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The Impact of Cost Efficiency on Liquidity Risk in the Banking Sector: Evidence from Kosovo

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Abstract: This study aims to examine the relationship between cost efficiency and liquidity risk in a sample of Kosovo's commercial banks. We used secondary data from the financial records of seven commercial banks operating in Kosovo between 2013 and 2020. The fixed effect model (FEM) was used throughout the investigation to assess the study's hypotheses. The study is divided into two phases: first, the cost efficiency is determined using the DEA, and second, the liquidity risk factors are reviewed. While liquidity risk is considered a dependent variable, other significant determinants include bank size, asset quality, concentration, and macroeconomic variables such as gross domestic product (GDP) and inflation. The findings indicate that liquidity risk has a positive and significant association with cost efficiency, company size, and asset concentration. Additionally, the asset quality variable has a positive but insignificant effect on liquidity risk. In macroeconomic terms, inflation has been negative and considerable, whereas GDP has had little effect on liquidity risk. Profitable banks have reduced costs and are also more attractive to potential investors in higher-risk loans, which signals regulators to conduct a closer examination of these banks' performance and risk portfolios. As a result, this study also supports the need for regulatory measures such as Basel III's proposed liquidity risk norms.

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1. Introduction

Liquidity risk is the risk of incurring losses resulting from the inability to meet payment obligations promptly when they become due or from being unable to do so at a sustainable cost (Smaoui, Mimouni, Miniaoui, & Temimi, 2020). Liquidity risk indicates the level of security expressed through the liquid assets that the bank keeps available for its day-to-day commercial and financial activities, or liquidity risk arises from small inflows versus large financial outflows (Ahamed, 2021). When creating this disproportion between financial inflows and financial flows, the bank faces difficulties securing additional funds, either by increasing the liabilities or returning the assets immediately, at a reasonable cost, affecting its profitability. When researching the adequate literature on liquidity risk, we came across more credit risk literature. So, in general, there is a lack of literature that explains the liquidity risk and even less about the impact of cost efficiency on liquidity risk.

Hussain et al. (2012) stated that the Basel I Agreement established regulatory requirements for credit risk and market risk. Jones and Knaack (2019) noted that the Basel II Agreement takes operational risk into account, but liquidity risk is seldom mentioned. Additionally, the Basel III Agreement emphasizes liquidity risk, which has emerged as one of the primary concerns facing banks and other financial institutions in recent years. Liquidity risk is a multidimensional and rather complex issue for the banking sector. Numerous internal factors amplify their effect on liquidity risk. However, they can be managed by the bank and macroeconomic factors affecting liquidity risk, which are therefore uncontrollable and their impact on liquidity risk. Banks are exposed to liquidity risk due to their position in financial intermediation, which converts clients' short-term deposits into long-term loans.

As stated by Sopan and Dutta (2018), the liquidity problem also arises due to the decisions of depositors to withdraw their deposits; therefore, the bank does not have sufficient cash at its disposal. The literature on liquidity risk has primarily focused on the bank's operation or failure. Additionally, earlier empirical research examined the causes of bank profitability primarily by using liquidity ratios to quantify bank liquidity and the inclusion of liquidity risk as an exogenous variable. There are, however, a few studies that examine the underlying causes of liquidity risk. Previous empirical research indicates that liquidity risk has a mixed influence on bank profitability. Some studies such as Mohammad, Asutay, Dixon, and Platonova (2020), Galletta and Mazzù (2019), and Alsyahrin, Atahau, and Robiyanto (2018) have found a positive effect. Others such as Saleh and Abu Afifa (2020) and Tvaronavičienė, Masood, and Javaria (2018) have found a negative effect between liquidity risk and bank profitability, while the third group of papers finds that banks with high liquidity have low-interest margins.

Cost efficiency is about saving money to improve a product (Amin & Ibn Boamah, 2020). Companies' measurement of cost efficiency is performed by comparing the cost incurred and the revenue generated by the same process. While commercial activity does not end with cost efficiency, it is a critical business plan component. Cost-efficiency and association with liquidity risk are critical characteristics that must be thoroughly examined. Additionally, assessing the effect of cost efficiency on bank risk is critical, particularly for liquidity management purposes.

Researchers such as Assaf, Berger, Roman, and Tsionas (2019) and Al-Khasawneh, Essaddam, and Hussain (2020), in their studies, have found that efficiency results in low banking risk, while other researchers such as Rekik and Kalai (2018) and Safiullah and Shamsuddin (2019) show that efficiency encourages taking banking risk. Other research examining the relationship between cost efficiency and liquidity risk discovered conflicting results, demonstrating that there is no indication that the efficiency disparities between types of banks affect their risk and performance. Why were commercial banks operating in Kosovo selected to analyze the impact of cost efficiency on liquidity risk? Kosovo is considered a solid profit center in the banking industry nowadays. Several banks, including foreign banks, some even domestic ones, are taking advantage of the lucrative business in Kosovo due to the rapid growth mainly of trade.

There is no doubt that Kosovo is recognized as a center of growth in the banking sector. Therefore, we intend to evaluate the impact of cost efficiency on liquidity risk specifically. Since 2001, the number of commercial banks in Kosovo has grown steadily. In 2001, seven commercial banks operated in Kosovo, mainly with foreign capital. According to the Association of Banks in Kosovo, Kosovo currently maintains 11 (eleven) commercial banks, accounting for 67.8 percent of the financial sector's total assets. Even though Kosovo has 11 commercial banks, it is believed that there is still room for fresh investments, particularly from developed nations, that would aid in the development of various economic sectors and reduce the country's unemployment rate.

The study objective is to explore the impacts of asset quality, cost efficiency, bank size, asset concentration, GDP, and Inflation on liquidity risks. Asset liquidity or liquidity risk has been a favorite topic among scholars. Still, the present study greatly contributes to the literature as it removes many literary gaps. First, mostly in the past studies, the assets' impacts on liquidity risks have been examined without giving attention to different aspects of assets. But as the present study discusses the impacts of quality of assets, cost efficiency, and asset concentration on liquidity assets, it removes the literary gap. Second, in prior literature, different research surveys have examined the impacts of assets quality, costs efficiency, bank size, assets concentration, GDP, and Inflation on liquidity risks. The present study that examines the impacts of assets quality, costs efficiency, bank size, assets concentration, GDP, and Inflation on liquidity risks with the help of the same research survey adds to the literature. Third, though the banking sector of Kosovo is of great importance to the economy, no study has been conducted for the analysis of the impacts of assets quality, costs efficiency, bank size, assets concentration, GDP, and Inflation on liquidity risks. The present paper examines the effects of asset quality, cost efficiency, bank size, asset concentration, GDP, and inflation on Kosovo's banking industry liquidity concerns.

The following is the structure of the paper: The second section summarizes existing research on the effects of asset quality, cost efficiency, bank size, asset concentration, GDP, and inflation on liquidity risks. The third section details the data gathering and analysis technique, culminating in the study's findings. The study's findings are then compared to prior literature to determine whether they are supported by prior research. The study's conclusions, consequences, and findings are then presented.

2. Literature Review

Numerous studies have dealt with cost-effectiveness analysis or the impact of liquidity risk on efficiency in the literature. Still, very few of these studies have incorporated the role of efficiency in liquidity risk. Several studies have examined the banking industry's efficiency through technical efficiency. It refers to achieving maximum potential output from given quantities of input factors while taking physical output relationships into account, or allocation efficiency or price efficiency, which refers to a firm's ability to choose the optimal

combination of inputs while taking input prices into account but also the efficiency of the scalability. ' ' (Shamshur & Weill, 2019).

Another group of studies examined efficiency and risk concerning a country's economy by sampling many banks or conducting cross-country studies. Certain researchers have relied on ratio analysis, while others have relied on frontier analysis. Commonly, ratio analysis studies evaluate the reports of profitability, liquidity, solvency, and leverage, which in most cases show the company's good performance. As is noted by Coccorese and Ferri (2020), the ratios approach is simple to use. Still, it can be not very clear when applied to the multi-input and multi-output banking industry as it does not reflect all the inputs used to generate outputs.

Moreover, the ratios approach ignores the interactions between multiple inputs and outputs, hindering its predictive capability. These shortcomings are justifications for using frontier analysis in some banking industry studies. Analyzing the literature on cost efficiency, it was noted that two econometric methods (approaches) were used for its calculation. First, the Stochastic Frontier Analysis (SFA) approach is a parametric approach with statistical testing capabilities. Second, the Data Envelopment Analysis (DEA) approach, a non-parametric approach sensitive to measurement error, does not require the output function to be specified. Nguyen and Pham (2020) independently proposed the uses of SFA. Some researchers, using the SFA, analyzed cost-effectiveness in commercial banks.

As Elsa, Utami, and Nugroho (2018) demonstrate, another significant category in the assets quality literature is studies that employ a non-parametric methodology for evaluating the relative efficiencies of each set of comparable decision-making, assuming the existence of a marginal technology described by a discrete part of convex linear numbers that supports the observed results. Unlike the AQ is purely deterministic and creates virtual units that serve as benchmarks for measuring the comparative efficiency of decision-making units. Researchers such as Beltrame, Previtali, and Sclip (2018) and Forgione and Migliardo (2018) analyzed the assets' quality impact on the liquidity risk. The studies mentioned above generally differ in selecting the variables investigated. There are studies in which the association between asset quality and factors from a specific category is determined. Nonetheless, there are studies in which variables from multiple categories are examined. Numerous studies have been conducted on the association between asset quality and credit risk, but not on the relationship between asset quality and liquidity risk. A survey by Balakrishnan and Ertan (2018) has analyzed the assets quality impact on liquidity risk as an alternative risk measure and has found mixed results.

Ahamed (2021) explores the impact of bank size, return on equity, capital adequacy ratio, inflation, GDP, and domestic credit on liquidity risks in a research piece on the determinants of banks' liquidity hazards. The study sampled 23 commercial banks in Bangladesh from 2005 to 2018, and regression analysis was conducted using panel data. ' The results showed a positive relationship between bank size and GDP and a negative relationship between inflation with liquidity risks. Adusei (2015) explores the relationship between bank size and liquidity risks. According to this report, as a bank's size decreases, it requires sophisticated technologies for client responsiveness and business expansion. As a result, liquidity issues arise. A study was conducted by Mohd Amin and Abdul-Rahman (2020) to investigate the influences of asset concentration on liquidity risks. The study's authors examine the effects of asset concentration on liquidity concerns using data from OIC nations from 2000 to 2014. The study demonstrates that investments in low-value assets can be sold or converted to cash as soon as necessary.

In contrast, higher-valued assets are more difficult to convert to cash due to low marketing. As a result, organizations that have invested their money in a specific group of high-value assets face significant liquidity concerns. Frumkin and Keating (2011) analyze the impacts of asset concentration on liquidity risks. This study also shows a positive impact of the influences of asset concentration on liquidity risks.

Mohammad et al. (2020) conducted a research survey to check the influences of a country's GDP on liquidity. The technique of comparative analytical research was used, as well as a comparative analysis of Islamic risks in 145 commercial banks from 1996 to 2015. Using a panel data regression model, the study incorporated the random effect technique. The study finds a positive association between GDP and liquidity risks for the increase in the total production and increased earning, encouraging the firm to adopt heavy technology, which restricts assets marketability and liquidity risks. In addition, a study by Kupfer (2018) examined the association between inflation and liquidity risk and found a positive association between inflation and liquidity risks for the increase in the prices of the goods and services and increased earnings, encouraging the firm to adopt heavy technology which restricts assets marketability and liquidity risks.

3. Methodology and Data

The purpose of this study is to examine the effect of cost efficiency on the liquidity risk of commercial banks operating in Kosovo from 2013 to 2020, focusing on the relationship and effect of the dependent variable, liquidity risk, and independent variables, which include specific variables such as cost efficiency, bank size, asset quality, and asset concentration, as well as two macroeconomic variables, GDP and inflation. The study's equation is as follows:

$$LR_{it} = \alpha_0 + \beta_1 CE_{it} + \beta_2 SZ_{it} + \beta_3 AQ_{it} + \beta_4 ACN_{it} + e_{it} \quad \textbf{(1)}$$

By using macro-economic variables, the equation is given below:

$$LR_{it} = \alpha_0 + \beta_1 CE_{it} + \beta_2 SZ_{it} + \beta_3 AQ_{it} + \beta_4 ACN_{it} + \beta_5 GDP_{it} + \beta_6 INF_{it} + e_{it} \quad \textbf{(2)}$$

This analysis was done using descriptive correlation analysis and slight squares regression. The study extended the analysis into two phases: Data Envelopment Analysis (DEA) was used to calculate cost efficiency in the first phase. Efficiency is a comparison between input and output used (Kohl, Schoenfelder, Fügener, & Brunner, 2019). A company can be called efficient if it can achieve maximum output from the given input or minimize the input used in production output. The Data Envelopment Analysis method (DEA) was used to measure cost efficiency in this research. According to the latest banking literature, DEA is a techno-combination elaborating linear logic and mathematical programming on the current multiple outbound observations. The study identifies total cost as a dependent variable (Wang, Liu, & Zhang, 2022).

The cost-efficiency examines how close the bank's costs are to the minimum (or the cost of a fully efficient bank) to produce a certain output level at a given cost of input and technology. In terms of inputs and outputs, there is substantial agreement in the literature concerning the determination of inputs and outputs that are decisive in insurance industries for accurately measuring cost efficiency. In our study, three input variables are taken ('customer's deposits - X_1, labor as personnel expenses of bank staff such as wages and benefits - X_2, and fixed assets as tangible assets that the bank buys or invests and uses for its products - X_3). On the other hand, Outputs represent payments to customers or other interested parties (total customer loans - Y_1) and the investment with a significant added value (securities - Y_2). Also, the input variables (y) consisted of three input prices: the price of deposits (Z_1) as interest expenses

divided by total deposits, the price of labor (Z_2) as personnel expenses divided by the total assets, and the price of capital (Z_3) as operating expenses minus personnel expenses divided by total fixed assets. In the second phase, the FEM was used to examine the variables we used, which are believed to be principal in explaining performance risk and liquidity. Four distinct bank variables were evaluated in the first stage: bank size (SZ), asset quality (AQ), and asset concentration (ACN), as well as two macroeconomic variables: GDP and inflation. The LR stands for liquidity risk, and the CE stands for cost efficiency as determined by the DEA. We used macroeconomic variables in the second specification. The World Development Indicators provide macroeconomic data on GDP and inflation. Liquidity risk (LR) is a dependent variable, whereas bank-specific factors include cost efficiency (CE), bank size (SZ), asset quality (AQ), and asset concentration (AC) (ACN).

Additionally, two macroeconomic indicators are used: gross domestic product (GDP) and the rate of inflation (INF). The determinants of risk liquidity are listed in Table 1.

Table 1. Variables and measurements

Symbols	Variables	Measurements	Sources
LR	Liquidity risk	(ln of Total loans / Deposits and short term funding)	(Choudhary & Limodio, 2021)
CE	Cost efficiency	DEA approach	(Ton Nu Hai, Bui Dung, & Speelman, 2018)
SZ	Size of the bank	The logarithm of total assets	(Abeyrathna & Priyadarshana, 2019)
AQ	Asset quality	Loss loan reserve / Gross loans	(Bholat, Lastra, Markose, Miglionico, & Sen, 2018)
ACN	Asset concentration	Total loans / Total assets	(Sarwar, Muhammad, & Zaman, 2020)
GDP	Gross domestic product	The real growth rate of GDP	(Tümer & Akkuş, 2018)
INF	Inflation	Inflation rate	(Athari, Alola, Ghasemi, & Alola, 2021)

The article examines the descriptive statistics that show the maximum values, standard deviation, mean values, and minimum values of all the variables. Moreover, a correlation matrix was used to check the association and the variance inflation factor (VIF) to examine the multicollinearity. The VIF equations are given below:

$$R^2_Y \longrightarrow Y_{it} = \alpha_0 + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + e_{it} \quad (2)$$

$$j = R^2_Y, R^2_{X1}, R^2_{X2,} R^2_{X3,} R^2_{X4,} R^2_{X5} \quad (3)$$

$$Tolrance = 1 - R^2_j VIF = \frac{1}{Tolerance} \quad (4)$$

In addition, the Hausman test has also been applied to check the best model. If the probability value is lower than 0.05, FEM is suitable and vice versa. The equation is given as under:

$$H = (b_1 - b_0)\,(Var\,(b_0) - Var\,(b_1))\,(b_1 - b_0) \quad (5)$$

The present research applied the FEM because the major feature of FEM is that it was suitable when the Hausman test exposed a probability value lower than 0.05. In addition, FEM also controls the effects of autocorrelation and heteroscedasticity on the results that disturb the results (Abe, Taniguchi, Kawachi, Watanabe, & Tamiya, 2021). The FEM equation is given below:

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + u_{it} \quad (6)$$

In equation (6), subscript (i) presented the individual bank and made the different banks according to their characteristics. While (i) represents the years. The FEM equations with understudy constructs are given as under:

$$LR_{it} = \beta_{1i} + \beta_2 CE_{it} + \beta_3 SZ_{it} + \beta_4 AQ_{it} + \beta_5 ACN_{it} + u_{it} \quad (7)$$

$$LR_{it} = \beta_{1i} + \beta_2 CE_{it} + \beta_3 SZ_{it} + \beta_4 AQ_{it} + \beta_5 ACN_{it} + \beta_6 INF_{it} + \beta_7 GDP_{it} + u_{it} \quad (8)$$

4. Empirical Results and Discussions

Descriptive statistics were used to describe and summarize the ratios of the variables in the study, including liquidity risk, cost efficiency, size, asset quality, asset concentration GDP, and inflation. They are presented in Table 2. The first point to note is that there is a considerable level of efficiency (78.8%) of banks operating in Kosovo, perhaps due to technological innovations or even the efficiency of employees in these banks. The table also shows that size has a very high average value (5,593). ACN has significant average values (0.713). The average ACN indicates the adequacy of a bank. They show the company's position regarding the adequacy of total deposits and assets versus total loans. The AQ has an opposing average (-0.001) if it is not significant to indicate a correlation between the dependent variable and other specific variables. GDP and inflation as independent macroeconomic variables significantly impact, especially inflation (1.032). This is likely to be the result of macroeconomic developments in Kosovo.

Table 2. Descriptive statistics of variables

	LR	CE	SZ	AQ	ACN	GDP	INF
Mean	6.137	0.788	5.593	- 0.001	0.713	0.355	1.032
Median	6.194	0.806	5.629	- 0.001	0.704	0.580	0.900
Stand. Dev.	1.711	0.213	0.269	0.003	0.058	0.454	1.160
Minimum	2.797	0.232	5.023	- 0.015	0.596	- 0.653	- 0.900
Maximum	9.587	1.000	6.009	0.007	0.857	0.690	3.200
Obs.	224	224	224	224	224	224	224

Source: Own survey

Table 3 contains the results of the correlation analysis, which is based on the relationship between the dependent and independent variables. This point demonstrates that all explanatory variables are correlated. In other words, this is an attempt to prevent difficulties associated with multicollinearity. Cost efficiency has a positive correlation with liquidity risk at significant level of 96% (r = 0.187, p = 0.04). Unlike cost efficiency, LLR (r = 0.159, p = 0.079) has a positive and significant level of 92%, LTA (r = 0.271, p <0.001) and Size (r = 0.450, p < 0.001), have a positive and very significant correlation at a significant level of 99%. Macroeconomic variables show a low positive but not significant correlation (r = 0.010) with liquidity risk, but not inflation which has a low negative correlation with significant level of 98.73% (r = - 0.032) but significant (p = 0.012).

Table 3. Correlation analysis

	LR	CE	AQ	ACN	SZ	GDP	INF
LR	1						
CE	0.18750	1					
AQ	0.15867	-0.13815	1				
ACN	0.27104	-0.13257	-0.0328	1			
SZ	0.45025	-0.56496	0.1550	-0.00852	1		
GDP	0.00971	0.03476	-0.0576	-0.02477	-0.02059	1	
INF	-0.03203	0.04958	0.0411	0.09377	0.12699	0.14460	1

Source: Own survey

The article examined multicollinearity using the VIF, and the results suggested that the VIF value is less than five and that the reciprocal of the VIF is greater than 0.20. These numbers revealed the absence of multicollinearity. These findings are summarized in Table 4.

Table 4. Variance inflation factor

	VIF	1/VIF
LR	2.739	0.365
CE	1.810	0.552
AQ	2.431	0.411
ACN	3.923	0.255
SZ	1.723	0.580
GDP	2.375	0.421
INF	3.102	0.322
Mean VIF	2.586	.

In addition, the Hausman test was applied to check the suitable model, and the results exposed less than a 0.05 probability value. This value indicated that the FEM is appropriate. Table 5 shows these outcomes.

Table 5. Hausman test

	Coef.
Chi-square test value	4.763
P-value	0.000

After conducting the preliminary analysis, the study evaluates the panel data model for determining the effect of independent variables on banks' liquidity risk. The results of the evaluation model are presented in the Tables below. The evaluations are executed through the FEM. To test the factors affecting liquidity risk, we have included two sets of variables: variables representing the banking sector (CE, SZ, AQ, and ACN) and macroeconomic variables (GDP and Inflation). The first model includes only variables that represent banking characteristics. By comparison, the second model includes all variables to determine the effect of macroeconomic variables and if the first model's results will change: We used panel data and included seven Kosovo-based banks. The first table summarizes the results of the first model:

Table 6. FEM results of specific variables

Variables	*Coefficient*	*Std. Error*	*t-ratio*	*p-value*	
Const	−19.780	6.869	−2.880	0.004	***
CE	2.261	1.114	2.029	0.044	**
SZ	3.384	0.522	6.486	0.001	***
AQ	61.597	34.985	1.761	0.079	*
ACN	8.883	1.833	4.847	0.001	***
R squared				0.305	
Adjusted R square				0.288	
F				16.792	
P-value (F)				0.000	
Durbin - Watson				0.730	

Model 1: FEM, using 224 observations, included 7 cross-sectional units, Time-series length = 8, Dependent variable: LR
Source: Own survey

The coefficient of determination R2 measures the proportion of variability in the dependent variable explained by independent variables. The model shows that R2 is 0.305, indicating that a 30.5% variation in liquidity risk is defined by the independent variables: CE, Size, AQ, and ACN. The second model presents the second equation's results, including the model's two macroeconomic variables (GDP and Inflation). Considering the data from the estimates from model 2, liquidity risk is more influenced by bank-specific factors than by macroeconomic factors. As they are within the control of management, these specific factors are a major concern for the bank. As such, they will affect the bank's risk presentation and risk level, which at the same time influences liquidity management decisions. Analyzing all independent variables, changes in cost efficiency have a relatively high positive and significant impact ($p < 0.05$) on changes in liquidity risk. This indicates that the level of liquidity risk increases with an increasing level of cost-efficiency. The positive relationship between cost efficiency and liquidity risk is dependable on the findings of Tvaronavičienė et al. (2018). This positive impact of cost efficiency on liquidity risk implies the need to closely monitor banking behavior towards risk and return trade-off objectives. It is also essential to install joint management of liquidity risk and efficiency in the banking sector. According to the results mentioned above (in both models), bank size is substantial and positive, suggesting that the larger the bank, the greater the liquidity risk, and the larger the bank, the greater the instability. Additionally, a positive bank size ratio shows a proclivity to raise liquidity risk. As a result, the larger the bank, the greater the likelihood of developing liquidity risk. Additionally, the writers observed an encouraging indicator. Asset concentration (ACN) and liquidity risk have positive and significant relationships. High capital banks have high-risk tolerance due to their strong ability to absorb losses. Although capital acts as a safety buffer against the deterioration of asset values, it also creates incentives for risk-taking. These findings are consistent with Smaoui, Mimouni, Miniaoui, and Temimi (2020Smaoui et al. (2020).

Table 7: FEM results of all variables

Variables	*Coefficient*	*Std. Error*	*t-ratio*	*p-value*	
Const	−20.903	6.818	−3.066	0.003	***
CE	2.724	1.119	2.434	0.014	**
SZ	3.601	0.522	6.893	0.001	***
AQ	65.755	34.673	1.896	0.059	*
ACN	9.462	1.825	5.184	0.001	***
GDP	0.195	0.229	0.855	0.394	
INF	−0.231	0.092	−2.518	0.013	**
R square				0.330	
Adjusted R square				0.305	
F				13.223	
P-value (F)				0.000	

Model 2: FEM using 224 observations, including 7 cross-sectional units, Time-series length = 8, Dependent variable: LR

Source: Own survey

The same findings apply to the variable quality of banks' assets (AQ), which has a positive but not high significant relationship with liquidity risk. The same results are confirmed by Abdelaziz, Rim, and Helmi (2020). This means that the higher the ratio, the riskier the loans are, and vice versa. Apart from being non-significant, the signs in both models are different, and hence we do not consider it an explanatory variable for liquidity risk. In terms of macroeconomic factors, inflation significantly negatively impacts liquidity risk. So, growth in inflation level affects the increase of liquidity level. The results are similar to the findings of Hassan, Khan, and Paltrinieri (2019) but contradict the findings. Meanwhile, despite its positive beta value, GDP as a second macroeconomic variable has a negligible effect on liquidity risk. Additionally, I discovered the same findings.

The results showed that bank size has a positive relation to liquidity risks. These results are supported by Ahamed (2021), which show that when the firms have a large firm size, they mostly have investments frozen in the heavy technological and other physical assets that are less likely to be converted into cash. Hence, the large size causes liquidity risks. The results showed that asset concentration has a positive relation to liquidity risks. These results are supported by Mohd Amin and Abdul-Rahman (2020), which shows that when the banks or other financial or non-financial organizations rely on putting the money in a single investment or debt portfolio and acquiring particular assets, it becomes difficult for them to convert the assets into cash whenever they require. So, asset concentration creates liquidity risks. The results showed that GDP has a positive relation to liquidity risks. These results are supported by Asutay et al. (2020), which show that when the GDP growth rate is high in a country, the money is invested into large technologies or other high-value assets with less frequent marketability. As a result, the firms have to face liquidity risks. The results showed that inflation has a negative relation to liquidity risks. These results are supported by Kupfer (2018), which shows that the firms spend money on low-value assets with high marketability because of low purchasing power during the inflationary period. So, inflation reduces the liquidity risks.

5. Conclusion

This paper explores the relationship between cost efficiency and liquidity risk in seven Kosovo banks for the period (quarterly) from 2013 to 2020. We have measured cost efficiency using the DEA approach. While analyzing the impact of cost efficiency and other variables, we apply the FEM model. Several of our findings are congruent with those reported in the prior literature in this field of inquiry. The data indicate that cost-effectiveness has a positive and significant effect on liquidity risk, implying that cost-effectiveness is a factor that motivates the bank to accept the risk. Given the strong link, it is critical to manage cost efficiency and liquidity risk to meet the bank's objectives. The fact that efficient banks benefit from lower costs and present incentives to invest in high-risk loans and instruments signals regulators to closely monitor these banks and their risk portfolios. In addition to cost efficiency, there is also evidence of the importance of bank size (SZ) and asset concentration (ACN) as well as asset quality (AQ) and lower inflation in liquidity risk. At the same time, other factors such as GDP do not significantly impact liquidity risk.

In contrast to liquidity ratios and the broad causes of this risk, this study contributes by examining cost-effectiveness as another proxy for liquidity risk. Profitable banks have reduced costs and are also more attractive to potential investors in higher-risk loans, which signals regulators to conduct a closer examination of these banks' performance and risk portfolios. As a result, this study also supports the need for regulatory measures such as Basel III's proposed liquidity risk norms.

6. Limitations and Future Directions

We were presented with some limitations during the analysis of the impact of cost efficiency on liquidity risk. First, the current research focused only on Kosovo's seven major commercial banks. Future research can be conducted by taking a larger sample by taking banks from across the region or comparing other market-based and bank-based economies. The data was obtained to cover eight years, which may be longer, but we were forced to limit ourselves to this period because of its unavailability and time constraints. That is why we obtained quarterly data from the financial statements. Future researchers can obtain annual data from the financial statements and extend the research period by expanding the number of sample banks from countries in the region.

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