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BANKING MARKET CONCENTRATION IN THE REPUBLIC OF NORTH MACEDONIA

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Abstract

This project presents information on the concentration of the banking system of the Republic of North Macedonia, in the period of 2021. The project is based on the research carried out in order to determine the degree of concentration with: Concentration coefficient, Hirschman-Herfindahlovov index, The Giniev coefficient and the Lorenzov curve, the Lernerov index, the Hall-Tidemanov index and the Rosenbluthov index, the Comprehensive Industrial Concentration Index and the Entropy Measure. The measurement of the concentration of the banking sector was used to arrive at the conclusions that lead to the concurrency of the banking system.

Keywords: ***Concentration coefficient, Hirschman-Herfindahlovo index, Giniev coefficient and Lorenzov curve, Lernerov index, Hall-Tidemanov index and Rosenbluthov index, Comprehensive index of industrial concentration and Entropy measure.***

Entry

To understand banks, including the need to define them, there are many definitions, but the most common are those from a legal point of view, according to national legislation.[1]The bank as a financial intermediary is an economic agent that specializes in the activity of buying and selling (at the same time) financial contracts and securities.[2]Banks differ from all other non- deposit institutions in that they only have the privilege to receive deposits from the general public and based on them they grant loans, which the bank does daily.

Local and foreign natural and legal persons can establish a bank in RNM. The creation of a bank will be entered in the judicial register based on authorization. In addition to the requirements for the approval of the founders of the bank, other documents such as the bank charter, the necessary sources of capital, a detailed description of the work to be performed by the bank and a plan to perform these tasks are also attached. Planned financial statements for the next five years, names of all members of management, supervisory boards and information about their level of education and professional qualifications. The basic documentation which will be able to determine that the bank related to employees, organization, structure, as well as technical conditions to be able to carry out activities for which the request was made. In addition, a documentation that contains the description of accounting support, software, organization of internal control, auditing and risk assessments, etc.

Source and type of data

The method of providing data is from existing sources, the statistical data published by the Central Bank of North Macedonia and their number is for each bank in particular. The Central Bank of North Macedonia is responsible for keeping records of all banks operating in the Republic of North Macedonia, it is logical to use its data. In this case, an institution that brings together related information for the entire banking system, made the publication available to interested users for further analysis.

[1]*Gregurek M.* , Vidaković N.: *Bankarsko Poslovanje* , RRIF plus doo., Zagreb, 2011. Pg. 10.
[2]Salko D., Dhuci O.: *Banking Management* , Tirana, 2005.

Concentration coefficient

The concentration coefficient shows the share r of the largest participants in the overall market being analyzed. It represents the most widely used measure of concentration. The intent of the model is for all market values to be sorted by size from largest to smallest.

$$x_1 \geq x_2 \geq \cdots \geq x_i \geq \cdots \geq x_n$$

The concentration coefficient is calculated based on the formula:

$$C_r = \frac{\sum_{i=1}^{r} x_i}{\sum_{i=1}^{n} x_i}$$

the number n represents the number of participants in the market, r represents the largest number of participants for which the concentration coefficient is calculated, while xi represents the occurrence of individual values. The value of the concentration coefficient each time moves to the given limit

$$\frac{1}{n} \leq C_r \leq 1$$

If all the values in between are equal, then the concentration coefficient takes the value 1/n. In that case, if all values except one are equal to zero, then the concentration coefficient has a value of 1. Then we will have the largest possible coefficient. This indicates that one participant controls the entire market.

In practice, the concentration coefficient is mostly used for the four, eight and twelve largest representatives in the market.

Herfindahlov index

The concentration coefficient takes most of the representatives in the market, but from it we cannot see how the production ratio is between the largest ones. If the concentration coefficient is calculated for the four largest participants, their share in the overall market will be obtained, but it cannot be concluded whether the work is done for the four participants with an equal share or there are also other small participants and to grow. Hence, market power is measured with the Herfindahlov index.

The Herfindahlov index is the most well-known index in the concentration industry. Its use in practice is more frequent, but its use is more necessary for decisions on mergers and acquisitions of market participants. It is about the decisions on whether the increase in market concentration will be allowed or whether there will be an attempt to prevent it.

The Herfindahlov index is calculated as the sum of the squares of the market participants.

$$H = \sum_{i=1}^{n} p_i^2$$

From which *pi* represents the share of each participation in the market. The value of the Herfindahlov index moves in the range

$$\frac{1}{n} \leq H \leq 1$$

If the distribution of the values is the same, the Herfindahlov index accepts the values 1/n, until the value 1 means the maximum concentration when one participant generally controls the market.

Since the calculation of the Herfindahlov index includes all market participants, this index provides better information about the concentration coefficient. It gives more importance to the participants with a larger part than those in the calculation which are squared.

The Gini coefficient and the Lorenzo curve

We assume that the calculation of the Giniev coefficient is with the values from which it measured the concentration of values ordered by size.

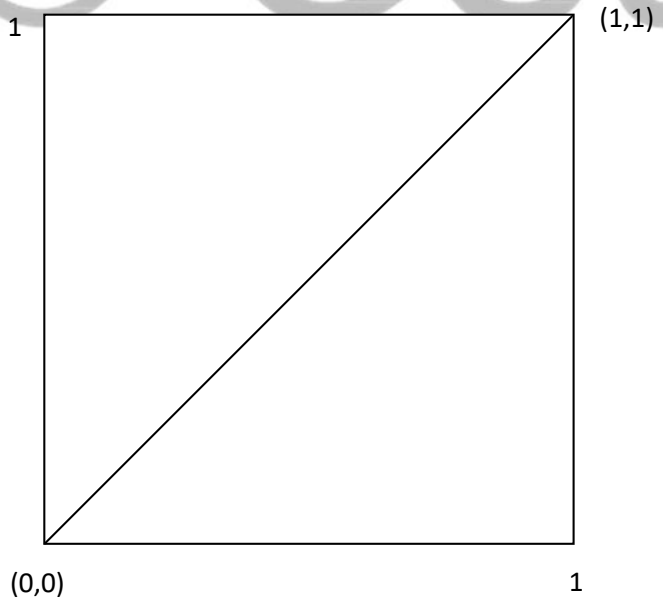
$$x_1 \le x_2 \le \cdots \le x_i \le \cdots \le x_n$$

From the array of data, the coefficient can be calculated according to the formula

$$G = \frac{2\sum_{i=1}^{n} i x_i - (n+1)\sum_{i=1}^{n} x_i}{n\sum_{i=1}^{n} x_i}$$

The Lorenz curve is also related to the Giniev coefficient,which is represented graphically in a square where the diagonal is drawn between the points (0,0) and (1,1).

Figure 1. Lorenz cube



The Lorenz curve and the Giniev coefficient are related, so the Giniev coefficient can be derived from the Lorenz curve.

Lernerov index

The Romanian economist Abba Ptachya Lerner [3](1903-1983) wanted to measure the power of the market only in the microeconomic aspect. So he developed a model in which he used only microeconomic variables, price and marginal cost.

The Lernerov index is calculated based on the formula:

$$I = \frac{P_A - MC}{P_A}$$

Where P_A is the price of production *A*, while *MC* is the marginal cost of the firm that produces production *A.*

Hall –Tidemanov index and Rosenbluthov index

Hall-Tidemanov index and Rosenbluthov index emphasize the absolute importance of the number of financial institutions in the market. The importance of including the absolute number of participants in the market stems from the fact that the number of participants in the market can be partially explained by the possibility of new participants entering the market. Both of these models assume that entering the market is easy even though the number of participants in the market is large, but in a market where the number of participants is small, penetration is difficult.

The Hall-Tidemanov concentration index is calculated with this formula:

$$HTI = \frac{1}{2\sum_{i=1}^{n} is_i - 1}$$

Where *si* represents the market share of financial institutions, *n* represents the number of participants in the market, while *i* represents the rank it belongs to. Rank 1 is won by the largest participant in the market, where the smallest wins rank *n* .

[3]http://www.economyprofessor.com/theorists/abbalerner.php

The Hall-Tidemanovog index takes the values of 0 and 1. The value 0 indicates that the market has an indefinite number of financial institutions that are the same in size, while the value 1 indicates an exact monopoly.

The Rosenbluthov concentration index is calculated in the same way as the Hall-Tidemanov index, the difference is that here the participants are ranked from the smallest to the largest.

The formula for calculation is:

$$RI = \frac{1}{2\sum_{i=1}^{n} js_i - 1} \qquad j = n, n-1, ..., 2, 1$$

Where *si* represents the market share of financial institutions, *n* represents the number of participants in the market, while *j* represents the corresponding rank. Rank 1 is won by the smallest participant in the market, where the largest one wins rank *n* . In the Rosenbluht index, the number of small participants is mainly affected .

Comprehensive index of industrial concentration

Some indicators of industrial concentration emphasize the role of the largest and dominant participants, as well as their influence on the market, ignoring other participants who operate and can influence the change in the market structure. Also, some other indicators underestimate the importance of the largest companies in the industry .

The comprehensive index of industrial concentration also shows the relative distribution, and the absolute number of companies.

Calculate according to the formula:

$$CCI = s_1 + \sum_{i=2}^{n} s_i^{\,2}\left(1 + \left(1 - s_i\right)\right)$$

The first element, s_1, represents the largest share of companies and is subtracted from the sum obtained by adding the parts of the products of the share *of companies and the* multiplier representing a proportional share of other companies in the industry. The full index of industrial

concentration ranges from 0 to 1. It takes the value 1 in the case of pure monopolies . This index is suitable for analyzing the market where we can distinguish the existence of different groups of financial institutions. On one side is one of the dominant institutions (banks), while the other group consists of other institutions in the market (other banks).

Entropy measure

The measure of entropy is an indicator that is often used to calculate concentration in a particular industry.

Calculate according to the formula:

$$E = -\sum_{i=1}^{n} s_i \log_2 s_i$$

Unlike most other indices that range from 0 to 1, the value of the E index ranges from 0 to log2n. The value of entropy is the inverse of the degree of concentration in the industry, therefore it takes the value 0 in the case of monopoly, and the value of log2n, when the market share of all companies is equal, and the concentration is smaller. Interestingly, unlike other indicators that do not give any importance to companies with a very small market share (less than 1%), the entropy measure gives relatively more importance only to small companies.

Characteristics of small and medium banks in the Republic of North Macedonia

Based on this analysis, as a banking criterion we will have the size of the assets which the Bank of Macedonia has defined in the publications of its official website. Banks are compared for different purposes. For the development and performance of the bank, models are applied, standards that present motivation for the models, which are flexible and adapt to specific points for their interest.

Table: 1. Number of banks and their classification according to the size of balance assets

	Totally	**Classification by asset (in MKD)**		
		Small banks	Medium banks	Big banks
year	Number of banks	A<11,000,000	11,000,000<A<44,100,000	A>44,100,000
2021	13	3	5	5

Source: Central Bank of Macedonia, 2021.

Banks of North Macedonia which are classified with assets less than 11 million denars are considered small banks. While other banks are classified as follows:

- banks with assets between 11 million and 44.1 million denars ,
- large banks - with assets over MKD 44.1 million .

Table: 2. Overview of banks by size on 31.12.2021.

	Big banks		**Medium banks**		**Small banks**
1.	Commercial Bank	1	ProCredit Bank	1	TTK Bank
2.	Stopanska Banka	2	UNI Bank	2	Silk Road Bank
3.	NLB Bank	3	RBSM Bank	3	Capital Bank
4.	Shparkasse Bank	4	Stopanska Banka Bitola		
5.	Halk Bank	5	Centralna Cooperative Banka		

Source: Central Bank of North Macedonia, 2021.

At the end of 2021, a total of 15 credit institutions operated in the Republic of North Macedonia: 13 banks and 2 savings banks, which according to their specification are a separate group. The

banks of North Macedonia in recent years have been characterized by varying success and the intervention of foreign banks in the Macedonian financial market. Currently, foreign capital is present in the ownership structure of 13 Macedonian banks, of which three banks (NLB Banka, TTKBanka, ProcreditBanka) are entirely with foreign capital .

The entry of foreign banks into the banking market in Macedonia generally shows a number of economic benefits: the transfer of know-how, the special knowledge of managed banks, the strengthening of competition, which leads to the introduction of new financial services at lower prices than existing financial services and to increase resources that can stimulate economic growth.

North Macedonia's banking sector has grown at a rapid rate in recent years. However, this growth rate of development cannot be compared with other countries in transition and the countries of the European Union since this rate is still low. This has come as a result of the significant increase of foreign owners in the country's banks. The growth of foreign banks in the country is a consequence of the European integration process, which has encouraged EU banks to see countries in transition as a future part of the market.

The comparative analysis with other countries in transition shows that the banking sector of North Macedonia has lagged behind in the process of bank consolidation. In the group of 13 countries in transition, Macedonia (after Slovenia) has the largest number of banks in terms of population. On the other hand, if the ratio of foreign banks to the total number of banks in North Macedonia is 14, then the banking sector needs to attract more foreign investors . If we look at the ownership structure of the Macedonian banks, we see that the owners of the biggest banks in North Macedonia are the partners that are traditionally connected with commercial and political affairs from the countries of Bulgaria, Greece and Turkey. The entry of foreign capital is particularly important to strengthen competition and achieve greater efficiency.

Bank assets

The total asset of the banking system in the Republic of North Macedonia at the end of 2021 is 638,666 million denars. Compared to the previous year, all banks operating in the Republic of North Macedonia have recorded an increase in total assets of 17%.[4]

Table: 3. Statement of assets for each bank in particular as of 31.12.2021.

The Name of the Bank	**Assets (000 denars)**
Komercijalna Banka	148,587
Stopanska Banka	114,103
NLB Bank	107,943
Shparkasse Bank	73,580
Halk Bank	72,825
ProCredit Bank	39,455
UNI Bank	23,985
RBSM Bank	14,498
Stopanska Banka Bitola	12,016
Centralna Cooperative Banka	11,448
TTK Bank	9,160
Silk Road Bank	7,896
Capital Bank	3,169
in total	**638,666**

Source: Central Bank of North Macedonia

[4]Financial reports of the Central Bank of North Macedonia 2021.

Concentration coefficient

Banking concentration can be measured in different ways. In this paper, we will use the concentration coefficient measured by the assets of banks operating in the Republic of North Macedonia. Where as part of the concentration coefficient we will calculate: C_4, C_8, and C_{12}.

The analysis shows the following results:

Table: 4. Concentration coefficient from the annual reports of banks in RMV as of 31.12.2021.

Name of banks	Assets (000 denars)	Parts in the market	Concentration coefficient
Komercijalna Banka	148,587	23.26%	23.26%
Stopanska Banka	114,103	17.86%	41.12%
NLB Bank	107,943	16.90%	**58.02%**
Shparkasse Bank	73,580	11.52%	69.54%
Halk bank	72,825	11.40%	80.94%
Prokredit bank	39,455	6.17%	**87.11%**
UNI banka	23,985	3.76%	91%
RBSM Bank	14,498	2.27%	93%
Stopanska Banka Bitola	12,016	1.88%	95%
Centralna Cooperative Banka	11,448	1.79%	97%
TTK Bank	9,160	1.43%	**98%**
Silk Road Bank	7,896	1.24%	99%
Capital Bank	3,169	0.50%	100%
in total	**638,666**	**100.00%**	

Source: By the author of the paper taking the data from the annual reports of 2021 from each bank in particular

Taking into account the above criteria, the largest bank in the banking system of North Macedonia is KomercijalnaBanka, which holds 23.26 % of total market assets, and if the second largest bankStopanska Banka, is added to it, they present 41, 12 % of total assets. The three largest banks hold 58.02 % of assets, and the first four banks in terms of size represent 69.54% of the participation in the banking system. The concentration coefficient of C_8 is 86.59 % and 95.70 % C_{12}.

Based on this data, it can be concluded that the banking system of North Macedonia is highly concentrated. Medium and small banks hold a very small part of the banking system, the largest share of the market is in the hands of the group of large banks.

Some authors [5]consider the market in which the four largest players control more than 40 % of the market to be an oligopolistic market. As in North Macedonia, four banks control 68.67 % of the market, it can be concluded that this is the case in the banking market of North Macedonia.

Herfindahlov index

There are 13 banks operating in the banking system of North Macedonia, the Herfindahlov Index should be between 1/13 and the value 1 or between 0.0625 and 1.

Table: 5. Herfindahlov index on 31.12.2021.

The Name of the Bank	Assets (000 denars)	Part in the market	HHH
Capital Bank	3,169	0.00	0.00
Silk Road Bank	7,896	0.01	0.00
TTK Bank	9,160	0.01	0.00
Centralna Cooperative Banka	11,448	0.02	0.00
Stopanska Banka Bitola	12,016	0.02	0.00
RBSM Bank	14,498	0.02	0.00
UNI Bank	23,985	0.04	0.00
ProCredit Bank	39,455	0.06	0.00
Halk Bank	72,825	0.11	0.01
Shparkasse Bank	73,581	0.12	0.01
NLB Bank	107,943	0.17	0.03
Stopanska Banka	114,103	0.18	0.03
Komercijalna Banka	148,587	0.23	0.05
in total	**638,666**		

Source: From the author of the paper taking the data from the annual reports to 2021 from each bank in particular

From the calculation, we obtained the Herfindahlov index with a value of 0.13. Comparing it with the values of the interval in which it can move, we can come to a conclusion that the concentration of banks in the Macedonian banking system tends towards a not too high of a concentration.

[5]McConell, CR, Brue, SL(1996) Microeconomics – Principles, Problems and Policies, MsGraw – Hill inc., London

Giniev's coefficient and Lorenzo's curve

Table: 6. Ginievcoefficient

The Name of the Bank	Assets (000 denars)	The	i*xi
Capital Bank	3,169	1	3,169
Silk Road Bank	7,896	2	15,792
TTK Bank	9,160	3	27,480
Centralna Cooperative Banka	11,448	4	45,792
Stopanska Banka Bitola	12,016	5	60,080
RBSM Bank	14,498	6	86,988
UNI Bank	23,985	7	167,895
ProCredit Bank	39,455	8	315,640
Halk Bank	72,825	9	655,425
Shparkasse Bank	73,580	10	735,800
NLB Bank	107,943	11	1,187,373
Stopanska Banka	114,103	12	1,369,236
Komercijalna Banka	148,587	13	1,931,631
in total	**638,665**		

Source: From the author of the paper taking the data from the annual reports to 2021 from each bank in particular

Based on the data from table 1.1. the Giniev coefficient can be calculated through the formula:

$$G = \frac{2\sum_{i=1}^{n} ix_i - (n+1)\sum_{i=1}^{n} x_i}{n\sum_{i=1}^{n} x_i}.$$

We have gained:

$$G = \frac{2 \cdot 4756433 - 17 \cdot 369506}{16 \cdot 369506}$$

In the end the result is:

$$G = 0.54655$$

The Giniev coefficient takes values between 0 and 1, where 0 represents perfect distribution in the market, while the value 1 represents complete concentration (the situation in which one participant controls the entire market), we can conclude that the NorthMacedonian banking system is partially concentrated.

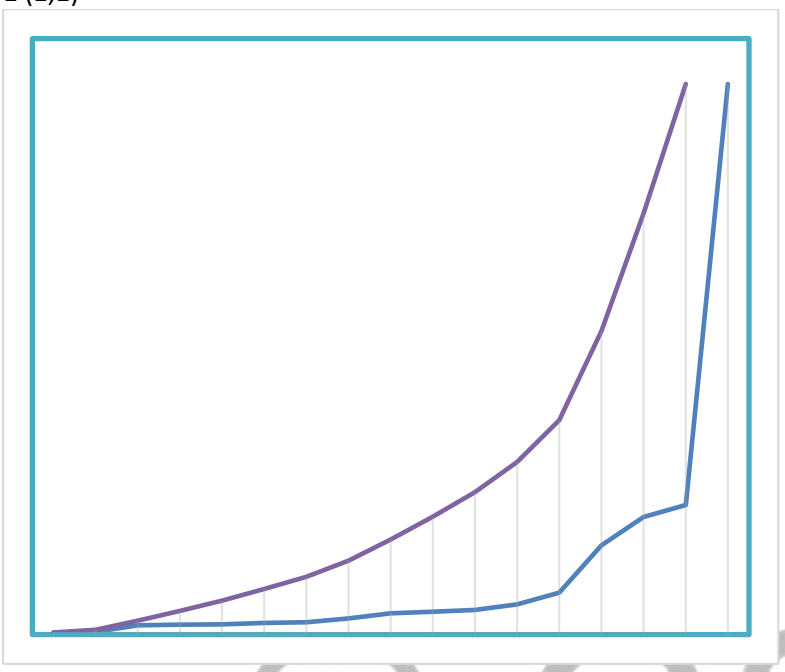
Table: 7. Lorenzo's curve

The Name of the Bank	**Assets (000 denars)**	**of**	**Cumulative number of banks**	**Cumulative assets**	**Cumulative percentage of banks**
Capital Bank	3,169	1	0.076923077	3,169	0.50%
Silk Road Bank	7,896	2	0.153846154	11,065	1.24%
TTK Bank	9,160	3	0.230769231	20,225	1.43%
Centralna Cooperative Banka	11,448	4	0.307692308	31,673	1.79%
Stopanska Banka Bitola	12,016	5	0.384615385	43,689	1.88%
RBSM Bank	14,498	6	0.461538462	58,187	2.27%
UNI Bank	23,985	7	0.538461538	82,172	3.76%
ProCredit Bank	39,455	8	0.615384615	121,627	6.18%
Halk Bank	72,825	9	0.692307692	194,452	11.40%
Shparkasse Bank	73,580	10	0.769230769	268,032	11.52%
NLB Bank	107,943	11	0.846153846	375,975	16.90%
Stopanska Banka	114,103	12	0.923076923	490,078	17.87%
Komercijalna Banka	148,587	13	1	**638,665**	23.27%
in total	**638,665**				**100%**

Source: From the author of the paper taking the data from the annual reports to 2021 from each bank in particular

Based on the calculation of the table above, the Lorenzo curve is presented graphically.

Figure: 2. Lorenzo curve



The Lorenzo curve has the same conclusion as the Giniev coefficient. Considering that the Lorenz curve is very far from the diagonal and has a considerable concentration.

Lernerov index

The Lernerov index is calculated from economic variables: price and marginal costs. Considering that the banking system is a specific sector which does not have products in the classical sense, it is not easy to define what is the price and what is the marginal cost.

We assume that the main function of every bank is to accept deposits and grant loans, which is also the most important function of every bank. The bank accepts deposits and pays interest rates for their acceptance. It is about passive interests which are calculated based on the interest rate of the passive. It is always lower than the asset's interest rate, which the bank calculates on the basis of granting loans. The interest rate of the asset can be calculated as a price based on which it is. The price of the loan is the interest rate that is paid. On the other hand, the interest rate of the liability can also represent the marginal cost which for the bank is a waste because the interest rate of the liability must be paid to the client from whom it borrowed money.

Because every Macedonian bank has variable interest rates for the needs of this paper, the average interest rate for 2021 was taken, which was published by the Bank of North Macedonia.[6]

The interest rate calculated on the loans with the currency clause for 2021 was 8.5% [7]. Considering that all Macedonian loans are given with the currency clause, this data can be used as relevant data for the entire market.

The average interest rate paid for deposits in 2021 was 5.1% [8].

Since both data are referred to as a percentage, we can present the following formula:

$$I = \frac{P_A - MC}{P_A}$$

$$I = \frac{8{,}5\% - 5{,}1\%}{8{,}5\%} = 0{,}4$$

[6]Central Bank of North Macedonia
[7]Financial Stability Report, 2020
[8]Financial Stability Report, 2020

The Lernerov index for the banking market of North Macedonia is 0.4. The space in which it moves is from zero to infinity, where zero represents a perfect distribution, corresponding to the minimum concentration. The index value of 0.4 indicates a low concentration of the banking system in North Macedonia.

Hall –Tidemanov index and Rosenbluthov index

The Hall-Tidemanov concentration index is calculated based on the number of banks and their market share, as detailed in the text above.

Table: 8. Calculation of the Hall-Tidemanov index

The Name of the Bank	Market share (as)	of	how
Komercijalna Banka	0.23	1	0.23
Stopanska Banka	0.18	2	0.36
NBL Bank	0.17	3	0.51
Shparkasse Bank	0.12	4	0.48
Halk Bank	0.11	5	0.55
ProCredit Bank	0.06	6	0.36
UNI Bank	0.04	7	0.28
RBSM Bank	0.02	8	0.16
Stopanska Banka Bitola	0.02	9	0.18
Centralna Cooperative Banka	0.02	10	0.2
TTK Bank	0.01	11	0.11
Silk Road Bank	0.01	12	0.12
Capital Bank	0.00	13	0
in total			**3.5400**

Source: From the author of the paper taking the data from the annual reports to 2021 from each bank in particular

In the formula:

$$HTI = \frac{1}{2\sum_{i=1}^{n} is_i - 1}$$

by substituting the data you get:

$$HTI = \frac{1}{2 \cdot 3.5400 - 1} = 0{,}16447$$

In relation to a range of 0 to 1, the score of 0.16447 indicates the low concentration of the banking system of North Macedonia.

The Rosenbluthov index is calculated in the same way as the Hall-Tidemanov index, except that it starts from the bank with the smallest part.

Table: 9. Calculation of the Hall-Tidemanov index

The Name of the Bank	**Share on the market**	**of**	**like**
Capital Bank	0.00	1	0.00
Silk Road Bank	0.01	2	0.02
TTK Bank	0.01	3	0.03
Centralna Cooperative Banka	0.02	4	0.08
Stopanska Banka Bitola	0.02	5	0.1
RBSM Bank	0.02	6	0.12
UNI Bank	0.04	7	0.28
Pro Credit Bank	0.06	8	0.48
Halk Bank	0.11	9	0.99
Shparkasse Bank	0.12	10	1.2
NLB Bank	0.17	11	1.87
Stopanska Banka	0.18	12	2.16
Komercijalna Banka	0.23	13	2.99
in total			**10.32**

Source: From the author of the paper, taking data from the annual reports of 2021 from each bank in particular

By substituting the formula:

$$RI = \frac{1}{2\sum_{i=1}^{n} js_i - 1} \qquad j = n, n-1, ..., 2, 1$$

the Rosenbluthov index is calculated $RI = \frac{1}{2 \cdot 10.3377 - 1} = 0{,}005082$

The Rosenbluthov index shows the low level of concentration in the banking system of North Macedonia. This calculation result is different from the concentration index.

Comprehensive index of industrial concentration

The comprehensive index of industrial concentration takes into account the number of banks in the market and their market share, and based on that data indicates the degree of concentration.

Table: 10. Calculation of the comprehensive index of industrial concentration

The Name of the Bank	**Assets (000 denars)**	**like**	**as^2**	**as^2(1+(1-as))**
Komercijalna Banka	148,587	0.23	0.0529	0.093633
Stopanska Banka	114,103	0.18	0.0324	0.058968
NBL Bank	107,943	0.17	0.0289	0.052887
Shparkasse Bank	73,580	0.12	0.0144	0.027072
Halk Bank	72,825	0.11	0.0121	0.022869
ProCredit Bank	39,455	0.06	0.0036	0.006984
UNI Bank	23,985	0.04	0.0016	0.003136
RBSM Bank	14,498	0.02	0.0004	0.000792
Stopanska Banka Bitola	12,016	0.02	0.0004	0.000792
Centralna Cooperative Banka	11,448	0.02	0.0004	0.000792
TTK Bank	9,160	0.01	0.0001	0.000199
Silk Road Bank	7,896	0.01	0.0001	0.000199
Capital Bank	3,169	0.00	0	0.000000
in total	**638,666**			**0.174690**

Source: From the author of the paper taking the data from the annual reports to 2021 from each bank in particular

To calculate the comprehensive industry concentration index, the last aggregated column must be substituted into the formula.

replace in

$$CCI = s_1 + \sum_{i=2}^{n} s_i^{\,2}\left(1 + \left(1 - s_i\right)\right)$$

won

$$CCI = 0{,}23 + 0{,}174690 = 0{,}40469$$

The range of values in which the comprehensive concentration industry index can move is from 0 to 1. The index value of 0.40469 shows the average concentration of the banking system of North Macedonia.

Entropy measure

Unlike other indicators, the entropy measure gives the greatest importance to banks with the smallest market share.

Table: 11. Calculation of entropy measure

The Name of the Bank	Assets (000 denars)	like	log(2) as	as*log(2)as
Capital Bank	3,169	0.004962	-7.6548879	-0.037982886
Silk Road Bank	7,896	0.012363	-6.3377936	-0.078355974
TTK Bank	9,160	0.014342	-6.123568	-0.087826768
Centralna Cooperative Banka	11,448	0.017925	-5.8018919	-0.103998275
Stopanska Banka Bitola	12,016	0.018814	-5.7320308	-0.107843833
RBSM Bank	14,469	0.0227	-5.4611336	-0.123970336
UNI Bank	23,985	0.037555	-4.734855	-0.177817006
ProCredit Bank	39,455	0.061777	-4.0167793	-0.248145787
Halk Bank	72,825	0.114027	-3.1325537	-0.357195435
Shparkasse Bank	73,580	0.115209	-3.1176738	-0.359184297
NBL Bank	107,943	0.169013	-2.5647897	-0.433484056
Stopanska Banka	114,103	0.178659	-2.4847227	-0.443917093
Komercijalna Banka	148,587	0.232652	-2.1037515	-0.489443015
in total	**638,665**			**-3.049164762**

Source: From the author of the paper taking the data from the annual reports to 2021 from each bank in particular

Based on the data from the table, with substitution in the formula: $E = -\sum_{i=1}^{n} s_i \log_2 s_i$

the measure of entropy is calculated: $E = 3{,}049164762$

The entropy value ranges from 0 to $log_2 n$, in our case from 0 to $log_2 13$. The value of the entropy measure of 3.049164762 shows the low level of concentration of the banking system of North Macedonia.

Conclusions

Banks, due to their role, are extremely important in the economy and under the direct supervision of the Central Bank, which supervises, controls, protects the competition between them. In this context, it is necessary to continue and improve the legal framework. The Sensitive Regulation is part of the general concept of banking control.

A stable and efficient financial system is a prerequisite for the successful mobilization and allocation of financial savings in economically sustainable projects and as a consequence the sustainable growth of the economy in general .

Concentration indicators in the Macedonian banking sector show that the banking market is moderately concentrated. The largest banks hold a significant share of the market, but due to the participation of 13 banks, the concentration of market concentration is not very high. Some indicators point to a high concentration, while some to a lower concentration. Therefore, in general, the concentration of the Macedonian banking market can be assessed as average. Medium and small banks hold a very small part of the banking system, while the majority is in the hands of large banks.

Conclusions and recommendations

The project describes, compares and analyzes the banking system in the Republic of North Macedonia for 2021.

The banking sector in 2021 faced a number of challenges, but showed adequate readiness to respond to risks. In the conditions of the strong health and economic crisis, the banking system has maintained stability and contributed to mitigating the consequences of the crisis, achieving a solid increase in activities. This, on the one hand, is the result of citizens' trust in the banking system, in terms of liquidity with the banks, but on the other hand, it also comes from the quick response of the People's Bank.

In general, the banking system is sound, stable and well consolidated, with the capacity to withstand a series of shocks, including the negative effects of crises. The good condition and strong liquidity and capacity positions of local banks show a sufficient potential for absorbing possible losses, but also for providing credit support for individuals and companies. The People's Bank is closely following all developments and is ready to take all the necessary measures within its competence, to overcome the consequences of crises more easily and to maintain the stability of the banking system.

The Banking System has an irreplaceable role in providing financial assistance to the private sector and promoting economic growth. Thus, the banking system allows more efficient financing of private entities, resulting in increased investments for companies and higher consumption for family economies.

Currency transformation and term deposits contributed to lower interest expenses on banks' balance sheets, but they still made it difficult to manage liquidity risk and imposed the need for higher prudence, in fact maintaining a higher volume of liquid assets, which are less efficient.

As a recommendation, it can be said that what needs to be improved the most in our banks is their credit risk management method, since we still have banks that use traditional methods. The improvement of these methods will lead to the reduction of time for analyzing applications, the reduction of errors that may occur as a result of the human factor, the reduction of their expenses for bad loans, the increase of profitability as well as the increase of localinternal production.

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