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ESTIMATION OF FACTORS AFFECTING FINANCIAL STABILITY FOR THE REPUBLIC OF ARMENIA

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Abstract: Financial stability is one of the core components of sustainable development. This paper analyzes key factors affecting financial stability by using a Financial Soundness Index as a proxy. The main destination of the paper is to find factors that are not obvious at first. For this exercise we used OLS method. Results show that increases in the interest rate spread, monetary base and gross international reserves have a positive impact on stability, whereas higher government revenues may reduce it. The results can be implemented in policy decision making process.

Keywords: financial stability, financial soundness indicators, financial soundness index, OLS method, IMF

JEL code: E4

Research aims: to uncover factors affecting financial stability and explain the mechanisms through which these factors influence the stability of the financial system.

Research novelty: focusing on factors that are not traditionally considered in analyses of financial stability. By incorporating these less obvious determinants, the research provides a broader understanding of the drivers of financial system resilience.

Introduction

A well-functioning financial system can be served as a key engine of economic growth by facilitating efficient maturity and liquidity transformation, credit intermediation and the provision of other financial services.

Financial stability is also one of the core components of sustainable development in modern economies. It ensures the resilience of the economic system to both internal and external shocks, supports the efficient allocation of resources and promotes long-term economic growth. In the context of the Republic of Armenia, assessing financial stability is especially important.

The global financial crisis and regional instabilities triggered financial imbalances, thus revealing vulnerabilities in the financial system. This in turn underlines the significance of uncovering and effectively managing systemic risks. This paper is directed towards analyzing indicators of financial stability, constructing a FSI (Financial Soundness Index) and estimating factors influencing financial stability.

The rest of the paper is organized as follows: the second part summarizes the data, that is used. We represent the FSI, its explanation, the results of the econometric model with relevant variables and their interpretations in the third part.

Methododlogy of data provision

The components of FSI are Financial Soundness Indicators. The indicators were proposed by the International Monetary Fund (IMF). The IMF developed the main indicators inspired by the CAMELS rating system (IMF, 2019). The indicators included in the index can be divided into four main categories: capital adequacy (Capital Adequacy Ratio and Ratio of NPLs net of provisions to capital), asset quality (Ratio of NPLs to total loans), liquidity (Ratio of liquid assets to total assets and Loan-to-deposit ratio), and profitability (Return on assets, Interest margin-to-gross income ratio and Non-interest expenses-to-gross income ratio) (Cheang N., and Choy I., 2010). The first, fourth, and fifth indicators are sourced from the website of the Central Bank of Armenia (CBA), while the others are taken from the IMF database.

The estimated equation includes the following variables:

FSI_emp_cycle_ - The cyclical component of FSI derived from empirical normalization,

_180_1y_ - The difference between lending and deposit interest rates for maturities between 180 days and 1 year,

DLGov_rev_ - Government revenues, log-transformed using the natural logarithm and differenced to the first order,

DMB_ - Monetrary base, log-transformed using the natural logarithm and differenced to the first order,

DLRes_ - Gross international reserves of Armenia, log-transformed using the natural logarithm and differenced to the first order.

The model is estimated based on monthly data from January 2010 to October 2024 (178 observations). We take log-differences of government revenues, monetary base, and gross international reserves of Armenia to ensure stationarity. For FSI we used Hodrick-Prescott (HP) filter to extract the time-varying trend.

Research results

According to the Central Bank of Armenia, financial stability is the ability of a financial system, i.e. financial institutions, markets, and market infrastructure, to withstand possible shocks and imbalances, thus reducing the likelihood of disruption of financial intermediation functions (Central Bank of Republic of Armenia. Financial Stability).

The goal of financial stability does not imply stability of a single financial institution, but the stability of the entire financial system.

In this paper, we use FSI as a proxy for financial stability.

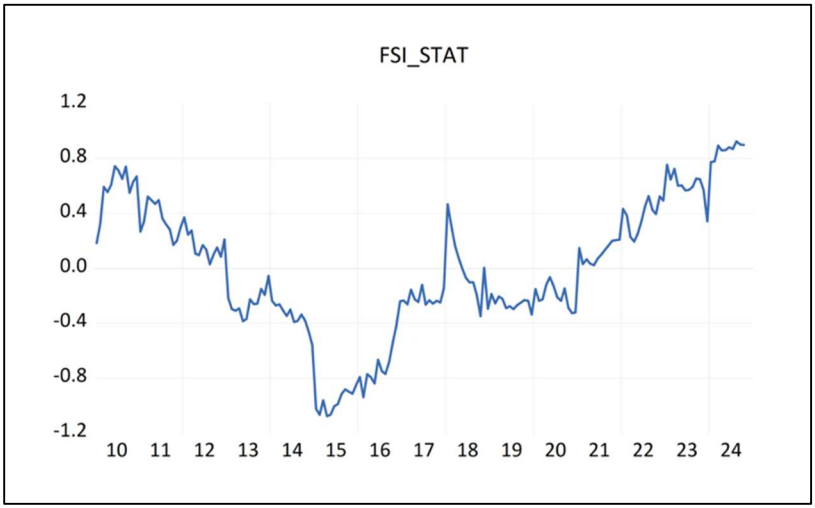

Figure 1. FSI (calculated by statistical normalization)

To calculate FSI we should normalize the indicators. The indicators can be normalized statistically or emporicaly. We obtain two indeses derived through statistical and empirical normalization methods, respectively.

Notably, the index reflects historical events that have significantly impacted the financial stability of Armenia. During 2010-2011, the index shows an upward trend, indicating post-crisis recovery following the 2008 global financial crisis. The index decreases in 2012-2015 reaching its historical minimum of 0.22 (Figure 2). The visible sharp drop beginning in 2014 can be described as result of the 2014 financial crisis in the Russian Federation.

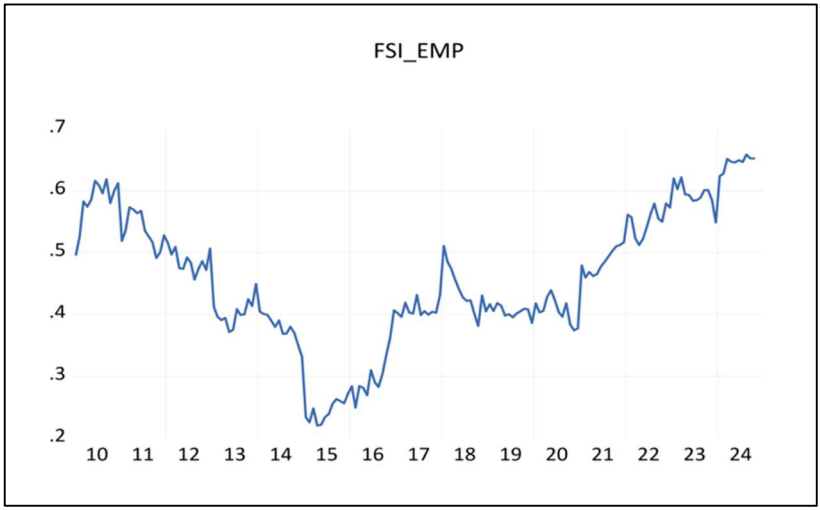

Figure 2. FSI (calculated by empiric normalization)

The decline during 2012-2013 was largely due to increase in Ratio of NPL net of provisions to capital, which could possibly be

driven by slowdown in economic growth (5.7%-1.2%) (Central Bank of Republic of Armenia. Financial Stability).

The period 2015-2018 can again be interpreted as a recovery phase. From 2018 to 2020, Armenia's economy experienced one of its most difficult periods including COVID-19 and Nagorno-Karabakh war. From 2021 to 2024, in response to the escalating geopolitical situation in the Russia-Ukraine region, many countries and international organizations-imposed sanctions on Russia. As a result, a large number of professionals from IT sector relocated to Armenia. In addition to individuals, six large companies also relocated from Russia to Armenia (Modex, 2024). During this period the index reached its highest value. We can also see a drop in 2023, which is the result of the relocation of Armenians from Nagorno-Karabakh.

Having constructed the FSI, we can observe how Armenia's financial stability has evolved over time. This leads us to the next important question: What factors have effect on financial stability in Armenia? To answer this question, we estimate econometric model using Ordinary Least Squares (OLS) method.

$$\begin{aligned}\widehat{\text{FSI\_emp\_cycle}}_t = {} & -0.011 + 0.759\text{FSI\_emp\_cycle}_{t-1} \\ & + 0.002\_180\_1y_{t-1} - 0.060\text{DLGov\_rev}_{t-1} \\ & + 0.114\text{DLMB}_t + 0.055\text{DLRes}_t\end{aligned}$$

All coefficients of the variables included in the model are statistically significant at the 95% confidence level. The coefficients of all variables are jointly significant, as shown by the F-statistics. The model exhibits a relatively high R^2 value, which is noteworthy given the nature of time series data. An additional strength of the

model is that the Durbin-Watson (DW) statistic is close to 2, suggesting no significant autocorrelation.

We need to determine whether the Gauss-Markov (GM) assumptions are satisfied or not. It is evident from the model specification that both linearity in parameters and absence of perfect collinearity are satisfied.

Table 1. Factors Affecting on Financial Stability

Dependent Variable: FSI_EMP_CYCLE
Method: Least Squares
Date: 04/28/25 Time: 22:57
Sample (adjusted): 2010M03 2023M12
Included observations: 166 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FSI_EMP_CYCLE(-1)	0.765338	0.047531	16.10201	0.0000
_181_1Y(-1)	0.002017	0.000781	2.581823	0.0107
DLGOV_REV(-1)	-0.057268	0.019201	-2.982598	0.0033
DLMB	0.107448	0.025599	4.197262	0.0000
DLRES(-1)	0.055977	0.025917	2.159849	0.0323
C	-0.010671	0.004319	-2.470884	0.0145

R-squared	0.651874	Mean dependent var	0.000846
Adjusted R-squared	0.640995	S.D. dependent var	0.036005
S.E. of regression	0.021573	Akaike info criterion	-4.799253
Sum squared resid	0.074465	Schwarz criterion	-4.686772
Log likelihood	404.3380	Hannan-Quinn criter.	-4.753596
F-statistic	59.92067	Durbin-Watson stat	1.906516
Prob(F-statistic)	0.000000		

As in time series analysis strict exogeneity is often difficult to meet, the weak exogeneity is commonly accepted $E(\varepsilon_t \mid x_{it}) = 0$. To ensure this, based on expert judgment and model diagnostics we need to verify the absence of omitted variables that are correlated with included regressors, misspecification of functional form, reverse causality and systematic measurement errors. Although the

model has a relatively high R^2 for a time series regression, it is not close to 1, suggesting the potential presence of omitted variables. One plausible omitted variable is housing prices, which may influence financial stability. However, they are likely uncorrelated with government revenues, monetary base or gross international reserves. Misspecification of functional form was tested using Ransey RESET test, which was not rejected. Data were sourced from trusted institutions such as the Central Bank of Armenia, IMF and the National Statistical Committee of Armenia. This fact minimizes the risk of measurement error. Overall, we conclude that the assumption of weak exogeneity is satisfied.

The model is homoskedastic, which was verified by Breusch-Pagan-Godfrey test.

Serial correlation was tested using Correlogram Q-statistics. The p-values for all lags exceeded 0.05, confirming the absence of autocorrelation in the residuals.

So, we can insist, that the regression clearly satisfies all five Gauss-Markov assumptions. Therefore, the coefficients are consistent and asymptotically normally distributed (Enders W., 2015).

The estimated model is a first order autoregressive process AR (1). In an AR (1) process, the impact of a shock is theoretically infinite in duration but diminishes over time. One percentage point increase in the interest rate spread between loans and deposits at time t leads to approximately 0.002 units increase in FSI at time t+1. In the short term the higher spread implies a greater profit margin for banks, which enhances their capacity to absorb potential losses, thereby contributing to financial stability. We can also

mention that it has dual effect, in long-/mid-term. A rise in spread can also depress asset prices. A 1% increase in government revenue at time t is associated with an approximate decrease of 0.0599/100 in the FSI. Tax rate increases results in slowdown in the economy and in the financial sector, which is raising default risks and weakening profitability. When the monetary base grows by 1 percent the FSI tends to rise by roughly 0.1137/100. The increase of monetary base means extra liquidity in banking sector, as monetary base consists of reserves of banks in the Central Bank, which enhances the resilience of the financial sector. Similarly, the increase of gross international reserves contributes approximately 0.0554/100 to the FSI increase. This variable provides insurance against exchange rate volatility and promotes financial system stability.

These results provide a deeper understanding of financial stability. Now we can move on to the concluding remarks.

Conclusion

In this paper Financial Soundness Index (FSI) was calculated based on the indicators recommended by IMF. It was done by the following two methodologies: statistical and empirical normalization. FSI is a proxy of financial stability in this paper. Throught the index we can see that financial stability in Armenia has been significantly affected by major historical events such as the 2008 global financial crisis, the 2014 Russian financial crisis, the COVID-19 pandemic, and the 2020 Nagorno-Karabakh war. The index also effectively illustrates periods of recovery.

Using OLS method, we have found, that increase in the interest rate spread, monetary base and gross international reserves may have a positive impact on financial stability, while an increase in government revenues may have a negative effect.

A limitation of the study is the lack of data on certain variables, such as housing prices which could be explored in future. Future analyses could also incorporate non-bank institution related components into the FSI. Additionally, further studies might examine how these findings might be integrated into the policy-making processes.

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ՖԻՆԱՍԱԿԱՆ ԿԱՅՈՒՆՈՒԹՅԱՆ ՎՐԱ ԱԶԴՈՂ ԳՈՐԾՈՆՆԵՐԻ ԳՆԱՀԱՏՈՒՄԸ ՀՀ ՕՐԻՆԱԿՈՎ

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մագիստրատուրայի ուսանող

Բանալի բառեր - ֆինանսական կայունություն, ֆինանսական առողջության ցուցիչներ, ֆինանսական առողջության համաթիվ, OLS մեթոդ, ԱՄՀ

Ֆինանսական միջնորդությունը զգայուն է կարճա-ժամկետ պարտավորությունների միջոցով երկարաժամկետ ակտիվներ ֆինանսավորելու և պոտենցիալ ոչ բավարար չափի կապիտալի բուֆերների առկայության նկատմամբ: Եթե այս խոցելի մասերը չեն դիտարկվում, դրանք կարող են հանգեցնել տնտեսական ճգնաժամի:

Ֆինանսական կայունությունը նաև ժամանակակից տնտեսությունների կայուն զարգացման կարևոր բաղադրիչներից մեկն է: Այն ապահովում է տնտեսական համակարգի դիմակայունությունը արտաքին և ներքին ցնցումների նկատմամբ, նպաստում է ռեսուրսների արդյունավետ բաշխմանը և խթանում է տնտեսական աճը: Հայաստանի Հանրապետության պարագայում ֆինանսական կայունության գնահատումը հատկապես կարևոր է՝ հաշվի առնելով երկրի

տնտեսության կառուցվածքային առանձնահատկությունները, միջազգային տնտեսական միջավայրի փոփոխությունները և վերջին տարիներին տեղի ունեցած մակրոտնտեսական մարտահավերերը:

Համաշխարհային ֆինանսական ճգնաժամը և տարածաշրջանային անկայունությունները բացահայտել են ֆինանսական համակարգերի խոցելիությունները, ինչն ընդգծում է համակարգային ռիսկերի կառավարման անհրաժեշտությունը:

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