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# THE EFFICIENCY OF ENSURING THE FINANCIAL SECURITY OF ARMENIA: NEW APPROACHES

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**Abstract:** *Financial security is considered a subsystem of the economic security system. The financial security of the Republic of Armenia is one of the most urgent issues of study and analysis. Covid-19 and the 2020 war in Armenia harmed all sectors of the Armenian economy, especially economic and financial security. At this moment, the research of the chosen topic becomes more than necessary and urgent. In the current post-crisis period, financial security is more than possible in Armenia. In this article, we tried to define and analyze the elements affecting the security of the Armenian financial system and evaluate the current effectiveness of financial security. For that purpose, we have formulated the following research questions: How are countries' financial security assessed? What elements ensure financial security in Armenia? Is the current system of financial security effective in Armenia? The applied methodologies are quantitative and qualitative. In particular, we used index analysis, graphical analysis, comparison, and expert evaluation analysis to answer the research questions. The analysis results showed that the change of isolated factors significantly impacts indicators of the country's economy, particularly the financial system; moreover, the factors indirectly impact the country's social, political, and public life.*

**Keywords:** *Financial System; Security; Efficiency; Index; Indicators*

## INTRODUCTION

In current conditions, ensuring the country's financial security is impossible without the state's sustainable economic development and effective mechanisms for the protection of the economic sector, which is crucial for the viability of society. Many quantitative-qualitative indicators allow for objective and systematically assessing the country's financial stability level. Based on the change in these indicators, conclusions can be drawn about the effectiveness of financial security policies.

Quantitative indicators have a certain threshold, the crossing of which indicates financial security threats. Financial security thresholds are based on macroeconomic indicators that reflect

vital national interests. The threshold of financial security indicators is conditional and mainly based on expert assessments. These indicators are generally not normative and are intended for direct analysis.

We have singled out the following three areas, from which arise the main risks that affect the security of the Armenian financial system:

1. Risks arising from the country's macroeconomic environment
2. Risks arising from the financial banking system
3. Risks from the external environment.

To assess the risks arising from these directions, we have observed the dynamics of nine indicators during 2010-2021. In this article, we explore the following research questions:

1. How is the financial security of countries assessed?
2. What elements ensure financial security in Armenia?
3. Is the current system of financial security effective in Armenia?

Accordingly, we propose a method for describing the effectiveness of financial security in Armenia, which allows us to assess the effectiveness of financial security in previous periods and make specific predictions through scenario testing.

## DEFINING FINANCIAL SECURITY

The security of the financial system has always been used, but since the 1990s, it has been the subject of discussion by many authors and international organizations. The authors often use the terms financial security and financial system stability, the contents of which are close to each other. This article will use the term financial system security, the most comprehensive description of the topic under discussion.

The greater emphasis on financial stability is related to several significant trends in financial systems during the past few decades. These trends reflect the expansion, liberalization, and subsequent globalization of financial systems, all of which have increased the possibility of more significant adverse consequences of financial instability on economic performance.

There are many books and articles on the security of the financial system in which the authors place different emphases on its definition; some have defined it in terms of what it is a situation in which financial imbalances impair the real economy (Crockett 1997; Davis 2002). Haldane (2004) defines financial stability using a simple model in which asset prices serve to secure the optimal level of savings and investment. Others take a macro-prudential viewpoint and specify financial stability as limiting risks of significant actual output losses associated with episodes of systemwide financial distress (Borio 2003). Garry J. Schinasi (2006) has a comprehensive definition of financial system stability:

Financial stability is a situation in which the financial system can satisfactorily perform its three essential functions simultaneously. First, the financial system is efficiently and smoothly facilitating the intertemporal allocation of resources from savers to investors and the allocation of economic resources generally. Second, forward-looking financial risks are assessed and priced reasonably accurately and

relatively well managed. Third, the financial system is in such a condition that it can comfortably, if not smoothly, absorb financial and real economic surprises and shocks (p. 82).

We agree with this definition, and as a summary, we define the security of the financial system as follows: The security of the financial system is a situation when the financial system can ensure the country’s sustainable economic growth and absorb system shocks.

### METHODS FOR ASSESSING THE FINANCIAL SYSTEM SECURITY

The financial system’s security is assessed by several indicators characterizing the financial sector, for which threshold values are set. Policymakers and academic researchers have focused on many quantitative measures to assess financial stability. The set of Financial Soundness Indicators developed by the IMF (2006) are examples of such indicators, as are the monitoring variables used in Hawkins and Klau (2000), Nelson and Perli (2005) and Gray *et al.* (2007), which focuses on market pressures, external vulnerability and banking system vulnerability.

The indicators are presented in Table 1.

**Table 1: Financial System Stability Indicators According to the IMF (Source: IMF webpage 2021)**

I001	Ratio of total regulated capital to risk-weighted assets
I002	Ratio of regulatory capital to risk-weighted assets
I004	The ratio of non-performing loans to total loans
I006	Profitability by assets
I007	Profitability by capital
I010	Ratio of highly liquid assets to total assets
I011	The ratio of highly liquid assets to demand liabilities

The indicators refer to and focus on the banking system, which suggests that the stability of the financial system, which is considered to be its component, is more critical in the stability of the financial system.

Based on the above conclusion, financial system security policymakers and implementers do not have a different methodology. The effectiveness of the security of the financial system by a combination of quantitative and expert assessment.

The universal method of banking system security is the integrated method, as it assesses the financial security of the banking system based on critical indicators: yield, liquidity, capital adequacy, and capital growth rate.

This method is based on V. V. Kovalenko’s methodology (2013, 81), according to which the calculation of the integrated assessment of the level of financial security of the banking system consists of the following stages:

1. Development of essential criteria.
2. Normalization of criteria.
3. Determination of weighted coefficients.
4. Integral index calculation.

Kovalenko offers the following as fundamental indicators:

1. Bank asset to GDP ratio.
2. The level of dollarization of the banking system.
3. The ratio of gross external debt to GDP.
4. The share of foreign capital in the gross banking capital.
5. The share of problem loans in the net assets of the banking system.
6. The ratio of banks' own and borrowed funds.
7. Regulatory capital adequacy.
8. Net interest margin.
9. Bank asset to GDP ratio.
10. The level of dollarization of the banking system.
11. The ratio of gross external debt to GDP.
12. The share of foreign capital in the gross bank capital.
13. The share of problem loans in the net assets of the banking system.
14. The ratio of banks' own and borrowed funds.
15. Regulatory capital adequacy.
16. Net interest margin.

The next stage is normalizing baseline indicators, which is necessary to bring them to comparable values. This stage is needed because when calculating the integral grade, completely different baseline indicators are used, which can differ quantitatively and qualitatively. In addition, the selected indicators may have different effects on the result; for example, the increase of some indicators may lead to both an increase and a decrease in the level of security of the banking system. The same can happen if some indicators decrease. If the selected indicators are combined in one model, it is impossible to get a good grade, so they are normalized, i.e., brought to a single scale. Kovalenko suggests normalizing the indicators as follows:

$$1) X_{\text{norm } j} = \frac{X_{\text{max}j} - X_j}{X_{\text{max}j} - X_{\text{min}j}}, \text{ where}$$

$X_{\text{norm } j}$  is the normalized  $j$ -index,

$X_{\text{max}j}$ -the maximum value of the third indicator in the selected period,

$X_{\text{min}j}$ -the minimum value of the third indicator in the selected period,

$x_j$ -the value of the third indicator in the given period.

For the determination of weighted coefficients, the assessment of weights for each indicator  $g_{i,t}$ , the determination of weights for each indicator, the integral assessment is used.

The authors propose to calculate the integral grade as follows:

$$2) I_{f,s} = \sum_{t=1}^n I_{i,t} * g_{i,t}, \text{ where}$$

$I_{f,s}$  is the security index of the banking system in period  $t$ ,

$I_{i,t}$  is the normalized value of the third baseline in period  $t$ ,

$g_{i,t}$  is the weighted value of the third baseline in period  $t$ .

Moreover, all  $I_{i,t}$  meet the following condition:

$$0 \leq I_{i,t} \leq 1$$

$$\sum_t^i I_{i,t} = 1$$

Each weighted coefficient  $g_{i,t}$  is normalized  $0 \leq g_{i,t} \leq 1$ . Moreover, the closer the value of  $g_{i,t}$  is to 1, the more optimal the index.

After performing the calculations, the authors propose to set the threshold values of the integral index for their comparison or to analyze the change of the indices in the dynamics.

### FINANCIAL SYSTEM SECURITY ASSESSMENT FOR THE REPUBLIC OF ARMENIA

As we mentioned in the previous part, to assess the security efficiency of the financial system in Armenia, we have relied to some extent on the integrated method. However, we chose the coefficients based on our research on the financial system of Armenia. We have grouped these indicators according to the risks arising from the following directions

1. Risks arising from the macroeconomic environment of the country
2. Risks arising from the financial-banking system
3. Risks from the external environment.

Thus, we have presented the security of the financial system as a function depending on the following coefficients. It will mathematically look like this:

$$3) FS=f(D+ND+I+IR+PBD+IC+CE+BA+BP), \text{ where}$$

FS is the Financial Security Index

D is State Budget Deficit/GDP%

ND is National Debt/GDP%

I is Annual Actual Inflation Rate%

IR is International Reserve/GDP%

PBD is Balance of Payments Deficit/GDP%

IC is Fixed Capital Investments/GDP%

CE is Capital Adequacy%

BA is Bank Asset/GDP%

BP is the profitability of the banking system by capital%.

Moreover, based on the general logic of financial security, the efficiency of financial security will be high if:

1. The state budget deficit/GDP ratio should be equal to the set threshold:

$$D \leq D_t \text{ or } \Delta D = D - D_t \leq 0$$

2. The government debt/GDP ratio should be equal to the set threshold:

$$ND \leq ND_t \text{ or}$$

$$\Delta ND = ND - ND_t \leq 0$$

3. The actual annual inflation rate should be equal to the forecasted threshold:

$$I \rightarrow I_t \text{ or } \Delta I = I - I_t = 0$$

4. The international reserve/GDP ratio should be as high as possible:

$$IR \rightarrow +\infty \text{ or } \frac{1}{IR} = 0$$

5. The balance of payments deficit/GDP ratio should be as low as possible,

$$PBD \rightarrow 0$$

6. IC Fixed capital investments/GDP ratio as high as possible:

$$IC \rightarrow +\infty \text{ or } \frac{1}{IC} = 0$$

7. The capital adequacy ratio should be equal to or greater than the normative index:

$$CE \geq CE_t \text{ or } \Delta CE = CE_t - CE \leq 0$$

8. The bank assets/GDP ratio should be as high as possible:

$$BA \rightarrow +\infty \text{ or } \frac{1}{BA} = 0$$

9. The profitability of the banking system by capital should be as high as possible:

$$BP \rightarrow +\infty \text{ or } \frac{1}{BP} = 0$$

Let us call the sum of the obtained indicators the absolute efficiency factor of Financial Security  $K_{FS}$ .

Therefore, the coefficient will have the following equation:

$$4) K_{FS} = \Delta D + \Delta ND + \Delta I + \frac{1}{IR} + PBD + \frac{1}{IC} + \Delta CE + \frac{1}{BA} + \frac{1}{BP}$$

Based on the above equation, the financial security indicator will be effective if:

$$K_{FS} \leq 0$$

Based on the mentioned formula, let us present the calculation of the absolute efficiency factor of financial security for Armenia, according to 2010-2021.

**Table 2: Absolute Efficiency Indicators of Financial Security 2010-2021**

(Source: Statistical Committee of the Republic of Armenia 2022, and authors' calculations)

<i>Year</i>	$\Delta D \leq 0$	$\Delta ND \leq 0$	$\Delta I = 0$	$1/IR > 0$	$PBD > 0$	$1/IC = 0$	$\Delta CE \leq 0$	$1/BA = 0$	$1/BP = 0$
2010	-0.025	-0.20	-0.05	0.048	0.14	0.03	-0.02	0.022	0.09
2011	-0.047	-0.18	-0.01	0.055	0.10	0.04	-0.06	0.018	0.10
2012	-0.061	-0.19	0.01	0.055	0.11	0.04	-0.05	0.016	0.09
2013	-0.059	-0.19	-0.02	0.063	0.08	0.04	-0.05	0.014	0.11
2014	-0.056	-0.16	-0.01	0.055	0.07	0.05	-0.03	0.013	0.22
2015	-0.027	-0.11	0.04	0.078	0.03	0.05	-0.04	0.015	0.25
2016	-0.020	-0.03	0.05	0.061	0.01	0.06	-0.08	0.013	0.17
2017	-0.027	-0.01	0.01	0.056	0.02	0.06	-0.07	0.013	0.17
2018	-0.058	-0.04	0.02	0.054	0.07	0.06	-0.06	0.012	0.19
2019	-0.065	-0.06	0.03	0.069	0.07	0.06	-0.06	0.011	0.13
2020	-0.021	0.07	0.02	0.045	0.04	0.06	-0.05	0.009	0.14
2021	-0.022	0.01	-0.03	0.044	0.04	0.05	-0.05	0.010	0.15

Now let us calculate the absolute efficiency index of financial security for 2010-2021.

**Table 3: Absolute Efficiency of Financial Security 2010-2021 (Source: Authors' calculations)**

Year	$K_{FS}$	Year	$K_{FS}$
2010	0.026	2016	0.232
2011	0.021	2017	0.219
2012	0.023	2018	0.249
2013	-0.006	2019	0.191
2014	0.161	2020	0.318
2015	0.277	2021	0.192

As presented above, the model would be a financial security indicator effective, if  $K_{FS} \leq 0$ , however, we see from Table 3 that the absolute efficiency index tends to the target 0, but in recent years, especially in 2020, has a growth trend, which in this case it is a negative phenomenon. In 2014, due to the decrease in the profitability of the capital banking system, there was also a significant change in the index. From the data, it can be concluded that in 2020 the index will be negatively affected by the State Budget Deficit/GDP change and Public Debt/GDP. The best indicator for the observed period was registered in 2013 - 0.036.

In 2020, the lowest level of the financial security index was recorded, in which Public Debt/GDP, International Reserves/GDP and Investments in Fixed Capital/GDP changed negatively. At the same time, the indicators started to change from the first half of 2020 due to Covid-19 and maintained a negative direction in the second half due to the war situation. It can also be concluded that absolute adequate financial security is possible only in theory, as in practice, this coefficient will always be greater than 0. To increase the practical significance of the coefficient, give each coefficient selected in the model a coefficient corresponding to its weight. We used qualitative and quantitative expert evaluation methods to give appropriate weights to the selected 9 indicators in the model.

In particular,

- The indicators were provided by 7 leading experts in the field of finance in Armenia, who are engaged in scientific research activities, who gave each of the 9 indicators corresponding points on the latter’s impact on the security of the financial system in Armenia.
- The experts answered the following: “Assess the impact of each indicator on the security of the RA financial system on a scale of 1-10”.
- The experts conducted the assessment independently of each other, not knowing in advance the content and objectives of the research.
- Each indicator had an equal chance of getting the minimum or maximum score.

The result is the following.

**Table 4: Coefficients of Indicators Affecting the Security of the RA Financial System**  
(Source: Authors’ calculations)

Indicator	Rate							Total	Index's Coefficient in the Model
State Budget Deficit/GDP%	8	7	10	10	9	4	8	56	<b>0.8</b>
National Debt/GDP%	8	9	10	10	10	6	9	62	<b>0.885</b>
Annual Actual Inflation Rate%	6	5	4	9	9	5	5	43	<b>0.614</b>
International Reserve/GDP%	7	5	8	10	7	4	9	50	<b>0.714</b>
Balance of Payments Deficit/GDP%	8	6	9	10	9	5	8	55	<b>0.785</b>
Fixed Capital Investments/GDP%	9	8	7	8	8	6	7	53	<b>0.757</b>
Capital Adequacy%	7	7	4	10	8	9	7	52	<b>0.742</b>
Bank Asset/GDP%	7	6	4	8	6	8	5	44	<b>0.628</b>
Profitability of the Banking System by Capital%.	7	8	3	7	7	7	6	45	<b>0.642</b>

According to the expert assessment, the 3 most important indicators are the State Debt/GDP, state budget deficit/GDP and Balance of Payments Deficit/GDP indicators. It should be noted that no indicator received 0, which suggests that the correct indicators were selected from the beginning.



As a result, the adjusted model for assessing the effectiveness of financial security as a result of an expert assessment looks like this:

$$5) K_{FS} = 0.8\Delta D + 0.9\Delta ND + 0.6\Delta I + \frac{1}{0,7IR} + 0.8PBD + \frac{1}{0,7IC} + 0.7\Delta CE + \frac{1}{0,6BA} + \frac{1}{0,6BP} + 2.43$$

After some math, the model will look like this:

$$6 = 0.8\Delta D + 0.9\Delta ND + 0.6\Delta I + 1.4IR + 0.8PBD + 1.4IC + 0.7\Delta CE + 1.7BA + 1.7BP + 2.43$$

Now let us calculate the relative efficiency of the security of the RA financial system for 2010-2021.

**Table 5: Relative Efficiency of Financial Security 2010-2021 (Source: Authors' calculations)**

Year	$K_{FS}$	Year	$K_{FS}$
2010	0.011	2016	0.134
2011	-0.006	2017	0.133
2012	-0.007	2018	0.158
2013	-0.036	2019	0.119
2014	0.073	2020	0.230
2015	0.146	2021	0.132

As we can see from the data in Table 5, the relative security index of the financial system in Armenia is closer to zero in the negative direction in 2011-2013, and from 2014 it started to change. The worst indicator was re-recorded in 2020. The index was also low in 2018, which can be conditioned by the outflow of assets from the banking system during the Velvet Revolution.

## CONCLUSION

Thus, the security of the financial system is a crucial criterion for the country. To increase its efficiency, parallel work must be done in many directions within the country and with international partners and financial and economic structures, establishing competent financial and trade relations. Examining the indicators affecting the security of the financial system of Armenia 2010-2022, we can say that the change of isolated factors has a significant impact on the country's economy, particularly the financial system. Referring to the results of our proposed model, we can conclude: The first 9 indicators are essential factors for the security of the RA financial system. Second, in case of a change in each indicator, the model reacts adequately and changes the coefficients of the other indicators. Finally, the model enables scenario testing, i.e., to model situations threatening the financial security of the Republic of Armenia to check the reaction behavior of the financial system.

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