International Journal of Applied Economics, Finance and Accounting
ISSN 2577-767X
Vol. 12, No. 2, pp. 69-77.
2022
DOI: 10.33094/ijaefa.v12i2.559

The Impact of Macroeconomic Factors on Banks' Liquidity from 2008 to 2020

Driton Qehaja[1]
Malsore Gashi[2]
Arber Hoti[3*]

[1,2,3]*Faculty of Economics, University of Prishtina 'Hasan Prishtina', Kosovo.*
[1]*Email: driton.qehaja@uni-pr.edu*
Tel: +38344525165.
[2]*Email: malsore.gashi2@student.uni-pr.edu*
Tel: +38349622154
[3]*Email: arber.hoti@uni-pr.edu*
Tel: +38349373681

Keywords:
Bank liquidity
Inflation
Unemployment
GDP per capita.

JEL Classification
E00; G21; G30; M41.

Received: *17 March 2022*
Revised: *25 April 2022*
Accepted: *9 May 2022*
Published: *23 May 2022*
(Corresponding Author)*

Abstract

Liquidity is fundamental to the well-being of financial institutions, particularly banks. It determines the growth and development of banks as it ensures the proper functioning of financial markets. This research aims to examine the impact of macroeconomic variables (GDP per capita, inflation rate, and unemployment rate) on banking liquidity in the 28 European Union member countries, Turkey, and Switzerland from 2008 to 2020. The study relied on secondary data from the databases of international organizations, including the World Bank and Eurostat, to compile its sample of 390 observations. Since the research spans numerous states over 13 years, panel data are used, which are estimated using a simple linear regression model using the least squares method. According to the regression findings, GDP per capita and the unemployment rate positively affect bank liquidity, whereas the inflation rate has a negative effect on bank liquidity. Also, the regression analysis did not find any statistically significant impact of GDP per capita and unemployment rate on bank liquidity. This study shows that the inflation rate is a statistically significant macroeconomic variable that affects banking liquidity.

Funding: This study received no specific financial support.
Competing Interests: The authors declare that they have no competing interests.

1. Introduction

The object in this paper is to analyze the role and impact of macroeconomic factors, such as GDP per capita, unemployment rate and inflation rate, in bank liquidity in specific countries from 2008 to 2020. Macroeconomic factors affect banks' liquidity but are not controlled by the bank's management as they are by external factors. The banking system is one of the most important spheres of the national economy of any state. Banks have always been, and will continue to be, central to managing the economy. The study of banking is one of the urgent tasks facing the banking system both at the current stage and in the future. Moreover, this topic is critical as the banking system is one of the integral structures of a market economy. Since every transaction or commitment has implications for a bank's liquidity, liquidity management is paramount (Li, 2020; Maddaloni, 2015). Banks should give high priority to their liquidity strategy as the main activity of banks is to establish and maintain adequate liquidity. Each bank creates its own liquidity management system, which focuses on good management of their liquidity. Banks must ensure that the liquidity management system is quantitatively and qualitatively consistent with the bank's size, activity type, and liquidity risk exposure (Davydov, Vähämaa, & Yasar, 2021).

2. Literature Review

Liquidity is the most critical indicator of the efficiency and reliability of the banking system as it gives information on how reliable a bank is. A concept such as a bank's liquidity – its ability to quickly meet obligations to depositors, investors, and creditors – is fundamental when choosing a bank. The liabilities of a financial institution can be current and potential (Berger & John, 2017; Bonner, Lelyveld, & Zymek, 2015; Chen, Phuong, & Lin, 2014). Banks' liquidity factors are external (macroeconomic factors) and internal (banking factors), but only the impact of macroeconomic factors on banking liquidity are analyzed in this

paper. Financial security and stability are critical factors for economic growth in a country. In order to have financial stability, there must be a developed banking system in which banks are more stable and more liquid to the return of deposits of their customers and better prepared for various risks that may arise both within the country and overseas, such unpredictable natural hazards (Angora & Roulet, 2011). Various authors have used econometric models to examine the connection between liquidity and macroeconomic variables. Based on their research of liquidity risk factors in commercial banks, (AL-QUDAH, 2020; Covas & Driscoll, 2011; Singh & Anil, 2016; Vodová, 2011a) found that macroeconomic aggregates have a significant effect on bank liquidity. In particular, the inflation rate is deteriorating in the general economy and banks' liquidity, so there is a negative correlation between the high inflation rate and the liquidity available to banks.

Inflation is the rate at which the general level of prices of goods and services rises and, as a result, purchasing power falls. Vodová (2011a), Vodová (2011b), Vodová (2013), Cucinelli (2013), Roman and Sargu (2015) and Sopan and Dutta (2018) showed that banks should maintain high liquidity while inflation rates fall and vice versa because it helps maintain the stability of the economy and the flow of liquidity in the system.

Maintaining the liquidity of a bank amid changing general price levels is an essential objective of each bank. Price stability in the cost of liquidity can bring problems, and every bank must reach a compromise between them. If a bank does not take care of price stability, it may not survive for a more extended period, while on the other hand, if it does not take care of liquidity, it may face bankruptcy (Audo, 2014; Mazreku, Morina, Misiri, Spiteri, & Grima, 2019; Nguyen & Nguyen, 2021; Rupeika-Apoga, Zaidi, Thalassinos, & Thalassinos, 2018; Shamsub & Haque, 2021; Trenca, Petria, & Corovei, 2015). For these reasons, price stability should be given due consideration as it may affect a bank's liquidity. Patel (2012) believes that liquidity is of great importance for both internal and external analysts because of its close relationship with day-to-day operations. A weak liquidity position threatens a bank's solvency and profitability and makes it unsafe and unhealthy. The degree of liquidity constraint depends on the actual value of money, which, in turn, depends on the inflation rate (Adelopo, Lloydking, & Tauringana, 2018; Dodig, 2020; Semenova & Vitkova, 2019). Inflation reduces the actual value of money and thus makes liquidity constraints mandatory. This problem can be solved by having a financial intermediary who channels funds from entrepreneurs with excess liquidity to those with no liquidity. However, intermediation, especially when there is high inflation, involves resource costs, especially in borrowers' repayment obligations.

Of course, costly mediation is used when inflation is relatively high (liquidity problem is severe) and not when inflation is relatively low (liquidity problem is mild). When a currency has surplus liquidity, it will enter different markets, leading to different effects. If it flows into fundamental markets, it will lead to rising prices, causing inflation. If it flows into the financial market, it will raise the cost of capital, causing asset bubbles (Chiu & Cesaire, 2008). GDP per capita shows the monetary value of the final goods and services produced in a country in a given period. Sopan and Dutta (2018), Bunda and Desquilbet (2008), Moussa (2015), Vodová (2013) and Adelopo et al. (2018) stated that GDP per capita has a positive impact on bank liquidity, which means that GDP per capita growth will affect liquidity growth by banks and vice versa.

In contrast, Aspachs, Nier, and Tiesset (2011); Dhal, Kumar, and Ansari (2011); Semenova and Vitkova (2019); Chen et al. (2014); Delechat, Camila, Priscilla, and Svetlana (2012) and Nikolaou (2009) found that GDP per capita has a negative effect on bank liquidity, implying that GDP growth per capita will affect bank liquidity reduction and vice versa. In 2006, an analysis of a panel of English banks reported a definite negative correlation between bank liquidity and GDP per capita and net interest margin, seen as an opportunity cost of holding liquid assets (Munteanu, 2012). It is noted that the growth rate of GDP per capita during these years has slowed down, and investors try not to borrow during periods of depression. Despite the Romanian Central Bank's ongoing efforts to reduce interest rates to boost lending and borrowing, banks strive to be more conservative and retain liquidity (Munteanu, 2012). The macroeconomic context is also likely to influence banks' activities and investment decisions, such as their liquidity profile Baltas, Kapetanios, Tsionas, and Izzeldin (2017); Berger and John (2017); Horvath, Seidler, and Weill (2016). For example, demand for diversified financial products is higher during an economic boom and may improve a bank's ability to expand its loan and securities portfolio at a higher rate. Similarly, economic downturns are exacerbated by declining bank lending. Based on these arguments, we expect banks to increase their transformational activities and illiquidity during an economic boom. GDP measures the capacity of an economy to produce goods and services in any country and is considered one of the most critical factors that can affect banks' liquidity. During the growth of GDP, business activities grow and, consequently, the demand for loans increases. As a result, banks will be more likely to lend when they reduce their liquid assets. This could lead to a negative correlation between economic growth and liquidity (El-Chaarani, 2019).

An important factor determining a country's economy is aggregate consumer spending on goods and services. If a country's economic conditions are stable, private consumption is also stable. This means that income levels are rising, so banks have a higher level of liquidity (Purwohandoko & Iriani, 2021).

The unemployment rate is the percentage of the unemployed labor force in a country. A high unemployment rate represents a weak or failed economy. Horvath et al. (2016) found that rising unemployment rates lowered loan demand, increasing a bank's liquidity. A bank's liquidity situation is vulnerable to changeable macroeconomic fluctuations. According to Madhi (2017) unemployment has a significant negative impact on bank liquidity. Higher unemployment reduces capital and hinders the creation

of liquidity. This finding is consistent with the fact that banks suffer from reduced solvency and create lower liquidity in turbulent times. In contrast, the study by Munteanu (2012) suggested that an increase in the unemployment rate in the economy results in increased bank liquidity. In 2009, the liquidity of state-owned savings banks in Germany was negatively correlated with the monetary policy interest rate and the unemployment rate (Rauch, Sascha, Andreas, & Marcel, 2011). Also, the level of liquidity in the previous period was directly determinant of the liquidity analyzed.

Messai and Gallali (2019) argued that an increase in the unemployment rate causes a deterioration in the consumers' ability to generate cash flow and pay off debt. For companies, an increase in unemployment results in lower consumption of goods and services, consequently leading to a decrease in the firms' cash flow and a weak debt-related position. Therefore, the effect of unemployment on bank liquidity is expected to be positive because, as unemployment increases, individuals and firms receive less credit. Consequently, banks have more cash and are more liquid. However, El Khoury (2015) argued that an increase in the unemployment rate will reduce the demand for credit and thus increase the banks' liquidity. Moreover, banks would refuse to guarantee the payment of installments and, therefore, would be discouraged from lending. Consequently, there is a positive correlation between the unemployment rate and banks' liquidity.

The OECD (BCBS, 2019; Slovik & Boris, 2015) estimated that the medium-term impact of the implementation of Basel III[1] on GDP growth would be in the range of -0.05% to -0.15% per year. Economic output would be mainly affected by an increase in bank credit differences as banks experience an increase in bank financing costs due to higher capital requirements for their customers. Banks were anticipated to increase their credit spreads by an average of 15 basis points to meet capital requirements that came into force in 2015. Capital requirements that took effect in 2019 (7% for equity ratios and 8.5% for Tier 1 capital ratios) have the potential to increase bank lending disparities by about 50 basis points. To the extent that monetary policy would no longer be constrained by the lower zero limit, the impact of Basel III on economic output could be offset by a decrease (or delayed increase) in monetary policy rates by around 30 to 80 basis points. Basel III was also criticized for negatively affecting the financial system's stability by increasing the banks' incentives to play the regulatory framework (Mdaghri & Oubdi, 2021).

3. Methodology and Data

The literature review findings were utilized to assess how various economic variables, such as GDP per capita, the inflation rate (IFLR), and the unemployment rate (UNPR), would impact bank liquidity. This chapter presents the basic principles of the research methodology, the selection of the appropriate research method, and the process of building the empirical model and identifying and measuring its components. It also presents the adapted approach to examine the effect of critical determinants on banks' liquidity, the type of data used, and the techniques applied to collect data, the sample size, and the methods used to analyze the data.

Table 1 presents the variables used in the model.

Table 1. Description of variables.

No.	Variable	Type	Description	Source	Unit of measurement
1	Banking liquidity	Dependent	Banks' available amount of cash and other assets that can be easily converted into cash to cover short-term financial liabilities.	Eurostat	%
2	GDP per capita	Independent	The monetary value of the final goods and services produced in a country in a given period related to the population number.	Eurostat	Euro
3	Inflation rate	Independent	The increase of the overall level of prices of goods and services.	World Bank	%
4	Unemployment rate	Independent	The number of unemployed as a percentage of the labor force.	World Bank	%

[1]The Basel III framework is a central element of the Basel Committee's response to the global financial crisis of 2007–2008. It addresses some shortcomings in the pre-crisis regulatory framework and provides a basis for a resilient banking system that will help avoid the accumulation of systemic weaknesses. The framework will allow the banking system to support the real economy during the economic cycle. This document, originally published in December 2010 and updated in June 2011, represents the initial phase of Basel III reforms, which focused on strengthening the relevant components of the regulatory framework. For more details, see (Angora & Roulet, 2011; BCBS, 2021; Pohl, 2017; Slovik & Boris, 2015).

3.1. Description of Variables

The dependent variable considered in this study is bank liquidity for the 28 European Union countries, Turkey and Switzerland for the period from 2008 to 2020. The independent variables include GDP per capita, inflation rate (IFLR), and unemployment rate (UNPR).

3.2. Data Collection and Analysis

Because the model includes 28 European Union countries, Turkey and Switzerland for 13 years, it was impossible to collect primary direct data in the field. Thus, the study is based on quantitative secondary data taken from public databases by both the World Bank and Eurostat. This data was then further analyzed using Stata software. The study relied on panel data to achieve the research goal. Thus, a correlation analysis and a multiple linear regression analysis using the least squares method were used to examine the collected panel data. Based on 390 observations, the mean values and standard deviations were used to analyze overall data trends from 2008 through to 2020.

3.3. Model Specification

The model specification provides the definition of dependent and independent variables included in the model and the expectations regarding the signs and the size of the function parameters. The available data were processed and analyzed based on three models: the multiple linear regression model with the ordinary least squares method (OLS), the fixed effects (FE) model, and the random effects (RE) model, but from all these models, the results show that the multiple linear regression model with random effects is more appropriate to analyze the impact of macroeconomic factors (GDP per capita, inflation rate, and unemployment rate) on bank liquidity as the results of this model are more in line with existing evidence and literature which were discussed above. Furthermore, the Breusch–Pagan Lagrange test and the Hausman test were used to compare the econometric models. Based on the results obtained, the simple linear regression model with the random effects method turned out to be more suitable for this research.

The following multiple linear regression model was used to evaluate the influence of independent factors on banking liquidity:

$$LB_i = \alpha + \beta_1 (GDP\ per\ capita) + \beta_2 (inflation\ rate) + \beta_3 (unemployment\ rate) + \mu_i$$

Where:

LB_i = bank liquidity.

α = constant coefficients (intercepts).

β_1 = the parameter estimated by the explanatory variable "GDP per capita".

β_2 = the parameter estimated by the explanatory variable "inflation rate".

β_3 = the parameter estimated by the explanatory variable "unemployment rate".

μ_i = error term.

4. Results and Discussion

4.1. Interpretation of Results

The variables in the model are listed in Table 2 (descriptive statistics), which shows that there are 390 observations for each one. According to Table 2, the average bank liquidity in these countries from 2008 to 2020 is about 8.20%. Given that the average bank liquidity is at 8.20%, the standard deviation for this variable seems to be very high. Regarding the minimum and maximum values, it is clear that the minimum value equals the inflation rate (-4.5%, indicating deflation). On the other hand, the maximum value is for GDP per capita (4,920,000 euros).

Table 2. Descriptive statistics.

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Bank liquidity	390	8.207	3.972	0.2	34.2
GDP per capita	390	206.000	650.000	8.503	4.920.000
Unemployment rate	390	8.664	4.487	2	27.5
Inflation rate	390	1.961	2.482	-4.5	16.33

Table 3 presents the correlation coefficient, which shows the relationship between the variables. The correlation coefficient can take values from -1 to 1. A coefficient closer to -1 tells us that there is a strong negative correlation between the variables, and a coefficient close to 1 tells us that there is a strong positive correlation. This coefficient is used to test for the problem of multicollinearity.

This problem appears in cases where the independent variables have a strong correlation between positive and negative (when the coefficient has a value greater than 0.8). In the analyzed model, the problem of multicollinearity is not presented because the independent variables have a correlation of less than 0.8 between them. In addition to multicollinearity, Table 3 explains the correlation between independent and dependent variables. Based on the findings, it is concluded that there is a weak positive relationship between bank

liquidity and GDP per capita (r = 0.37), which suggests that when GDP per capita grows so will bank liquidity, and vice versa. The relationship between bank liquidity and unemployment rate (r = 0.15) suggests that bank liquidity will increase if the unemployment rate rises, and vice versa. Finally, we have the relationship between the inflation rate and bank liquidity. It is shown that there is a weak positive relationship (r = 0.16), which suggests that a rise in the inflation rate would boost bank liquidity, and vice versa.

Table 3. Correlation coefficient.

Variable	Bank liquidity	GDP per capita	Unemployment rate	Unemployment rate
Bank liquidity	1.000			
GDP per capita	0.372	1.000		
Unemployment rate	0.150	-0.137	1.000	
Inflation rate	0.162	0.054	-0.082	1.000

Table 4 shows the results of the multiple linear regression using ordinary least squares (OLS) methods. The explanatory power of the independent factors in the dependent variable was examined, and R-statistics were used to determine the strength and reliability of our model and how explanatory the independent variables are. The p-values indicate the significance or influence of the individual variables on bank liquidity.

Table 4. Multiple linear regression (OLS).

Bank liquidity	Coef.	St. Err.	t-value	p-value	[95% Conf.	Interval]	Sig.
GDP per capita	0.000	0.000	8.58	0.000	0.000	0.000	***
Unemployment rate	0.192	0.041	4.72	0.000	0.112	0.272	***
Inflation rate	0.254	0.073	3.47	0.001	0.110	0.397	***
Constant	5.549	0.439	12.64	0.000	4.686	6.413	***
Mean dependent var.		8.207	SD dependent var			3.972	
R-squared		0.205	Number of obs.			390.000	
F-test		33.101	Prob > F			0.000	
Akaike info. crit. (AIC)		2100.401	Bayesian info. crit. (BIC)			2116.266	

Note: *** p<0.01.

The results of multiple linear regression with a fixed effect are shown in Table 5. According to the data in Table 5, the model selected for this analysis has a poor explanation, as 20% of the changes that occur in bank liquidity are explained through the independent variables that are included in the model (i.e., GDP per capita, rate of inflation and unemployment rate). According to the results obtained by the estimator with the OLS method, it is concluded that all the independent variables included in the model are significant or have a statistically significant impact on bank liquidity. Also, from Table 5, we can conclude that all variables included in the model positively correlate with bank liquidity.

Table 5. Multiple linear regression (Fixed effects).

Bank liquidity	Coeff.	Std. Err.	t-value	p-value	[95% Conf.	Interval]	Sig.
GDP per capita	0.000	0.000	-5.41	0.000	0.000	0.000	***
Unemployment rate	-0.061	0.039	-1.56	0.119	-0.138	0.016	**Not Significant**
Inflation rate	-0.284	0.056	-5.09	0.000	-0.394	-0.174	***
Constant	10.110	0.445	22.70	0.000	9.235	10.986	***
Mean dependent var.		8.207	SD dependent var.			3.972	
R-squared		0.124	Number of observations			390.000	
F-test		16.854	Prob > F			0.000	
Akaike info. crit. (AIC)		1630.746	Bayesian info. crit. (BIC)			1646.611	

Note: *** p < 0.01.

In addition to the OLS evaluators, the model was analyzed with two other evaluators—random effects and fixed effects. These two evaluators are compared through the Breusch–Pagan Lagrange tests. Stata automatically compares the OLS estimator and the fixed effects estimator using the F-test, which is calculated and presented at the end of the fixed effects regression. Table 5 shows the F-test tests hypothesis 0, where all fixed effects are equal to 0 or statistically insignificant. So, we come to our result where we see that Prob > F = 0.0000, which shows that the model with fixed effects is very accurate and reliable. However, in the OLS estimator, we also have Prob > F = 0.0000, so we continue to use the OLS model because the explanatory nature of this model is higher in the OLS estimator than in the FE estimator.

The random effects evaluator is presented Table 6. Even in this case, a comparison must be made between the random effects evaluator and the OLS evaluator to see which model is more appropriate. The comparison between these two evaluators is presented in Table 7 via the Breusch–Pagan Lagrange test.

Table 6. Multiple linear regression (Random effects).

Bank liquidity	Coeff.	Std. Err.	t-value	p-value	[95% Conf.	Interval]	Sig.
GDP per capita	0.000	0.000	-1.29	0.196	0.000	0.000	Not Significant
Unemployment rate	-0.005	0.040	-0.13	0.901	-0.083	0.073	Not Significant
Inflation rate	-0.216	0.058	-3.70	0.000	-0.330	-0.102	***
Constant	8.823	0.661	13.34	0.000	7.527	10.119	***
Mean dependent var.	8.207		SD dependent var.		3.972		
Overall r-squared	0.133		Number of obs.		390.000		
Chi-square	15.326		Prob > chi-square		0.002		
R-squared within	0.082		R-squared between		0.402		

Note: *** p < 0.01.

The test in Table 7 is used to compare the two econometric models (OLS and random effects), and based on the value of Prob > Chibar2 = 0.0000, we accept the model with the random effects estimator and reject the OLS estimator.

Table 7. Breusch–Pagan Lagrange test.

Estimated Results	Variance	Sd = sqrt (Variance)
Liquidity	15.78	3.972
e	4.101	2.025
u	6.613	2.571
Test: Variance (u)		
Chibar2 (01) = 644.13		
Prob > chibar2 = 0.000		

The fixed effects and random effects models are compared to select the study's final model using the Hausman test, which is presented in Table 8. The zero hypothesis is the random effects estimator, and the alternative hypothesis is the fixed effects estimator. The model was selected based on p-value statistics. In cases where this statistic is less than 0.05, we reject the null hypothesis and accept the alternative hypothesis. In contrast, we do not reject the null hypothesis when this statistic is greater than 0.05. In our model, we have a p-value of 1.0000, so we reject the fixed effects estimator and accept the random effects estimator.

Table 8. Hausman test.

	Coeff.
Chi-square test value	0.00
P-value	1.0000

Prob > F = 0.000 once again shows us that the random effects model is very reliable and very accurate, hence the decision to use this estimator. Since the random effects evaluator turns out to be the most reliable evaluator of our model, we will continue to use this evaluator to compare the importance of the years we have taken in our model.

Table 9 depicts the random effects model across the years, providing temporal comparisons.

4.2. Discussion of Results

When the model's output is compared to the existing data and literature presented above, the findings indicate that the link between bank liquidity and inflation is consistent with writers such as Moussa (2015) and Sopan and Dutta (2018). These authors argue that there is a negative relationship between inflation rate and bank liquidity. The same relationship is shown by the results of the selected model (random effects), while the results contradict those of Chiu and Cesaire (2008). Price rises affect a surplus of liquidity, as the authors claim. However, the regression findings in this study refute this assertion, and show that there is a positive link between these variables. When we compare the relationship between GDP per capita and bank liquidity to the regression results and the arguments of various authors, we can conclude that the regression results are consistent with authors such as Sopan and Dutta (2018); Bunda and Desquilbet (2008) and Bunda and Desquilbet (2008). They argue that GDP per capita has a positive impact on bank liquidity despite the findings contradicting writers such as Aspachs, Erlend, and Muriel (2005); Munteanu (2012) and Chen et al. (2014), who claim that GDP per capita has a negative impact on bank liquidity. Regarding the relationship between the unemployment rate and banking liquidity, it can be seen that the regression results support the arguments of authors such as Madhi (2017) and Rauch et al. (2011), who argue that there is a negative relationship between the unemployment rate and bank liquidity. In contrast, the results contradict authors such as

Munteanu (2012) and Messai and Gallali (2019), who argue that a positive relationship exists between the unemployment rate and bank liquidity.

Table 9. Random effects model over the years.

Bank liquidity	Coeff.	Std. Err.	t-value	p-value	[95% Conf	Interval]	Sig.
GDP per capita	0.000	0.000	-2.70	0.007	0.000	0.000	***
Unemployment rate	0.028	0.045	0.63	0.531	-0.060	0.117	Not Significant
Inflation rate	0.010	0.077	0.13	0.896	-0.140	0.160	Not Significant
Year1	-2.361	0.626	-3.77	0.000	-3.587	-1.135	***
Year2	-1.897	0.532	-3.57	0.000	-2.939	-0.855	***
Year3	-1.855	0.549	-3.38	0.001	-2.931	-0.780	***
Year4	-1.665	0.567	-2.94	0.003	-2.776	-0.555	***
Year5	-1.092	0.566	-1.93	0.053	-2.201	0.016	*
Year6	-0.208	0.552	-0.38	0.707	-1.289	0.874	Not Significant
Year7	0.064	0.543	0.12	0.906	-1.000	1.129	Not Significant
Year8	0.170	0.541	0.31	0.754	-0.890	1.230	Not Significant
Year9	-0.277	0.529	-0.53	0.600	-1.314	0.759	Not Significant
Year10	0.137	0.529	0.26	0.796	-0.899	1.173	Not Significant
Year11	0.067	0.532	0.13	0.900	-0.977	1.110	Not Significant
Year12	-0.023	0.529	-0.04	0.965	-1.060	1.013	Not Significant
Year13	0.000	.	.	.	.	.	Not Significant
Constant	8.936	0.732	12.21	0.000	7.502	10.370	***
Mean dependent var	8.207		SD dependent var		3.972		
Overall r-squared	0.012		Number of obs.		390.000		
Chi-square	77.596		Prob > chi-square		0.000		
R-squared within	0.227		R-squared between		0.196		

Note: *** $p < 0.01$, * $p < 0.1$.

5. Conclusions and Recommendations

This study has important implications for banks, policymakers, and consumers as the banking system is essential to a country's economy. Among the macroeconomic factors in this study, the inflation rate is presented as a statistically significant measure of banks' liquidity. Therefore, it is recommended that all commercial banks consider the macroeconomic environment when drafting strategies to improve their liquidity. As supported by the literature, the banking system is one of the most critical areas of the national economy of any country. Therefore, the positive relationship between GDP per capita and banking liquidity is in line with this theory.

The results of the regression analysis essentially complement the results of the literature. Liquidity trends show that the inflation rate significantly impacted banks' liquidity during the period from 2008 to 2020 in the countries mentioned above. According to the regression results and the literature reviewed, GDP per capita positively impacts bank liquidity. The results also show a negative correlation between the unemployment rate and bank liquidity. Examination of these macroeconomic factors have shown that GDP per capita has the lowest impact on the evolution of bank liquidity, while the inflation rate has the most significant impact.

In this paper's statistical analysis, the impact of macroeconomic factors on bank liquidity does not include all possible macroeconomic variables; therefore, a recommendation for future research is to include other macroeconomic factors and specific banking factors. There are a number of factors that can affect a bank's liquidity and can be researched in the future, including deposit flight, loan defaults, and changes in interest rates. Deposit flight occurs when customers withdraw their deposits en masse, due to concerns about the safety of their money or the health of the bank. This can put significant strain on a bank's ability to meet its obligations. Loan defaults occur when borrowers are unable to repay their loans, leading to losses for the bank. Changes in interest rates can also affect liquidity, as banks may need to post additional collateral if rates rise or may be able to borrow more easily if rates fall.

References

Adelopo, I., Lloydking, R., & Tauringana, V. (2018). Determinants of bank profitability before, during and after the financial crisis. *International Journal of Managerial Finance*, *14*(4), 378-398.Available at: https://doi.org/10.1108/ijmf-07-2017-0148.

AL-QUDAH, A. M. (2020). Macroeconomic and bank-specific variables and the liquidity of Jordanian commercial banks. *The Journal of Asian Finance, Economics, and Business*, *7*(12), 85-93.Available at: https://doi.org/10.13106/jafeb.2020.vol7.no12.085.

Angora, A., & Roulet, C. (2011). Transformation risk and its determinants: A new approach based on the Basel III liquidity management framework. University of Limoges. Retrieved from: https://www.semanticscholar.org/paper/Transformation-Risk-and-its-Determinants%3A-A-New-on-Angora-Roulet/1e14170a9d9bf3861f6ff354259be56114401196.

Aspachs, O., Erlend, N., & Muriel, T. (2005). Liquidity, banking regulation and the macroeconomy: Evidence on bank liquidity holdings from a panel of UK-resident banks. Retrieved from: http://dx.doi.org/10.2139/ssrn.673883 or https://ssrn.com/abstract=673883.

Aspachs, O., Nier, E. W., & Tiesset, M. (2011). Liquidity, banking regulation and the macroeconomy. *SSRN Electronic Journal*.Available at: https://doi.org/10.2139/ssrn.673883.

Audo, P. N. (2014). *The relationship between inflation rates and liquidity of commercial banks in Kenya*. Doctoral Dissertation.

Baltas, K. N., Kapetanios, G., Tsionas, E., & Izzeldin, M. (2017). Liquidity creation through efficient M&As: A viable solution for vulnerable banking systems? Evidence from a stress test under a panel VAR methodology. *Journal of Banking & Finance*, *83*, 36-56.Available at: https://doi.org/10.1016/j.jbankfin.2017.05.005.

BCBS. (2019). Basel committee on banking supervision basel III monitoring report October 2019. Retrieved from: https://www.bis.org/bcbs/publ/d477.pdf.

BCBS. (2021). Assessing the impact of basel III: Evidence from macroeconomic models: Literature review and simulations. Retrieved from https://www.bis.org/bcbs/publ/wp38.pdf. 1–89.

Berger, A. N., & John, S. (2017). Bank liquidity creation and real economic output. *Journal of Banking and Finance*, 1-47.Available at: https://doi.org/10.2139/ssrn.2515361.

Bonner, C., Lelyveld, I. v., & Zymek, R. (2015). Banks' liquidity buffers and the role of liquidity regulation. *Journal of Financial Services Research*, *48*(3), 215-234.Available at: https://doi.org/10.1007/s10693-014-0207-5.

Bunda, I., & Desquilbet, J.-B. (2008). The bank liquidity smile across exchange rate regimes. *International Economic Journal*, *22*(3), 361-386.Available at: https://doi.org/10.1080/10168730802287952.

Chen, I.-J., Phuong, N. L., & Lin, W. (2014). The determinants of bank liquidity buffer. *Available at SSRN*.Available at: https://doi.org/10.2139/ssrn.2313541.

Chiu, J., & Cesaire, M. (2008). Financial intermediation, liquidity and inflation. Bank of Canada Working Paper 2008-49. Retrieved from: https://www.bankofcanada.ca/wp-content/uploads/2010/02/wp08-49.pdf.

Covas, F. B., & Driscoll, J. C. (2011). The macroeconomic impact of adding liquidity regulations to bank capital regulations. Finance and Economics Discussion Series, N. 2014-85, Federal Reserve Bank of San Francisco, Retrieved from: https://www.frbsf.org/economic-research/wp-content/uploads/sites/4/Session_2_Paper_2_Covas_Driscoll_regulations.pdf.

Cucinelli, D. (2013). The determinants of bank liquidity risk within the context of Euro area. *Interdisciplinary Journal of Research in Business*, *2*(10), 51-64.

Davydov, D., Vähämaa, S., & Yasar, S. (2021). Bank liquidity creation and systemic risk. *Journal of Banking & Finance*, *123*, 106031.Available at: https://doi.org/10.1016/j.jbankfin.2020.106031.

Delechat, C., Camila, H. A., Priscilla, S. M., & Svetlana, V. (2012). The determinants of banks' liquidity buffers in central America. IMF Working Papers, WP/12/301, Retrieved from: https://www.imf.org/external/pubs/ft/wp/2012/wp12301.pdf.

Dhal, S., Kumar, P., & Ansari, J. (2011). Financial stability, economic growth, inflation and monetary policy linkages in India: An empirical reflection. *Reserve Bank of India Occasional Papers*, *32*(3), 1-35.

Dodig, A. (2020). Relationship between macroeconomic indicators and capital markets performance in selected southeastern european countries. *Zagreb International Review of Economics & Business*, *23*(2), 55-88.

El-Chaarani, H. (2019). Determinants of bank liquidity in the middle East Region. *International Review of Management and Marketing*, *9*(2), 64-75.

El Khoury, R. (2015). Liquidity in Lebanese commercial banks and its determinants. *Academy of Accounting and Financial Studies Journal*, *19*(3), 57-73.

Horvath, R., Seidler, J., & Weill, L. (2016). How bank competition influences liquidity creation. *Economic Modelling*, *52*, 155-161.Available at: https://doi.org/10.1016/j.econmod.2014.11.032.

Li, Y. (2020). Liquidity regulation and financial stability. *Macroeconomic Dynamics*, *24*(5), 1240-1263.

Maddaloni, G. (2015). Liquidity risk and policy options. *Journal of Banking & Finance*, *50*, 514-527.Available at: https://doi.org/10.1016/j.jbankfin.2014.01.018.

Madhi, D. (2017). The macroeconomic factors impact on liquidity risk: The Albanian banking system case. *European Journal of Economics and Business Studies*, *3*(1), 32-39.Available at: https://doi.org/10.26417/ejes.v7i1.p32-39.

Mazreku, I., Morina, F., Misiri, V., Spiteri, J. V., & Grima, S. (2019). Exploring the liquidity risk factors in the Balkan Region banking system. *European Research Studies*, *22*(1), 96-108.Available at: https://doi.org/10.35808/ersj/1409.

Mdaghri, A. A., & Oubdi, L. (2021). Basel III liquidity regulatory framework and bank liquidity creation in MENA countries. *Journal of Financial Regulation and Compliance*, *30*(2), 129-148.Available at: https://doi.org/10.1108/jfrc-01-2021-0002.

Messai, A.-S., & Gallali, M. I. (2019). Macroeconomic determinants of credit risk: A P-VAR approach evidence from Europe. *International Journal of Monetary Economics and Finance*, *12*(1), 15-24.Available at: https://doi.org/10.1504/ijmef.2019.098638.

Moussa, M. A. B. (2015). The determinants of bank liquidity: Case of Tunisia. *International Journal of Economics and Financial Issues, 5*(1), 249-259.

Munteanu, I. (2012). Bank liquidity and its determinants in Romania. *Procedia Economics and Finance, 3*, 993-998.Available at: https://doi.org/10.1016/s2212-5671(12)00263-8.

Nguyen, D. T., & Nguyen, T. N. Q. (2021). Impacts of monetary policy on stability of commercial banks – evidence from Vietnam. *International Journal of Management and Sustainability, 10*(4), 92–103.Available at: https://doi.org/10.18488/journal.11.2021.104.92.103.

Nikolaou, K. (2009). Liquidity (Risk) concepts: Definitions and interactions. ECB Working Paper No. 1008. Available at: http://dx.doi.org/10.2139/ssrn.1333568.

Patel, K. R. (2012). Trade-off between liquidity & profitability: A study of selected manufacturing firms in India. *International Journal of Scientific Research, 2*(2), 29–31.Available at: https://doi.org/10.15373/22778179/feb2013/12.

Pohl, M. (2017). Basel III liquidity monitoring tools. Bank for International Settlements in Basel, Financial Stability Institute, Occasional Paper No 14, Bank for International Settlements, Retrieved from: https://www.bis.org/fsi/fsipapers14.pdf.

Purwohandoko, P., & Iriani, S. S. (2021). Effect of gross domestic product, liquidity, size, growth, capital adequacy ratio, and inflation on financial performance. *Equilibrium: Journal of Economics-Management-Accounting, 17*(1), 46-53.Available at: https://doi.org/10.30742/equilibrium.v17i1.1423.

Rauch, C., Sascha, S., Andreas, H., & Marcel, T. (2011). Determinants of bank liquidity creation. *SSRN Electronic Journal*.Available at: http://dx.doi.org/10.2139/ssrn.1343595.

Roman, A., & Sargu, A. C. (2015). The impact of bank-specific factors on the commercial banks liquidity: Empirical evidence from CEE countries. *Procedia Economics and Finance, 20*, 571-579.Available at: https://doi.org/10.1016/s2212-5671(15)00110-0.

Rupeika-Apoga, R., Zaidi, S., Thalassinos, Y., & Thalassinos, E. (2018). Bank stability: The case of Nordic and Non-Nordic Banks in Latvia. *International Journal of Economics & Business Administration, 6*(2), 39-55.Available at: https://doi.org/10.35808/ijeba/156.

Semenova, T., & Vitkova, E. (2019). *Impact of macroeconomic indicators on the financial stability of construction companies in the Czech Republic and Spain.* Paper presented at the IOP Conference Series: Materials Science and Engineering.

Shamsub, H., & Haque, M. (2021). Identifying combinations of individual governance indicators essential for attracting international capital flows to Asian economies. *Journal of Social Economics Research, 8*(2), 108–118.Available at: https://doi.org/10.18488/journal.35.2021.82.108.118.

Singh, A., & Anil, K. S. (2016). An empirical analysis of macroeconomic and bank-specific factors affecting liquidity of Indian banks. *Future Business Journal, 2*(1), 40–53.Available at: http://dx.doi.org/10.1016/j.fbj.2016.01.001.

Slovik, P., & Boris, C. (2015). Macroeconomic impact of basel III. OECD Economics Department Working Papers, No. 844. Available at: http://dx.doi.org/10.2139/ssrn.2650033.

Sopan, J., & Dutta, A. (2018). Determinants of liquidity risk in Indian banks: A panel data analysis. *Asian Journal of Research in Banking and Finance, 8*(6), 47-59.Available at: https://doi.org/10.5958/2249-7323.2018.00043.3.

Trenca, I., Petria, N., & Corovei, E. A. (2015). Impact of macroeconomic variables upon the banking system liquidity. *Procedia Economics and Finance, 32*, 1170-1177.Available at: https://doi.org/10.1016/s2212-5671(15)01583-x.

Vodová, P. (2011a). *Determinants of commercial bank's liquidity in Slovakia.* Paper presented at the 13th International Conference on Finance and Banking.

Vodová, P. (2011b). Liquidity of Czech commercial banks and its determinants. *International Journal of Mathematical Models and Methods in Applied Sciences, 5*(6), 1060-1067.

Vodová, P. (2013). Determinants of commercial banks' liquidity in hungary. *Acta Academica Karviniensia, 13*(1), 180-187.Available at: http://dx.doi.org/10.25142/aak.2013.016.