therefore making a convex curve. However, the curve reflecting a particular market situation is not necessarily convex, even in conditions of total competition (meaning Linda indices are constantly decreasing) as shown in Figure 2. The graph shows that the difference between the perfect equilibrium curve and the Linda indices values curve in a particular market defines the space named "oligopolist arena". This visually illustrates how far or how close a market is from having perfect competition (compare Figures 2 and 3). Evidently, serious deviations from the situation of perfect competition will make this space larger, but they can also lead to the aforementioned anomalies in Linda indices tendencies.



Source: On the Basis of Financial Statements. http://www.nbs.rs/internet/cirilica/50/50_5.html.

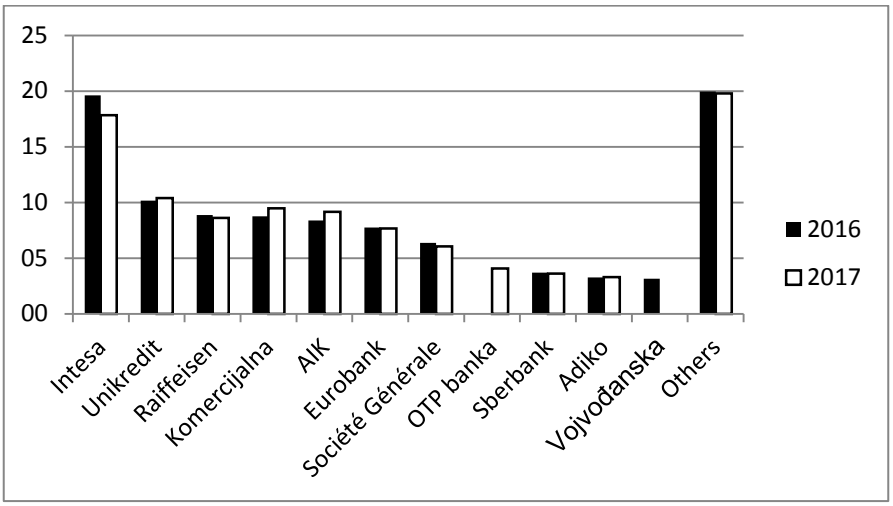
Figure 2. Linda indices for assets and "perfect equilibrium" curve for the Serbian banking sector, 2016 and 2017.



Source: On the Basis of Financial Statements. http://www.nbs.rs/internet/cirilica/50/50_5.html.

Figure 3. Linda indices for capital and "perfect equilibrium" curves for the Serbian banking sector, 2016 and 2017.

The third variant (variable V3, i.e., capital) points to oligopoly (IL8>IL7); the sequence of indices ILi is not a monotonically decreasing function. However, the observed variable (capital), as residual of assets and liabilities, is the "worst quality" variable among the ones chosen, so we should be restrained when interpreting the results. Therefore, having taken into consideration the other results from Table 3, it could be said with great certainty that the results obtained by coefficients CR3, CR4 and HH were confirmed, i.e., that the Serbian banking sector is one of low concentration. These are good conditions for the development of competition.



Source: On the Basis of Financial Statements. http://www.nbs.rs/internet/cirilica/50/50_5.html.

Figure 4. The shares of leading banks in total banking sector capital in 2016 and 2017.

The graphical representation of the Linda index is also of great interest (see Figures 2 and 3). It shows indices for assets (Figure 2), the most widely used balance variable used in such analyses of concentration and competition in the banking sector. It also shows indices for capital (Figure 3), where, as shown in Table 3, there is a suspicion of the existence of oligopolistic structures. Unlike the indices CRn, which are a monotonically increasing function as each subsequent participant is added (CR1<CR2<…<CRn), Linda indices form a broken curve (Figures 2 and 3). The area between IL and PE is named the "oligopolistic arena" or "competition model", according to Yves Morvan, and it visually depicts the difference between the real situation and ideal, perfect competition.

Each bank's shares of the total banking sector capital are shown in Figure 4. They suggest that the first seven banks form an oligopolistic structure; in 2016 the seventh one in range (Société Générale) is greater by over 70% in terms of capital than the next, eighth one (Sberbank) (the shares are 6.4 : 3.7), and in 2017 the seventh-ranked one (Société Générale) is over 49% greater in terms of capital than the eighth-ranked one (OTP banka) (the shares are 6.1 : 4.1). If so, of course, this could be a case of so-called loose oligopoly, in which, by theoretical propositions, 6–7 firms hold a 70–80% share of a market. In our case, the share for the first seven firms together is 69.9% in 2016 and 69.2% in 2017. Therefore, the following conclusion can be drawn: the state of the banking market must be constantly observed, because the values of coefficients HH and even CR4 are close to those of moderate concentration. As shown previously, the National Bank of Serbia does carry out such observation, although only through the use of simple instruments.

CONCLUSION

The banking market in Serbia is characterized by a relatively large number of banks (30). Among them there are no prominently large banks. By considering all the selected indicators (operating income, total assets, deposits, and capital), we conclude that the greatest share is held by Intesa Bank (16.4; 19.6; 16.6; 17.0 and 15.8%, respectively). The concentration indices (CR3, CR4, HH and Linda indices IL) indicate a low degree of concentration, although close to a moderate degree of concentration, but also an absence of oligopoly, with the aforementioned exception. Even though this does not assume the existence of true competition, these results point to good prospectives for the creation and development of competition. In fact, we could consider that our results confirm the results obtained by Lončar & Rajić (2012) and Miljković et al. (2013), which referred to three quarters of 2012, as well as those of Ljumović et al. (2014), for the period between 2003 and 2012. However, we should take account of the slight growth in concentration. It is difficult to compare the results of these works due to the differing approaches that were used, although the application of the HH index is a solid foundation for comparison in such cases.

As banking competition is very complex, this paper should be considered one of the first analyses of concentration and competition in banking, and of the Serbian financial market in general. We hope that it will become a research subject of other researchers. New approaches would, naturally, be desirable in such future studies.

In addition to the fact that the degree of concentration is not high despite its increase, more attention should be put towards the actions of banks in the market, which fall under the

scope of regulation and control. In particular, the issues of collusion and backroom deals between banks should be dealt with, although they have not been considered in this paper.

Lastly, it is necessary to say that this analysis reflects the complete adequacy of the use of the Linda index when investigating concentration in the banking sector. It would be useful to use those indices in the appropriate analyses in the future, including the National Bank's analyses. Clearly, there might still be a possibility and need for use other methodological solutions in investigative projects, even those by authorities whose domain is the analysis of concentration in banking and other markets.

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