Branimir Kalaš[1]
Vera Mirović[2]
Nataša Pavlović[3]

How macroeconomic determinants influence the bank liquidity: The case of Serbia

Abstract: *The aim of the research paper is to highlight the importance of macroeconomic framework to banking sector stability, as well as determine how selected macro determinants influence bank liquidity. The paper analyzes the influence of macroeconomic determinants on bank liquidity in Serbia from 2008 to 2022. Employing OLS model, the research discovered a significant influence of GDP growth rate, inflation, unemployment and gross savings, while gross government debt negatively affects bank liquidity, but without statistical significance. The obtained results indicate that a higher GDP growth rate and inflation rate lead to greater bank liquidity, while a greater unemployment rate erodes the bank liquidity for the observed period. Likewise, a sufficient evel of gross savings enable positive influence on bank liquidity, while increased debt level has harmful effect on bank liquidity. These findings can be lucrative for bank managers, regulatory authorities, and economic policymakers during creating strategies, policies and procedures in terms of bank liquidity and stability.*

Keywords: *banks, liquidity, macroeconomic determinants, OLS model, Serbia*

Kako makroekonomske determinante utiču na likvidnost banaka: Slučaj Srbije

Apstrakt: *Cilj ovog istraživačkog rada je da istakne važnost makroekonomskog okvira za stabilnost bankarskog sektora, kao i da utvrdi kako odabrane*

[1]University of Novi Sad, Faculty of Economics in Subotica, branimir.kalas@ef.uns.ac.rs
[2] University of Novi Sad, Faculty of Economics in Subotica
[3] Novi Sad School of Business

47

makroekonomske determinante utiču na likvidnost banaka. Rad analizira uticaj makroekonomskih determinanti na likvidnost banaka u Srbiji u periodu od 2008. do 2022. godine. Korišćenjem OLS modela, istraživanje je otkrilo značajan uticaj stope rasta BDP-a, inflacije, nezaposlenosti i bruto štednje, dok bruto javni dug negativno utiče na likvidnost banaka, ali bez statističke značajnosti. Dobijeni rezultati ukazuju da viša stopa rasta BDP-a i inflacije vode ka većoj likvidnosti banaka, dok veća stopa nezaposlenosti umanjuje likvidnost banaka za posmatrani period. Takođe, dovoljan nivo bruto štednje omogućava pozitivan uticaj na likvidnost banaka, dok povećani nivo duga ima štetan efekat na likvidnost banaka. Ovi nalazi mogu biti korisni za menadžere banaka, regulatorne organe I kreatore ekonomskih politika pri kreiranju strategija, politika i procedura u pogledu likvidnosti i stabilnosti banaka.

Ključne reči*: banke, likvidnost, makroekonomske determinante, OLS model, Srbija*

1. Introduction

Banks have a significant role in the financial systems of many countries, particularly in developing economies where the structure of financial markets is dominantly oriented to banking. Their vital role is manifested in maintaining the resilience of the financial system (Cvetkovska et al., 2021) and the development of any country (Adelopo et al., 2022). Similarly, the banking industry has a crucial effect on economic progress, and ensuring stability and efficiency is a key duty for policymakers to promote investments and boost economic growth (Bucevska and Misheva, 2017; Athari et al., 2023). The well-designed banking sector enables positive effects on companies and citizens, as well as the state from the aspect of financing and supporting business projects. Accordingly, Batrancea et al. (2021) point out that commercial banks have a significant role in allocating funds through loans and deposits to their customers. Maintaining a secure and stable banking system is crucial for a well-functioning economy and serves as an indicator of overall economic well-being (Yahaya et al., 2022). In the banking industry, the liquidity significance is unquestionable and banks are tasked with ensuring liquidity on both the asset and liability sections of their balance sheets (Al-Matari, 2023). Banks should provide an adequate liquidity level to cover short-term liabilities and ensure stability in their business. The issue of liquidity represents one of the most essential issues in the banking sector due to these institutions operate with borrowing funds. The banks, recognized as the most reliable entity for handling money worldwide, hold great importance in establishing a strategy to guide the allocation of limited resources for economic progress (Gazi et al., 2024).

48

At the end of the period 1990 and early 2000, foreign banks had a leading role in the region's banking sectors, where the capital transfer of the Europe was accelerated to the banking sectors of Central and East Europe (Grubišić et al., 2021). This also can applied to the banking market in the Republic of Serbia, where the transformation process has begun since 2001. The result of transition was the influx of foreign capital into the banking sector which reduced a number of domestic banks (Radojičić et al., 2021). The financial market in the Republic of Serbia is characterized by its small size, underdevelopment, and a strong focus on banking (Đuranović and Filipović, 2021). Namely, the banking sector is the most prominent part of the financial system in the Republic of Serbia. Banks hold an outstanding 91% of the total assets in Serbia's financial system, highlighting the sector's importance. According to the latest data from the National Bank of Serbia, other financial institutions account for only 9.1%, with the insurance sector at 6%, pension funds at 0.9%, and leasing at 2.2%. This trend aligns with Bayar (2019) observation that banking organizations dominate financial sectors in transition economies. As of 2021, foreign banks commanded 87% of total banking assets in Serbia, while domestic state banks held 7% and private banks 6%. Currently, there are 22 licensed banks in Serbia, comprising 6 domestic and 16 foreign institutions (National Bank of Serbia, 2022). Based on the mentioned above, it can be noticed that the banking sector in the Republic of Serbia has a substantial level of liquid assets which contributes to greater stability, but it could have harmful implications for profitability. Thus, banks must maintain a balance between liquidity and profitability to ensure a sufficient business performance (Radovanov et al., 2023).

The research is structured as follows. The initial sections cover an introduction and literature review concering the determinants influencing liquidity. Subsequently, a methodological framework is presented, encompassing formulated hypotheses and chosen variables. The fourth section comprises empirical findings and discussion, involving the use descriptive statistics, and regression models with diagnostics tests to analyze the determinants influencing banks' liqudity in Serbia. In conclusion, a summary of the findings is provided along with suggestions for future research aimed at enhancing the financial performance of banks through improved liquidity management.

2. Literature review

The influence of macroeconomic determinants on bank liquidity is a vital aspect of financial stability and risk management within the banking sector. The main macroeconomic factors such as GDP growth, inflation rate, interest rate, exchange rate can influence bank liquidity levels in different ways. For example,

during recession periods, banks may face higher loan defaults and declined deposit inflows, leading to liquidity shortages. This can be worsened by a decrease in GDP growth, which affects the overall economic activity and the borrowers' ability to repay their loans. Moreover, a higher inflation rate can erode the real value of bank assets, leading to potential liquidity constraints. When it comes to unemployment and implications for bank liquidity, a higher unemployment rate can lead to increased financial stress on individuals, which may result in greater default rates on loans. Thus, banks may face higher levels of non-performing loans and reduced cash flows from interest payments. The issue of government debt in the context of bank liquidity has not often been considered in terms of assessing the influence of bank liquidity determinants. However, greater government debt levels can increase the default risk and erode investor confidence in the economy, leading to market volatility and liquidity challenges for banks. It implies that can spill over to the banking sector, where banks may face losses or increased funding costs. Mohammad et al. (2020) point out that long-term debt is significant for liquidity risk. Furthermore, gross savings have a significant role in shaping bank liquidity by providing a stable source of funding for banks and affecting overall economic stability. Higher levels of gross savings can lead to increased deposit inflows into banks, improving their liquidity. Similarly, an adequate level of gross savings can contribute to a robust banking system with sufficient liquidity to support lending activities and meet short-term obligations.

Many empirical studies have analyzed influence of macroeconomic determinants on bank liquidity (Vodová, 2011; Sopan and Dutta, 2018; Mazreku et al., 2019; Al-Harbi, 2020; Chowdhury and Salman, 2021; Yitayaw, 2021; Mdaghri and Oubdi, 2022; Pham and Pham 2022; Radovanov et al., 2023). For instance, Vodová (2011) analyzed banks' liquidity in Czech Republic from 2001 to 2009 and detected that GDP and inflation have negatve influence on banks' liquidity, while the unemployment rate has no significant impact. Sopan and Dutta (2018) confirmed that GDP growth rate and inflation negatively and positively impact the bank liquidity in India for the period 2005-2016. Furthermore, Mazreku et al. (2019) identified a significant and positive influence of GDP and unemployment on bank liquidity in Balkan countries from 2000 to 2015. Al-Harbi (2020) found that GDP and inflation positively and adversely influence on bank liquidity in OIC countries from 1989 to 2008. Chowdhury and Salman (2021) indicate a positive effect of GDP on bank liquidity, while inflation adversely affects the bank liquidity in Bangladesh from 2012 to 2019. Yitayaw (2021) determined that GDP and interest margin rate negatively influence the bank liquidity in Ethiopia. Mdaghri and Oubdi (2022) found that inflation, unemployment, savings and interest rate significantly and negatively affect the bank liquidity creation in 12 MENA countries from 2008 to 2017. The study of Pham and Pham (2022) revealed that GDP growth and inflation positively

50

influence bank liquidity in Vietnam for the period 2007-2018. Finally, Radovanov et al. (2023) confirmed that GDP growth, inflation, gross savings, and unemployment positively influence bank liquidity in West Balkan economies for the period 2007-2022.

3. Research methodology

The primary aim of the research is to estimate the influence of main macroeconomic determinants such as gross domestic product (GDP), inflation (INF), unemployment (UNM), gross savings (GRS), and gross government debt (GGD). The empirical study has analyzed annual data series from the National Bank of Serbia from 2008 to 2022. The variable description is reflected in Table 1.

Table 1. Variable selection

Variable	Abbreviation	Notation	Source
Dependent variable			
Liquidity	LIQ	% of total assets	National bank of Serbia
Independent variables			
Gross domestic product	GDP	annual rate	IMF
Inflation	INF	annual rate	IMF
Unemployment	UNM	annual rate	IMF
Gross savings	GRS	% of GDP	World Bank
Gross government debt	GGD	% of GDP	IMF

Source: Authors' calculation

Derived from the defined goal of the research, there is a general hypothesis and five auxiliary hypotheses.

H_1: Macroeconomic determinants have significant influence on banks' liquidity in Serbia.

$H_{1.1}$: GDP has positive influence on banks' liquidity in Serbia.

$H_{1.2}$: Inflation rate has negative influence on banks' liquidity in Serbia.

$H_{1.3}$: Unemployment rate has negative influence on banks' liquidity in Serbia.

H₁.₄: Gross savings has positive influence on banks' liquidity in Serbia.

H₁.₅: Gross government debt has negative influence banks' liquidity Serbia.

This study employs the Ordinary Least Squares (OLS) regression model to analyze the relationship between the dependent variable bank (LIQ) and a set of independent variables (GDP, INF, UNM, GRS, and GGD. The OLS method is chosen due to its efficiency in providing unbiased and consistent estimators under the Gauss-Markov assumptions. These assumptions include linearity, independence, homoscedasticity, and no multicollinearity among the independent variables (Greene, 2012; Wooldridge, 2016). The proposed model and variable selection are created based on similar studies such as Radovanov et al. (2023) and Mirović et al. (2024) that have analyzed bank liquidity and profitability determinants:

$$LIQ_t = \beta_0 + \beta_1 GDP_t + \beta_2 INF_t + \beta_3 UNM_t + \beta_4 GRS_t + \beta_5 GGD_t \ldots + e_t \qquad (1)$$

4. Empirical analysis and results

This section of the paper comprises descriptive analysis and applied OLS model with diagnostic tests such as multicollinearity test, serial correlation test, and misspecification test.

Table 2. Descriptive analysis

Variable	Mean	Std. Dev.	Maximum	Minimum
LIQ	40.07	4.35	49	35
GDP	2.16	2.82	7.39	-2.73
INF	5.18	3.73	12.41	1.12
UNM	16.68	5.08	24.6	9.88
GRS	15.6	3.91	21	9
GGD	53.72	11.89	71.24	30.56

Source: Authors' calculation

Considering the findings of applied descriptive statistics, we can notice banks achieved a mean liquidity level of 40.07% of total assets, where the highest value was identified in 2009 (49% of total assets). When it comes to explanatory variables, the economy of Serbia registered average GDP growth of 2.16% with mean values of inflation rate (5.18%) and unemployment rate (16.68%). Additionally, average shares of gross savings and gross government debt were 15.6% and 53.72% of gross domestic product. The highest standard deviation was recorded for the variable GGD (11.89), while the lowest standard deviation was observed for the variable GDP (2.16).

52

Table 3. Collinearity test

Variable	VIF	1/VIF
UNM	4.85	0.2059
GRS	4.74	0.2111
INF	3.82	0.2616
GGD	3.70	0.2704
GDP	1.52	0.6570
Mean value	3.73	

Source: Authors' calculation

To ensure the choice of independent variables is properly chosen, we used the VIF test to identify any potential multicollinearity issues. It can be noticed that the mean VIF value is 4.76 that indicates that there is no multicollinearity in variable selection.

Table 4. Regression specification tests

Diagnostics tests		
BP test	Chi2(1)	0.11
	Prob > chi2	0.741
BG test	Chi2(1)	0.502
	Prob > F	0.479
RR test	F (3,3)	1.46
	Prob > F	0.404
DW test	F (9,15)	2.246

Source: Authors' calculation

After checking the multicollinearity concern, we applied diagnostics tests to asses heteroskedasticity (BP test), serial correlation (BG test and DW test), and misspecification (RR test). Given that the p-values of these tests are greater than 0.05, it can be concluded that the proposed model is appropriate.

Table 5. OLS model

Variable	Coefficient	Std. Err.	Prob.	Hypothesis
GDP	0.467	0.181	0.001	Accepted
INF	0.272	0.135	0.045	Accepted
UNM	-0.161	0.076	0.036	Accepted
GRS	0.313	0.151	0.042	Accepted
GGD	-0.149	0.298	0.631	Rejected
R-squared	0.647			
Prob > F	0.000			

Source: Authors' calculation

Derived from the obtained results, we can confirm the significant effect of gross domestic product (GDP), inflation (INF), unemployment (UNM) and gross savings (GRS) on banks' liquidity. Precisely, GDP, INF and GRS positively affect the banks' liquidity, while a higher unemployment rate reduces banks' liquidity level measured by liquid assets to total assets. An increase in GDP by 1% contributes to a growth in LIQ by 0.46%, while the rise in INF and GRS allows for a slightly smaller increase in LIQ by 0.27% and 0.31%, respectively. The positive effect of GDP on LIQ has also been confirmed in previous studies (Mazreku et al., 2019; Al-Harbi, 2020; Chowdhury and Salman, 2021; Pham and Pham, 2022; Radovanov et al., 2023). Additionally, positive influences of INF and GRS on LIQ were identified in empirical research (Sopan and Dutta, 2018; Pham and Pham, 2022; Radovanov et al., 2023). The negative impact of UNM on LIQ was in line with previous studies such as (Mgadhri and Oubdi, 2022). Contrary, gross government debt negatively affects the banks' liquidity, but no significant. Specifially, a 1% rise in UNM decreases LIQ by 0.16%, while a 1% growth in GGD reduces LIQ by 0.15%. The accuracy and consistency of the established model are manifested by the R-squared value (0.647) and F value (0.000). This means that 67% of the variation in the dependent variable LIQ is explained by the selected independent variables (GDP, INF, UNM, GRS and GGD).

5. Conclusions

The nexus between macroeconomic determinants and bank liquidity is complex and multifaceted. Banks must closely manage and monitor these determinants to ensure sufficient liquidity level and meet their obligations in typical and exceptional economic circumstances. The research analyzes the influence of observed macroeconomic determinants on banks' liquidity in Serbia from 2008 to 2022. The empirical research verified that gross domestic product (GDP), inflation (INF) and gross saving (GRS) significantly and positively affect banks' liquidity, this indicates that auxiliary hypotheses ($H_{1.1}$, $H_{1.2}$ and $H_{1.4}$) can be accepted. The findings indicate that a robust economy boosts bank liquidity by improving overall financial health. Low, stable inflation also plays a vital role, as it leads to predictable cash flows for banks, further enhancing their liquidity. Additionally, higher gross savings translate to more deposits for banks, allowing them to offer loans more efficiently.Furthermore, unemployment has a negative impact on banks' liquidity, that signifies the auxiliary hypothesis $H_{1.3}$ can be confirmed. Additionally, gross government debt (GGD) negatively affects banks' liquidity but without significance, which implies that auxiliary hypothesis $H_{1.5}$ can be rejected. Reducing unemployment leads to increased spending, boosting the demand for financial products and services, which in turn enhances bank liquidity. Additionally, lowering debt levels strengthens both

54

individual and corporate financial stability, making it less likely for borrowers to default and further improving banks' liquidity. Based on above mentioned, the general hypothesis H_1 can be partially accepted due to four of five auxiliary hypotheses being accepted. The paper expands the current theoretical opus about bank liquidity determinants and enables a fresh interpretation of existing data. Moreover, empirical findings reflect new insights and perspectives for the banking industry, business and scientific community. Specifically, conducted research suggests practical implications in the bank liquidity field, where these findings can be useful for policymakers, regulators, and financial institutions to enhance financial stability and mitigate liquidity risk within the banking system. Finally, the paper provides a better understanding of the relationship between macroeconomic determinants and bank liquidity position and gives certain directions about their influence on the sample of the banking sector in Serbia. The limitation of the paper can be presented in estimating the macroeconomic framework without considering bank-specific determinants such as bank size, profitability, risk type etc. Future research should include a comprehensive examination of internal and external determinants that may have significant implications on bank liquidity movements in Serbia, as well as the Balkan region.

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56

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