Dankiewicz, R., Balawejder, B., Chudy-Laskowska K., & Britchenko I. (2022). Impact factors and structural analysis of the state's financial security. *Journal of International Studies, 15*(4), 80-92. doi:10.14254/2071-8330.2022/15-4/5

Journal of International Studies

Scientific Papers

Impact factors and structural analysis of the state's financial security

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Abstract. The concept of state financial security is a key one, due to the fact that it reflects the state of the country, its public finances, as well as the state of the financial sector operating within it. An adequate level of state financial security can create optimal conditions for the development of the financial system, financial stability, as well as for the country's economic development and investment attractiveness. One of the main factors that determine a high level of state financial security is the stability of the financial sector. Given that the assets of the banking sector account for a significant, if not an overwhelming share of the total assets of the financial sector, this sector plays a key role in the economy as a whole. Therefore, a stable and secure banking sector is an important element affecting the level of financial security of a country. The paper attempts to define the concept of state financial security and to present its relevance. In addition, the paper also aimed to identify the main factors that most influence the level of

Received: February, 2022
1st Revision: October, 2022
Accepted: December, 2022

DOI: 10.14254/2071-8330.2022/15-4/5

state financial security. Eight indicators, generally accepted as those describing the level of state financial security, were applied in the paper and used as the basis for an econometric model expressing the relationship between them and the stable development of the banking sector. The study showed that the stability of the Polish banking sector determined the financial security of the state.

Keywords: financial security, security of the state, financial system

JEL Classification: E51, E6

1. INTRODUCTION

A high level of state financial security creates opportunities for optimal development of the financial system, increased financial stability, investment attractiveness and economic development of the country, and promotes sustainable enterprise development. A sufficiently high level of state financial security also helps to prevent crises and, when they occur, makes it possible to offset the threat to the financial system and restore an appropriate level of stability (Grikietytė-Čebatavičienė, 2020). There was increased interest in issues related to state financial security after the 2007-2008 financial crisis that rattled financial markets around the world. Today, a similar increase in interest can be attributed to the occurrence of the COVID-19 pandemic and the war in Ukraine, which have resulted in the emergence of new factors that can pose significantly higher risks to countries, threaten their stability and affect the level of financial security. To understand a country's financial security, one must identify the factors that determine its level. Undoubtedly, a crucial part here is played by the stability of the financial sector and the banking sector in particular. The latter is of essential importance to the economy, if only because of the significant share of banking sector assets in the total assets of the financial sector. A stable and securely operating banking sector is therefore a key factor in the country's financial security.

The main objective of the paper was to attempt to define the concept of state financial security, as well as to present the essence of the problem and to identify the key factors influencing its level. The empirical part of the paper focused on the analysis of 8 indicators related to state financial security. Since the banking sector plays a key role in the economy and, according to the literature review, is one of the main elements of state financial security, these indicators were analyzed in the context of their impact on the stability of the banking sector. The study used data from sources such as Eurostat and the Central Statistical Office for 2000-2020 and analyzed their basic descriptive statistics. Ratio of the banking system assets to GDP was chosen as the dependent variable for an econometric model, which was constructed in order to show the impact of key variables describing the financial security of the country on the stability of the banking sector.

2. LITERATURE REVIEW

State financial security is a multidimensional concept, as evidenced by the fact that the concept is defined in various ways (Dunaj, 2016). The very concept of security refers to a state in which there is no threat (Sciborek et. al., 2015). The literature points out that the financial security of the state is a dynamic concept, which is affected by many factors and processes (Jurgilewicz et.al, 2022; Susanti atal., 2022; Rekunenko et al., 2022), including the processes of globalization and regionalization (Paździor, Trubalska, 2018), and therefore is not a fixed value - it changes with the economic situation (Varnalii & Tomashevskyi, 2019). While approaches on how to define the concept of state financial security sometimes differ, scholars agree that state financial security is an element that forms the core of a state's national security (Durmanov

et. al., 2019; Sanusi et al., 2017; Shkolnyk et al., 2022; Akoh and Lekhanya, 2022) similarly in the context of socio-economic development. (Belas et al., 2018; Shkolnyk et al., 2019).

Although several approaches can be discerned in the literature when defining the concept of state financial security, it is often defined as the achievement by the state of a level of financial stability that allows it to maintain equilibrium and stimulates economic growth (Britchenko et.al., 2018). Financial security is also defined as the process of continually reducing and eliminating monetary risk in order to ensure an adequate level of capital adequacy (Raczkowski, 2014) which may condition the state's ability to raise funds in a satisfactory amount and under appropriate conditions (Redo et.al., 2018). Furthermore, it is linked to financial stability, which allows one to argue that financial stability is one of the conditions for an adequate level of state financial security and vice versa (Ciak, 2018; Pitoňáková, Zhurauliou, 2015). According to another approach, which emerges from the studies available in the literature, the level of financial security of the state is linked to the capacity of the public authorities to ensure an adequate level of financial and economic growth of the country and, moreover, it results from compliance with the main financial and economic parameters of the economy or the rational use of budgetary resources (Pochenchuk, 2014), which makes it possible to argue that it depends, among other things, on the quality of its management and counteracting threats from the internal and external environment (Sitdikova & Starodumova, 2019; Pasko et al., 2022).

Although the concept of state financial security is a rather general one, it is possible to identify areas of this security that fall under the broader concept of economic security, i.e. such a state of the political system and economic system that are able to provide economic entities with freedom to conduct business, a relatively low tax burden, as well as properly regulated international exchange relations that make it possible to ensure comparable competitive conditions. Among the areas of economic security, such components as financial security, raw materials and energy security, food security and technological security are distinguished (Redo, Siemiątkowski, 2017).

The literature indicates a number of factors that can determine the level of state financial security. The appropriate formation of these factors can cause an improvement in state security, while on the other hand, the formation of these factors at an inadequate level can cause a deterioration in the level of state financial security (Dankiewicz et. al., 2021). Among these factors, researchers in their studies distinguish such variables as the VAT gap (Redo, 2018) or excise tax collection (Małecka-Ziembińska, 2019). The importance of these factors boils down to the fact that problems in the collection of tributes, due to their relatively large share in the structure of taxes in the country, may cause depletion of the revenue side of the state budget, and therefore also negatively affect the level of its financial security. As another important factor, scholars point to the level of budget arrears, contributing to a decrease in the country's liquidity (Grześkiewicz, 2018), as well as the occurrence of the shadow economy, i.e. tax avoidance by citizens, which may have a moral basis and may contribute to an increase in the risk of the country's insolvency and unambiguously reduce the level of its financial security (Szturo et. al., 2018; Pasternak-Malicka, 2015). Among the other factors, also indicated are such aspects as the policy of the central bank (Kraś, 2013; Downs at al., 2022), the efficient functioning of financial safety net entities (Alinska, 2012) or as the level of reserve assets held by the state (Płaczek, Stańczyk, 2016; National Security Bureau, 2013). Non-financial factors include, for example, the country's level of cyber security, which is crucial given the occurrence of an increasing number of transactions based on IT networks, which, in the context of the emergence of hacking attacks, can significantly affect the security of state interests (Frańczuk, 2014; Balawejder et al., 2019; Prokopchuk at al., 2022).

As a result of the research conducted by Reznik et. al. (2020), it was established that the key components of state financial security were banking, debt, budget, currency, and monetary security. Since the banking sector is a key component when it comes to the entire financial sector, its stability very much

determines the level of state financial security. The research on the impact of defaulted loans on the level of country risk also shows that there is a high level of correlation between the country's financial sector risk and the capital adequacy of banks, diversification of the banking sector (Brůha & Kočenda, 2018; Hazudin at al., 2022; Aswar at al., 2022). Since the stability of the financial sector, especially the banking sector, is pro-cyclical in nature (Bouheni & Hasnaoui, 2017), increased lending may increase the risk of instability in the financial system, particularly with the empirically confirmed low financial literacy of economic participants (Cwynar et al., 2017; Cwynar et al., 2019), and capital accumulation increases financial stability (Thalassinos & Thalassinos, 2018). Central bank regulatory policy can also significantly affect financial sector stability and security, which, with the key role of the banking system in the economy, is of particular importance (Onyshchuk et al., 2020). Studies show that financial stability and diversification of the banking sector have a non-linear relationship - a moderate degree of diversification has a positive impact on financial stability, while an excessive degree has a negative impact (Kim el al., 2019), which is particularly important during financial crises, when fluctuations in financial stability can be greater. Nevertheless, a healthy and stable banking sector is less susceptible to economic or political influences, which, combined with a strong economy, significantly affects a country's financial security (Samitas et al., 2018). Referring to central bank policy, it is important to point out that always macroprudential policy, which is complementary to monetary policy, has a key impact on a country's financial security (Klingelhöfer & Sun, 2019), affecting financial stability (on capital regulation, bank risk and the financial market) by regulating interest rates (Agur & Demertzis, 2019). In addition, in the short term, macroprudential policy helps divert inflation away from the central bank's inflation target, while monetary policy can help boost lending, with optimal macroprudential policy also contributing to inflation and monetary stabilization to financial stability (Kim & Mehrotra, 2017; Ma, 2019).

3. METHODOLOGY

Since the banking sector plays a key role in the economy and, according to the literature review, is one of the key elements of the country's financial security, the empirical part of the paper focuses on the analysis of 8 indicators related to the country's financial security. These indicators were analyzed in the context of their impact on the stability of the banking sector as a key factor determining the level of financial security of the country. The study used data from sources such as Eurostat, the Central Statistical Office from 2000-2020, analyzed their basic descriptive statistics and checked the relationships between selected diagnostic characteristics.

Econometric modeling was used for the analysis. An econometric model is a simplified representation of reality. It depicts the relationships occurring in economic (and other) processes, taking into account only the most relevant factors. The purpose of regression analysis is to study the relationships between multiple independent (explanatory) variables and the dependent (explanatory) variable, which must be numerical in nature. In the social, natural and economic sciences, regression analysis is widely used as a research tool to describe and understand multivariate phenomena.

In classical multiple regression analysis, the model has the form:

$$Y_i = b_0 + b_1X_1 + ... + b_kX_k + e_i$$

and allows answering the question of what quantities best describe the phenomenon under study.

Once the appropriate set of diagnostic variables is selected, it is followed by:

- estimation of the structural parameters of the model;

- checking the quality of the model's fit to the data, usually with the coefficient of determination R^2 which indicates in what percentage the model fits the data;
- model verification - checking the basic assumptions about the distribution of the model's residuals.

The final stage is the analysis of the model and its interpretation and therefore checking the significance of the contribution of individual variables to the model and possibly the prediction of the dependent variable.

8 indicators related to state financial security were adopted for the study. Basic descriptive statistics of selected indicators are included in table 1.

Table 1

Basic descriptive statistics of the indicators adopted for the study

	Mean	Me	Min	Max	Std.dev.	Vz	S_k	K
Y – Assets of the banking system to GDP	59.0	63.2	34.4	73.8	12.7	21.5%	-0.7	-1.0
X_1 – General government debt related to GDP	48.7	48.7	36.4	57.2	5.9	12.0%	-0.5	-0.2
X_2 – Monetization level	54.8	54.2	39.8	78.3	11.3	20.5%	0.3	-0.9
X_3 – Capital adequacy ratio	15.0	14.6	11.2	20.7	2.4	16.1%	0.8	0.1
X_4 – Bank return on assets (%, after tax)	0.8	1.1	-3.8	2.1	1.3	157.5%	-2.6	8.7
X_5 – Bank return on equity (%, after tax)	7.2	10.0	-50.2	21.6	15.0	208.3%	-3.0	11.3
X_6 – Z-score	8.7	9.3	1.8	10.1	1.8	21.2%	-2.9	10.3
X_7 – Annual rate of inflation, %	2.6	2.2	-0.9	9.9	2.3	89.8%	1.4	3.9

Source: Author's own elaboration

The ratio of government debt to GDP. The indicator is given as a percentage. The average value was about 48.7%. The smallest value of the ratio of government debt to GDP took place in 2000 and amounted to 36.4%, while the largest value appeared in 2020 and amounted to 57.2%. Looking at the entire period over which the indicator was examined, the upward trend continues, although from 2013 the indicator dropped from 57.1% to 45.7% in 2019. On average, the index values deviated from the average level by about 5.9%. The volatility index does not show much variation in the ratio of government debt to GDP.

The ratio of financial sector assets to GDP - the indicator is given as a percentage. The average value of the indicator was 59%. The lowest value appeared in 2000 and was 34.4%, and the highest value occurred in 2016 and was 73.8%. Throughout the period, an upward trend of the examined indicator can be observed. From the calculated measures of variation it can be seen that the level of the indicator varies during the period under study. On average, the values deviate from the average by about 12.7%.

Monetization level - is a term from the field of finance, describing the monetary policy of a country, which involves the conversion of financial or physical assets into valid means of payment. In other words, it is the changing of something into money. In most cases, this involves the Central Bank of a country printing banknotes and minting new coins. Often it has to do with the central bank buying government bonds, sold to finance the country's deficit, or so-called public debt. In such a case, we speak of deficit monetization. It can be carried out directly or indirectly. In the former case, there is a borrowing of money from the Central Bank by the Ministry of Finance, resulting in a record of the creation of a new monetary base in the government's account. Deficit monetization, on the other hand, indirectly involves the Central Bank buying treasury bills on the open market or reselling them before their maturity. Monetization is usually associated with the phenomenon of rising inflation. The average value of the monetization level was 54.8% during the period under review. The lowest value appeared in 2004 at 39.8% and the highest in 2020 with a

score of 78.3%. On average, the value of the monetization level indicator deviated from the average in the period under review by 11.3%. The variation in performance over the period studied is moderate.

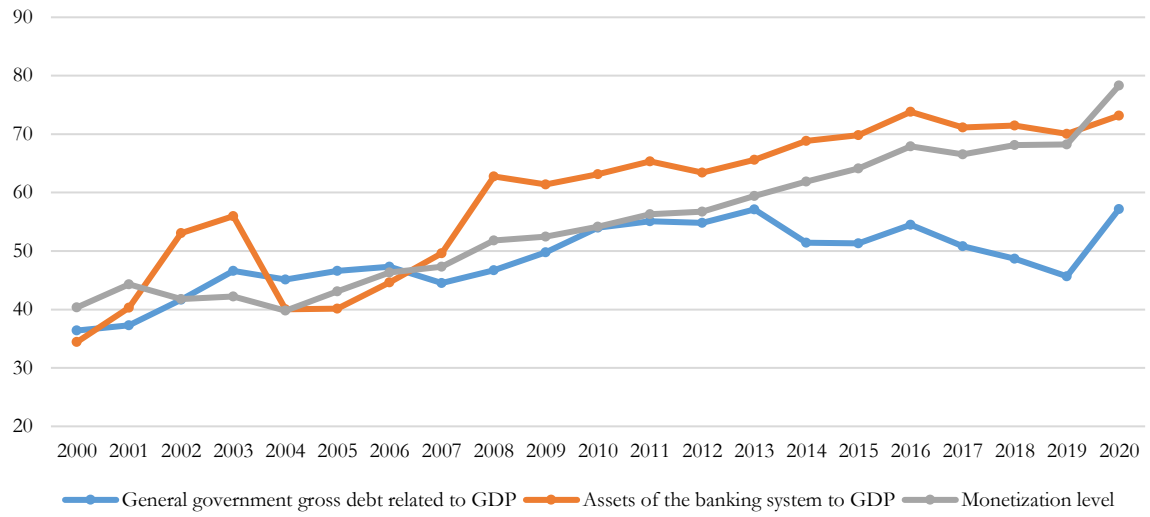

Figure 1. General government gross debt related to GDP, assets of the banking system to GDP and monetization level in Poland 2000-2020 [%]

Source: Author's own elaboration based on Eurostat data

Capital adequacy ratio - is one of the basic elements to determine the financial health of a bank. It indicates what is the zone of safety for creditors and depositors in case of unexpected losses that may be incurred by the bank. The capital adequacy ratio is determined as a percentage. It indicates the ability to protect with equity. The minimum value of the ratio in question, which has been adopted by the International Committee on Banking Supervision, is 8%. The average value of the solvency ratio is 15%. The lowest appeared in 2008 and amounted to 11.2% and the highest was in 2020 and amounted to 20.7%. The average value of the solvency ratio deviated from the average during the period under review by about 2.4%. The coefficient of variation shows little variation over time. Figure 1 clearly shows an upward trend in the solvency ratio since 2008.

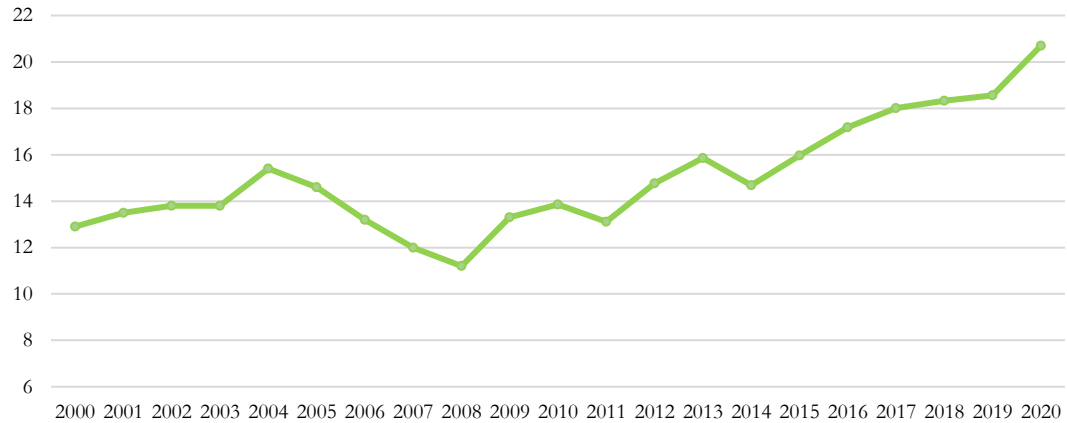

Figure 2. Capital adequacy ratio in Poland (2000-2020)

Source: Author's own elaboration based on Eurostat data

Bank return on assets - ROA - (after tax) - a ratio given as a percentage. ROA is the ratio of a company's net profit to the value of its assets; it can also be calculated as the product of return on sales and the asset turnover ratio. It informs about the company's ability to generate profits and the efficiency of managing its assets. The higher the ROA, the better the company's financial condition. Among other things, the indicator is important for financial institutions considering granting a loan and examining the possibility of repayment. The average value of ROA for the studied range is 0.8%, the smallest value appeared in 2003 and amounted to -3.8% and the highest was in 2004 and amounted to 2.1%. Since 2004, ROA has been on a downward trend. On average, ROA deviates from the average by 1.3%. The coefficient of variation shows a very large variation during the period under review.

Bank return on equity (%, after tax) - the return on equity (ROE) ratio is one of the most important measures of a company's profitability. It is the ratio of net profit generated to equity held. This means that the results state how much of the invested funds have returned after a given period. It can also be said that this measure shows what part of equity is net profit. The return on equity ratio is a stimulant. This means that the higher its value, the more favorable the situation of the company. The average value of ROA in the period under review was 7.2% On average, RA values deviate from the average by 15%. The smallest value was -50.2% and this occurred in2003 and the largest value was 21.6% in 2004. The coefficient of variation at 208% indicates that ROE was very volatile during the period under review. Like ROA, ROE is also characterized by a downward trend in the period under review.

Z-score - allows estimating the danger of high volatility of results with the simultaneous assumption that the source of bankruptcy of the bank is losses that are not covered by capital. In connection with the reduction of the analysis of the possibility of bankruptcy to a single dimension by the Z-score index, it is often used as a measure of security in banks. The Z-score indicates by how many standard deviations profits (expressed by ROA) must fall for it to lead to bankruptcy of the bank. The relationship between the Z-score and security is directly proportional, meaning that a sharp decline causes a drastic deterioration in the security of a given financial entity. The average Z-score during the period under review was 8.7 points. The lowest value was in 2003 at 1.8 points and the highest was in 2012 at 10.8 points. On average, Z-Score values in the studied period deviate from the average level by 1.8 points. The variability of the results is moderate, as indicated by the coefficient of variation at 21%.

Figure 3. Bank return on assets, bank return on equity, Z-score in Poland (2000-2020)
Source: Author's own elaboration based on Eurostat data

Annual rate of inflation, % - the rate of inflation is the average change in prices in a given year, and the value is expressed by the weighted average of costs for all goods and services. The effects of their high level are mainly an increase in prices related to maintenance, as well as a general decrease in the value of money. The inflation rate is a value expressed in percentages. It determines the extent to which there has been a change in average prices in the economy in a given year. Since inflation involves a decrease in the value of money, the inflation rate shows the relationship between costs in the past year and in the current year. The average inflation rate was 2.6 in the period under review. On average, values deviate from the average by 2.3%. The lowest inflation rate was recorded in 2015 and was (- 0.9%) and the highest in 2000, when it was equal to 10%.

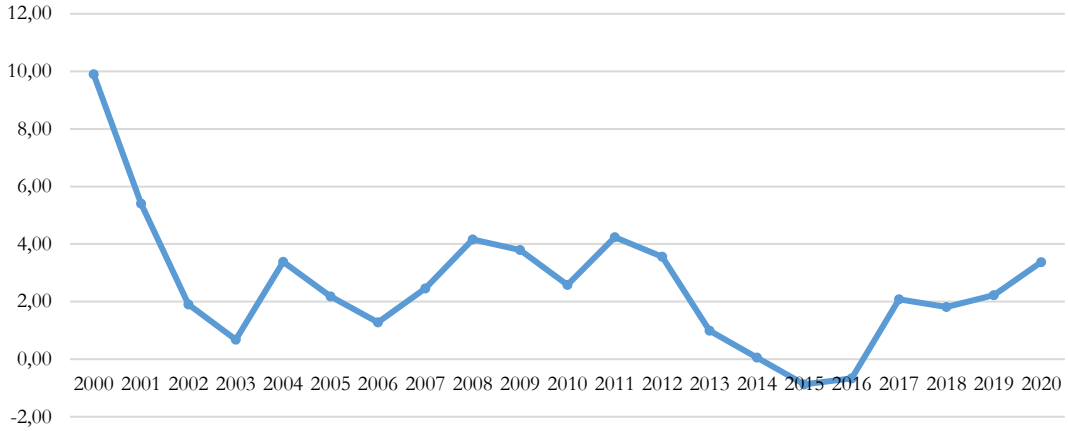

Figure. 4 Annual rate of inflation

Source: Author's own elaboration based on Eurostat data

4. EMPIRICAL RESULTS AND DISCUSSION

The relationships between the variables adopted for the study were checked. The Y variable- assets of banking system to GDP was taken as the interchangeable dependent variable. The correlation analysis shows that the highest relationship is between assets of banking system to GDP and monetarization level, the correlation coefficient was 0.89 that is, the relationship is significant very strong, with the increase of monitarization level the assets of banking system to GDP increases. The variables are 89% related. The second strongest is the relationship between assets of banking system to GDP and general government debt related to GDP. The relationship is also positive, that is, as general government debt related to GDP increases, assets of banking system to GDP increases. The relationship is also a saliva and the correlation coefficient is at 0.76, meaning that the variables model each other 76%.

Table 2

Correlation matrix between the studied variables

	X_1	Y	X_2	X_3	X_4	X_5	X_6	X_7
X_1	1	0.76	0.68	0.43	0.09	0.07	0.27	-0.51
Y	0.76	1	0.89	0.58	-0.13	-0.12	0.15	-0.54
X_2	0.68	0.89	1	0.79	0.07	0.07	0.36	-0.39
X_3	0.43	0.58	0.79	1	-0.07	-0.07	0.27	-0.33
X_4	0.09	-0.13	0.07	-0.07	1	0.99	0.90	0.15
X_5	0.07	-0.12	0.07	-0.07	0.99	1	0.90	0.20
X_6	0.27	0.15	0.36	0.27	0.90	0.90	1	-0.04
X_7	-0.51	-0.54	-0.39	-0.33	0.15	0.20	-0.04	1

Source: Author's own elaboration.

The graphical relationship between the variables is shown in the scatter plot in figure 6. The only negative relationship is between the assets of banking system to GDP and the inflation rate is -0.54. Which means that as the inflation rate increases, the assets of banking system to GDP ratio decreases.

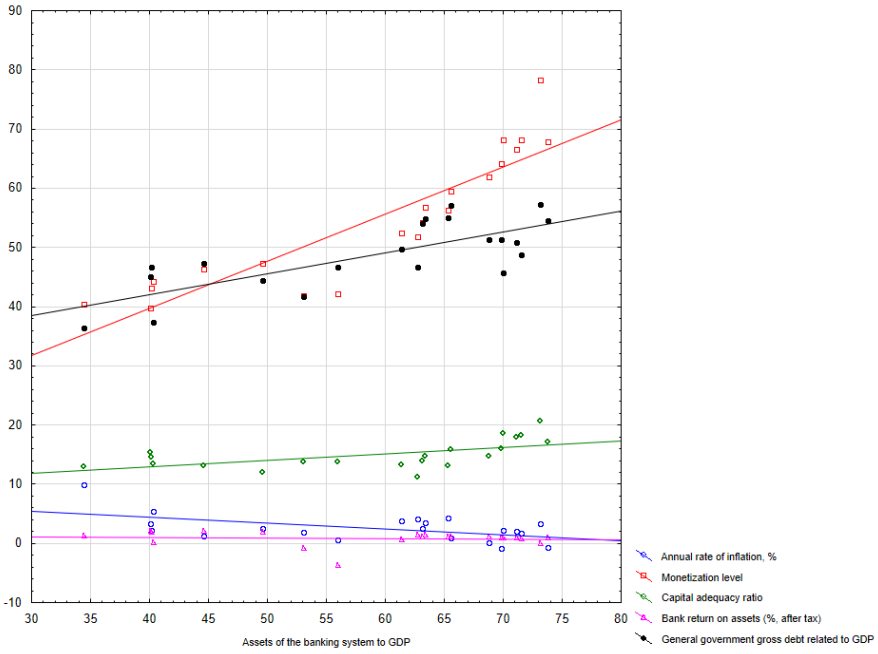

Figure 6. Scatter plot between banking system assets and GDP and Annual inflation rate, monetization regime, capital adequacy ratio, return on bank assets, and general government gross debt to GDP ratio

Source: Author's own elaboration.

Based on the variables adopted, an econometric model was constructed, where the dependent variable was assets of banking system to GDP. The results of the model construction are shown in Table 3. The coefficient of determination R2 was 0.92. So, the model has a 92% fit to the data.

Table 3

Results of model parameter estimation

	b*	Std. dev. from b*	b	Std.dev. from b	t(16)	p
Intercept term			24.14	6.25	3.85	0.0013**
Monetization level (X_2)	1.15	0.11	1.30	0.13	9.77	0.0000****
Annual rate of inflation, % (X_7)	-0.18	0.07	-1.03	0.41	-2.48	0.0245*
Capital adequacy ratio (X_3)	-0.40	0.11	-2.13	0.59	-3.56	0.0025**
Bank return on assets (%, after tax) (X_4)	-0.20	0.07	-2.04	0.72	-2.83	0.0118*

Source: Author's own elaboration.

Four variables entered the model in the following order of importance to the model. The most important variable describing Y or assets of banking system to GDP is Monetization level, next in importance is Annual rate of inflation, %, the next variable is Capital adequacy ratio and the last to enter the model is the variable Bank return on assets (%, after tax).

The model takes the form:

$$Y = \underset{(6.25)}{24.14} + \underset{(0.13)}{1.30}x_2 - \underset{(0.41)}{1.03}x_7 - \underset{(0.59)}{2.13}x_3 - \underset{(0.72)}{2.04}x_4$$

The model was checked for a good fit to the data, using the normal distribution of the model's residuals. It was assumed that: H0: the residuals have a normal distribution, and H1: the residuals do not have a normal distribution. This is a condition that allows the model to be interpreted and used.

The results of the tests are shown in figure 7. The tests show that p>α, (p=0.0997), so there are no grounds to reject H0, that is, the residuals have a normal distribution. So the model is correctly constructed.

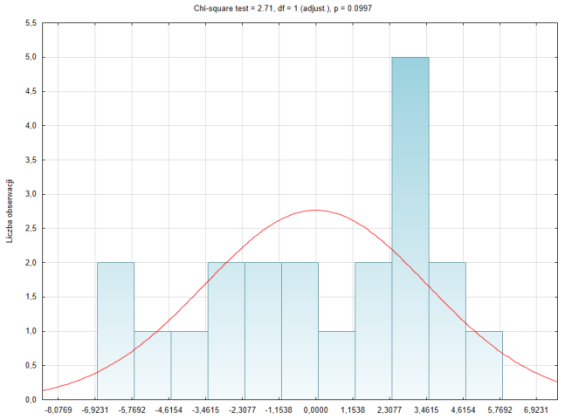

Figure 7. Testing the normal distribution of the model residuals

Source: Author's own elaboration.

The interpretation of the model is as follows. If the monitarization level increases by a unit, then assets of banking system to GDP will increase by 1.30, with constant levels of other variables. If Annual rate of inflation increases by 1%, then assets of banking system to GDP will decrease by 1.03, with constant levels of other variables. If Capital adequacy ratio increases by 1%, then assets of banking system to GDP will fall by 2.13 at constant levels of other variables.

If ROA increases by 1%, then assets of banking system to GDP will fall by 2.04 at constant levels of other variables.

5. CONCLUSION

When analyzing the literature on the subject and the studies undertaken so far on the determinants of the country's financial security, one could see that in their works the authors most often used such variables as: the level of the budget deficit, the country's foreign reserves, external debt, in % to the GDP, internal debt, in % to the GDP, level of monetization of economy, level of inflation, return on financial assets, the credit portfolio share in assets, and the ratio of the aggregate assets of the banking system to the GDP (Karaev et al., 2017), or indicators such as Government debt/GDP, Government budget deficit/GDP, Long-term interest rate of the government bonds or Money stock (M2)/GDP (Semjonova, 2016). Using the available literature on the subject and based on the results of available studies saying that the banking sector plays a key role in ensuring the financial security of the state, it was decided to study the impact of individual indicators describing the level of financial security of the state on the stability of the share of banking sector assets to GDP.

The research carried out allows us to conclude that many approaches to describe and study the level of state financial security can be distinguished, and the element that distinguishes them is the different indicators taken as input data, but they are always indicators that describe the economy as a whole and the banking sector, which is consistent with the results of Shkolnyk et. al. (2020).

Based on the constructed econometric model, where the assets of banking system to GDP were the dependent variable, it was noted that on the size of the banking sector, mixed as assets of banking system

to GDP, and therefore also its stability, it can be said that the state of the Polish banking sector, despite changes in the values of indicators such as z-score, or ROA and ROE ratios, remains at a relatively constant level, which confirms its stability and security. Taking into account the fact that the stability of the banking sector is a key factor in the financial security of the state, this level should be assessed equally positively, as it does not undergo major fluctuations (Jurgilewicz, et al., 2021a, Jurgilewicz, et al., 2021b).

Among the limitations of the present study, it should be pointed out that it is limited only to the study of the situation in Poland, and uses a limited catalog of data. In the future, the authors plan to expand the study by analyzing other countries and expanding the catalog of data adopted for the study.

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