PANDEMIC CRISIS AND ITS EFFECTS ON BULGARIAN BANKING SYSTEM'S EFFICIENCY

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Abstract: *The economies are once again facing the challenges of another crisis related to the spread of coronavirus in 2020. The banking sector, being one of the main intermediaries in the economies, is also affected by the spread of the new crisis, which is different compared to the previous crises such as the global financial crisis in 2008 and the European debt crisis in 2012-2013. Still, the banking sector in Bulgaria suffers from the pandemic crisis due to decelerated growth rate of loans, provided to households and non-financial enterprises, as well as declining profits related to the narrowing spread between interest rates on loans and deposits. The pandemic crisis, which later turned into an economic one, is having a negative impact on the efficiency of the banking system. To prove the negative impact of the pandemic crisis on the efficiency of banks, the non-parametric method for measuring the efficiency, the so-called Data envelopment analysis (DEA), is used.*

Keywords: *Banks, Loans, Deposits, Efficiency.*

1. INTRODUCTION

Economies have once again faced the challenges of a new crisis – pandemic crisis, triggered by the spread of a new virus, the so-called COVID-19. The new crisis is different compared to the previous crises, which we have seen in the last two decades: the global financial crisis in 2008 and the European debt crisis in 2012-2013. Still, all the crises had their negative consequences on the economic development of the countries on a global scale. The banking sector also suffered from the negative effects of the coronavirus pandemic. It is one of the main intermediaries in most of the countries, accumulating free financial resources and providing them to sectors that are short of funds. The role of the banks increases in case of the pandemic crisis as they could help countries to overcome the recession faster. The banks are not responsible for the pandemic crisis, as it was the situation in the global financial crisis in 2008.

The banking sector in Bulgaria is also the main financial intermediary in the economy. Its assets accounted for about 105% of GDP as of the end of 2020. Thus, the analysis of the banking sector's performance and their efficiency is an important research problem.

The research aimed to analyse the effect of the coronavirus pandemic on the Bulgarian banks' efficiency. The study defends the hypothesis that the banking system in Bulgaria suffered from the pandemic crisis in terms of its efficiency as it reported decelerated growth rates of loans, provided to households and non-financial enterprises. The intermediation role of the banking sector was limited. Still, the banking sector succeeded to withstand the negative effects of the coronavirus pandemic because they entered the crisis much better prepared compared to the period of the global financial crisis in 2008-2009, having a much higher capital base and liquidity position. The new institutional and regulatory reforms in the last decade helped the banking system to alleviate the negative effects of the pandemic crisis.

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To measure the effect of the pandemic on the Bulgarian banking system, the non-parametric approach Data Envelopment Analysis (DEA) is used.

The research contributes to the economic literature in two ways. First, the existing studies concentrate on the analyses of certain indicators. No studies are investigating the effect of the pandemic crisis on the banking system's efficiency measured by the complex indicator for efficiency such as technical efficiency, obtained by the DEA approach. Secondly, the effects of the coronavirus crisis on the development and performance of the banking sector, in the particular Bulgarian banking sector was not investigated that much.

The study is structured as follows. The first part presents the aim of the study, as well as the hypothesis tested. The next part makes a review of the literature on the research topic. The third part presents the methodology and the data used for the purpose of efficiency measurement. The fourth part analyses the obtained results on the Bulgarian banking system's efficiency. The final part concludes.

2. REVIEW OF THE LITERATURE

The financial system and banking sector respectively are closely related to economic development. The observed shocks in aggregate demand or supply could be transmitted directly to the financial system. The small and medium sized banks, having low capital positions and worse liquidity, are most vulnerable to the negative effects of crises, in particular the coronavirus pandemic crisis. (ECB, 2020).

The increasing risks and decreasing revenues for the German banks in terms of the coronavirus crisis were investigated by Strietzel et all. (2020). Mihaylova-Borisova (2020) analysed the banking sector in Bulgaria in terms of pandemic crisis through analyses of the traditional indicators such as ROA, ROE, capital adequacy, non-performing loans.

Giese and Haldane (2020) analysed the effect of the coronavirus crisis on the financial system, in particular the banking system. They concluded that the financial system was better prepared for the pandemic, caused by the COVID-19, than for the global financial crisis.

Tyson (2020) studied the effect of COVID-19 on Africa's banking system. The researcher pointed out the worsened economic outlook for Africa, which would affect the banking sector's performance. The regulators have undertaken steps to sustain the financial stability, reducing the risk for banking system failure. However, the stability of Africa's banking system is threatened as non-performing loans were at a high level of 11% as of end-2019, tending to increase in the future.

Tobias and Natalucci (2020) stressed that the banking system has more liquidity and capital base as compared to the period of the global financial crisis, placing it at a better position than ten years ago. Still, there was a risk in front of banks as the economic downturn and financial resources outflows could be much severe than it was expected and anticipated.

Economics Observatory (2020) defined several channels of influence of the coronavirus crisis on the development of the banking sector. First of all, the households and enterprises lose a lot of incomes and revenues, which lead to repayments of the granted loans by banks. Thus, the

net profits and efficiency, measured by the return on assets (ROA) and return on equity (ROE) decrease. Secondly, the pandemic crisis leads to a decrease in prices of financial instruments, which generates a loss for banks. Thirdly, the decelerated economic growth rates in terms of pandemic crisis leads to lower number of transactions. Finally, some positive effects could be observed in terms of faster digitalization of services and products, offered by banking system. It has also been analysed by EY (2020), showing the positive effects of digitalization in the banking sector due to changing consumer expectations.

The existing studies on the effect of the coronavirus pandemic crisis were concentrated on the expected channels of influence on the banking system. In addition, the more traditional approaches to the analyses have been used. So, the study will fill the gap in the literature by using more sophisticated method for bank efficiency measurement, transforming several inputs and outputs in one coefficient for the banking system's efficiency.

3. METHODOLOGY AND DATA USED

To measure the banking system's efficiency, a non-traditional approach – non-parametric method Data Envelopment Analyses (DEA) is used. The choice of the method is supported by the fact that it is one of the most commonly used methods for measuring the efficiency of banks (Efendic (2011), Kumar, Gulati (2008), Pawtowska (2005), etc.), and by the fact that it is also applied to small data sets of production units. At the end of 2020, there were 24 banks.

3.1. Methodology

The DEA is a linear programming method, which measures the efficiency of a specific production unit (Decision-making unit – DMU) in comparison with the remaining units, included in the sample. The method is based on the determination of a production frontier, based on the most efficient decision-making units. The efficiency of the remaining units, which do not lie on the production frontier, is measured relative to the most efficient units (Loukoianova (2008), pp. 26).

The method DEA is introduced by Farrell (1957) and further developed by Charnes at all. (1978). They included several inputs and outputs in the model. The DEA approach has been applied for non-profit organizations such as hospitals, universities, municipalities, but later it has been applied for profit institutions, including banks.

The non-parametric method DEA is appropriate to be applied for small sample of production units. It does not depend on the form of the production frontier, which could be Cobb-Douglas, Translog production frontier, etc. However, it depends on the extreme observation and the deviation from the production frontier could be due to the inefficiency or to the random error (Mihaylova-Borisova, 2015).

The DEA approach had two forms. On the one hand, the DEA is output-oriented i.e. the production units minimize inputs in order to produce a certain level of outputs. On the other hand, the DEA is input-oriented i.e. the production units maximize outputs in order to produce a certain level of inputs.

The production frontier of a production unit, having one output and one input, could be presented as follows (Figure 1):

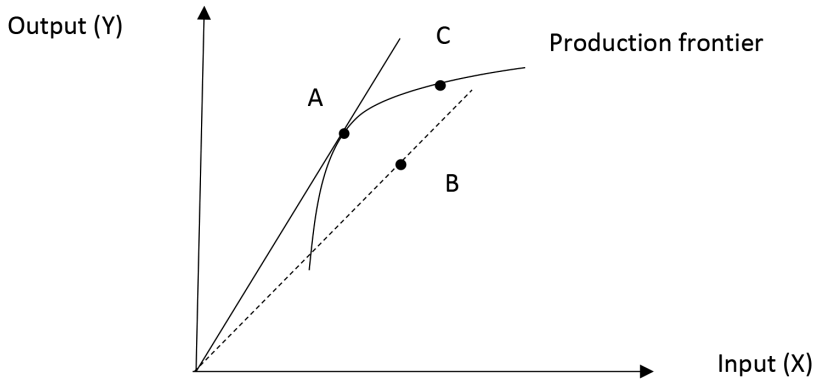

Figure 1. Production frontier of production unit
Sources: Mihaylova-Borisova, 2015; Nenovsky, Mihaylova, Ivanov, 2008

The production frontier includes all points, having a maximum output at given input. The production unit is technically efficient when it lies on the production frontier – point A. When the production unit lies below the production frontier it is not technically efficient, for example, point B, as it could produce higher output at a given input factor. Production unit at point A produces at the maximum level of productivity (Coelli, Rao, O'Donnell and Batesse, 2005) and the so-called technologically optimal scale of production, using the scale of production. The production unit at point C is technical efficiency, but its productivity is not at the maximum level. At point C the production unit works at decreasing scale of production so its works at a variable return to scale.

3.2. Data Used

To calculate the technical efficiency of banks in Bulgaria, the software DEAP 2.1 is used (Coelli, 1996). Among the available approaches for defining the inputs and outputs (production approach, intermediation approach, asset approach, user-cost approach, and value-added approach), the intermediation approach is applied. The most used approach for defining outputs and inputs is the intermediation approach, especially when the banks mainly attract deposits and give loans to the economic agents in the economy (Andries, Cocris, 2010). Thus, for the purpose of the current study, an intermediation approach is applied.

According to the intermediation approach, three inputs are defined: labour, capital and attracted deposits, and two outputs: loans and securities. As a measure for labour administrative expenditures are applied[2], while as a measure of capital – material and non-material assets are used. The study period is 2004-2020 and aims to cover several years before the global financial crisis in 2008 and 2020 when the pandemic crisis occurred. The descriptive statistics of inputs and outputs are presented in Table 1.

Table 1. Inputs and outputs, descriptive statistics

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Number of banks	35	34	32	29	30	30	30	31	31
Loans									
Average	394440	540562	711580	1548241	1859127	1925964	1947257	1947778	1998356
Standard Deviation	507421	696715	867638	1847564	2367974	2443047	2364508	2388985	2435597

[2] The administrative expenditures are applied instead of number of employees due to a lack of the public data for employees by banks (Nenovsky, Mihaylova, Ivanov, 2008).

Securities									
Average	108846	139198	150235	153223	148919	134980	167142	177905	236996
Standard Deviation	209920	221494	215534	223632	219574	182355	222287	230938	272166
Material and non-material assets									
Average	22763	26616	44774	43954	46128	52613	52084	51420	62860
Standard Deviation	36819	38392	81086	64088	67970	75446	73738	73841	98514
Deposits									
Average	557955	747427	1024075	1799875	2029320	2027779	2095241	2109343	2272957
Standard Deviation	721382	887841	1163168	2138551	2485451	2525505	2416226	2437693	2557820
Administrative expenditures									
Average	25224	32054	41077	44978	51036	56109	56379	55860	56615
Standard Deviation	30961	36248	42608	53031	60343	61107	60462	61685	61492

	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Number of banks	30	28	28	27	27	25	25	24
Loans								
Average	2163038	2258924	1974845	2064814	2211104	2780535	3284150	3290106
Standard Deviation	2533301	2826034	2528754	2637219	2758918	3347072	4110888	4498238
Securities								
Average	272391	308991	371926	465164	514755	449101	509011	513338
Standard Deviation	316071	373491	506564	673529	803670	802156	939978	874187
Material and non-material assets								
Average	68817	76330	79082	73191	77992	84790	118298	122415
Standard Deviation	117478	134480	137343	97801	99517	105325	140569	158976
Deposits								
Average	2462748	2639391	2626870	2839967	3118212	3626065	4100635	4461954
Standard Deviation	2654782	2997449	3209625	3543227	3754369	4194497	4827159	5868687
Administrative expenditures								
Average	59446	62807	46540	44050	59743	68694	69340	69866
Standard Deviation	62225	66678	50077	47582	63516	69920	74294	82883

Sources: BNB, own calculations

4. RESULTS

The results of the banking system in Bulgaria at the variable return to scale is analysed, as most of the banks do not operate under constant return to scale due to competition and market failures. The average technical efficiency of the Bulgarian banking system accounted for 0.82 in 2020 (Figure 2), which means that the banks do not use efficiently 18% of their inputs in 2020. At the same time, the level of technical efficiency in 2009 is lower – 0.798, which showed that the banking system in Bulgaria was better prepared in 2020 to withstand the coronavirus crisis. The banking system in Bulgaria had much better financial indicators before the coronavirus crisis, as after the global financial crisis there were new regulations, strengthening the capital and liquidity position of the banks. The global regulatory frame Basel III introduced higher capital requirements at the European level by Directive 2013/36/EU (CRD IV), which was also applied in Bulgarian legislature in Ordinance No 8 for capital buffers of banks. As a result, the capital adequacy of the Bulgarian banks reached 20.4% in 2020 versus 14.9% in 2009. The Bulgarian

central bank also undertook measures to counter the negative effects of the coronavirus crisis by introducing measures to improve the capital and liquidity of the banks in March 2020.

The decrease in technical efficiency confirmed the hypothesis that the pandemic crisis had negative effect on the banks' efficiency, due to the limitation of the intermediation role of the banking system in the country.

The reason for the lower technical efficiency in the pandemic 2020 year was related to the changed dynamics of the outputs. The pandemic crisis led to the decelerated growth rate of loans, provided to households and non-financial enterprises. The loans, provided to households reached BGN 25.5mn in 2020, decelerating their growth rates from 9.5% in 2019 to 6.6% in 2020. At the same time, the loans, provided to non-financial enterprises reached BGN 36.6bn in 2020, decelerating their growth rates from 6.6% in 2019 to 2.3% in 2020. Despite the decelerated growth rates of provided loans, they are higher compared to the crisis year 2009. In 2009, the growth rate of loans provided to households was 5.8%, while the growth rate of loans, provided to non-financial enterprises, was 2.2%. The banks also suffered through the declining profits related to the narrowing spread between interest rates on loans and deposits. Still, better performance of banks during the pandemic crisis was due to the higher liquidity buffers, which banks had in 2020 as compared to 2009.

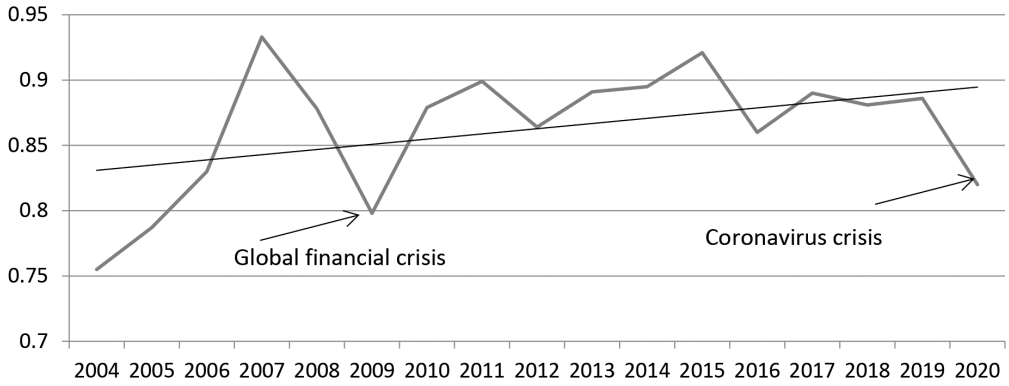

Figure 2. Technical efficiency of the Bulgarian banking system in the period 2004-2020

Source: author's calculation

At the same time, deposits retained its high growth rate as economic agents would like to secure resources for unexpected circumstances. The deposits of non-financial enterprises rose by 9.8% y/y in 2020, decelerating from 15.1% y/y, while the deposits of households accelerated their growth rate from 8.6% y/y in 2019 to 10.4% y/y in 2020.

The pandemic crisis continues all over the world, including in Bulgaria, having retained effects on the economic performance due to the measures for social isolation and lockdowns of the businesses. In 2020, the technical efficiency of the banking system is deteriorating, but it is at a much better level than in the years of the global financial crisis. In addition to the fact that in the pandemic crisis the banks were not the cause of the crisis, as was the case in the global crisis, the banks applied the so-called private moratorium on the liabilities of households and companies to them. The private moratorium contributes to postponing the deterioration of the quality of banks' loan portfolios. The non-performing loans accounted for 7.45% of the total amount of loans as of end-2020, while they were 6.5% as of end-2019. The further deterioration of the loans portfolio could be expected in the following years, which could have negative consequences on the banks' efficiency.

5. CONCLUSION

The pandemic crisis has negative consequences not only on the economy but also on the banking system in Bulgaria in terms of declining technical efficiency. The technical efficiency of banks is measured by the non-parametric method for measurement efficiency – Data envelopment analysis. The respective input and output products for the banks in Bulgaria are defined, through which a single efficiency index is obtained.

The results show that banking efficiency decreased in the pandemic year 2020 due to the disruption of the intermediary function of banks. However, the efficiency of Bulgarian banks in the year of the pandemic is at a better level compared to the period of the global financial crisis due to the fact that banks are better prepared for the current crisis and have a better liquidity and capital base.

Despite the negative effects of the pandemic crisis on the Bulgarian banks' efficiency in 2020, there are some positive factors for the better future development of the banks through the digitalization of the services and the supply of new products.

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