Analysis of Determinant Factors of Liquidity Coverage Ratio (LCR) on Conventional Banks in Indonesia Periods 2018 – 2021

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Abstract. The Financial Services Authority (FSA) plan to applies Liquidity Coverage Ratio (LCR) to all conventional commercial banks in Indonesia, this implementation of LCR will make Banks in Group Based on Core Capital 1 (KBMI 1) which is currently not required to calculate and fulfil LCR, in the future required to fulfil and report LCR. Therefore, in order to make preparations for the fulfilment of the LCR for the KBMI 1, research is needed to examine what factors affect the Liquidity Coverage Ratio (LCR). This study also examines the difference LCR determinants between before and during pandemic Covid-19. The analysis use regression with panel data using bank's financial ratio as the determinant factors of LCR. The result show that bank size, capital adequacy ratio (CAR), non-performing loan (NPL), return on asset (ROA), operational cost on operation revenue (BOPO) and central bank rate affect the LCR of banks that have been required to calculate and meet the LCR limit. There are several differences in LCR determinants between before the COVID-19 pandemic and during the pandemic. Factors that affect LCR before the pandemic are CASA, CAR, NPL, ROA and BOPO. Meanwhile, during the pandemic factors that affect LCR are SIZE, CASA, CAR, NPL and ROA.

Keywords: Liquidity coverage ratio, liquidity risk, basel III, conventional commercial bank, Indonesia.

1 Introduction

The introduction of the LCR liquidity requirement has had a profound effect on banks liquidity positions. Large banks subject to the LCR increased dramatically their holdings of high-quality liquid assets to match their liquidity risks including those that stem from providing credit lines to the business sector. Large US Banks that are required to meet and report LCR dramatically increase their holdings of high-quality liquid assets (HQLA) to offset their liquidity risks including those from providing credit lines to the business sector [1]. The implementation of LCR makes banks hold most of their assets in the form of high-quality securities, as well as

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reducing the quantity of bank loans and increasing bank lending rates [2]. A study conducted by [3] found that implementation of LCR is effective in persuading banks in emerging markets to accumulate more stable retail deposits.

As a member of the BCBS, Indonesia adopted the LCR framework to be applied in Indonesia with some adjustments to suit domestic conditions. On December 23, 2015 the Financial Services Authority (OJK) issued a Financial Services Authority Regulation (POJK) which specifically regulates LCR through POJK No. 42/POJK.03/2015 concerning Liquidity Coverage Ratio Obligations for Commercial Banks. Based on this regulation, the minimum LCR fulfilment is set at 100%. The implementation of the obligation to fulfil and report the LCR ratio only applied for Bank Group Based on Core Capital (KBMI) 2, 3, 4 and foreign banks.

On October 25, 2021, the Financial Services Authority (FSA) issued a Consultative Paper entitled "Policy Revision Pillar 2 – Implementation of the Internal Liquidity Adequacy Assessment Process (ILAAP)" in which it discussed that the Basel Committee on Banking Supervision (BCBS) requires the implementation of the Liquidity Coverage Ratio (LCR) consistently. In order to fulfil the BCBS requirements, the implementation of the LCR which is currently only applied for KBMI 2, 3, 4, and foreign banks, will be changed so that it applies to all Conventional Commercial Banks in Indonesia specifically KBMI 1 will also be required to fulfil and report LCR.

Implementation of Liquidity Coverage Ratio on in group KBMI 1 (core capital up to Rp. 6 trillion) lead banks to provide High Quality Liquid Assets (HQLA) in the form of placements with Bank Indonesia or government securities in sufficient quantities to meet the minimum requirement of 100%. In addition, banks also must improve the funding structure originating from third party funds. Most of the third-party funds owned by the KBMI 1 group are time deposits, which are classified as expensive funds, unlike savings and current accounts. In the LCR calculation, stable funds have a low run off rate so it can lower the cash outflow value.

Bank liquidity condition is very important in banking operations. Liquidity balance can be interpreted as a condition where the bank does not have too little or too big liquidity [4]. Banks that have a level of liquidity adequacy that is too small will experience difficulties in carrying out its liquidity function. Banks that have too little liquidity have the potential to improve their liquidity by selling some of their assets at low prices that result in losses, obtaining liquidity funds with high interest rates and the potential for cancellation of previously approved debtor loans. On the other hand, excess liquidity will result in idle money and the potential to reduce banking income due to unproductive assets. The bank's excess liquidity position is assumed to come from long-term sources of funds. In general, banks will pay higher interest rates to depositors. This will reduce the bank's profit rate. Therefore, management's ability is very much needed in maintaining adequate levels of liquidity that meet the bank's needs.

The liquidity condition of a bank is certainly influenced by internal and external factors. Profitability, capital, cost management efficiency, credit quality, third party funds, CASA, bank size are internal banking factors that need to be considered in determining LCR. Meanwhile, external factors that may affect bank liquidity are GDP, inflation and interest rates. Based on the list of the banks on the Financial Service Authority, by the end of 2021 out of 65 conventional commercial banks in Indonesia, 26 banks are not required to calculate LCR. Therefore, in order to make preparations for the fulfilment of the Liquidity Coverage Ratio (LCR), especially for KBMI 1, research is needed to examine what factors affect the Liquidity

Coverage Ratio (LCR). The pandemic Covid-19 has affected almost in all sectors, including the banking sector. Banking conditions between before and during the pandemic changed, so this study also examines the difference in LCR determinants between before and during the pandemic.

The remainder of this paper is structured as follows: Section 2 gives an overview on the literature. Section 3 is present the data and methodology. Section 4 discusses the results and finally, Section 5 present the conclusions and recommendations.

2 Literature Review

2.1 Liquidity risk

The definition of Liquidity Risk according to Financial Service Authority Regulation Number 18/POJK.03/2016 concerning Implementation of Risk Management for Commercial Banks is the risk due to the Bank's inability to meet maturing obligations from cash flow funding sources, and/or from high quality liquid assets that can be pledged as collateral, without interfere with the activities and financial condition of the Bank. Liquidity risk can be defined as the risk of being unable to liquidate in a timely manner at a reasonable price [5]. Banks face liquidity risk if they do not liquidate their assets at a fair price. Assets are offered at low selling prices, while the need to liquidate bank assets is urgent. This can result in significant losses and decreases in revenue.

According to [6], there are two basic aspects of liquidity risk: maturity transformation (maturity of bank liabilities and assets) and inherent liquidity in a bank's assets (the degree to which an asset can be sold without incurring a significant loss of value under market conditions). In fact, the two elements of a bank's liquidity are closely related. Banks don't have to be concern about maturing transformations if they have assets that can be sold without incurring losses. Meanwhile, banks that have assets that will mature in a shorter time may not need to maintain liquid assets. Apart from maturity mismatch conditions, liquidity risk can be caused by economic recession conditions. When customers withdraw their funds on a large scale, the bank will experience liquidity risk. This can lead to the failure of certain banks or even the entire banking system due to the contagion effect [7].

2.2 Liquidity coverage ratio (LCR)

According to Financial Services Authority Regulations Number 42/POJK.03/2015 Concerning Liquidity Coverage Ratio Requirement for Commercial Banks, Liquidity coverage ratio is the ratio between High Quality Liquid Assets and total net cash outflows for the next 30 days in a stress scenario. The following is the formula for calculating LCR

$$\boldsymbol{LCR} = \frac{High\ Quality\ Liquid\ Asset}{Net\ Cash\ Outflow \text{ in } 30\ Days} \quad (1)$$

High Quality Liquid Assets (HQLA) can be defined as cash and/or financial instruments that can be immediately converted into cash with little or no reduction in value in meeting the bank's liquidity needs over the next 30 days under stress scenarios. The 30 days period is used as a

reference because after that period the bank's management and supervisors are assumed to be able to take corrective action or the bank's operations have ceased reasonably.

Total Net Cash Outflow or Net Cash Outflow, is the total estimated cash outflow (cash outflow) minus the total estimated cash inflows that are expected to occur over the next 30 days in a stress scenario. In order to fulfil the LCR, Banks are required to calculate cash outflows for the next 30 days originating from:

a. Retail deposits;
b. Micro and small business deposits;
c. Wholesale deposits;
d. Secured funding; and
e. Additional requirement.

The value of cash outflows that are taken into account in fulfilling the LCR is equal to the outstanding value of liabilities on the balance sheet and commitments in the off-balance sheet multiplied by the run off rate. Meanwhile, to calculate the cash inflow for the next 30 (thirty) days the Bank is sourced from:

a. Secured lending;
b. Counterparty claim; and/or
c. Other cash inflow.

The value of cash inflows that can be taken into account in the LCR is a maximum of 75% of the total cash outflows. In calculating cash inflows, the Bank can only take into account contractual cash inflows originating from receivables that have a current quality and are not expected to default in the next 30 days.

2.3 Empirical findings

Previous studies suggest that there are two streams of literature on the factors that cause liquidity risk. The first line suggests that liquidity risk is driven by bank-specific variables and the second argues that macroeconomic factors may also influence banks' liquidity risk. [8] studies the liquidity determinants of Vietnamese commercial banks using indicators from the balance sheet to measure bank liquidity: total assets, profit rate, proportion of equity, loan growth rate, economic growth and inflation. [9], [10], and [11] also examines the factors determining the liquidity risk exposure by employing a panel data regression model with the random effect technique by considering bank specification, macroeconomic, governance and ownership-related variables.

Broadly, Bank size can be defined as total net assets. The Bank's total assets are one of the key factors that contribute to a good branding for a bank. Banks have large-scale mobilization of capital, are easy to withdraw, have the opportunity to select borrowers, develop banking services. The larger the size of the total assets of the bank, the higher the liquidity of the bank [12]. According to convertibility theory, commercial banks can increase liquidity by converting assets such as treasury bonds and derivative contracts on the stock exchange. With large total assets, banks can diversify their investment activities, and not only focusing on credit investments, so that banks have good asset conversion capabilities and high liquidity. This is in line with the research of [8] which shows that the total value of bank assets has a positive effect on bank liquidity. Hence, the formulation of the first hypothesis is as follow:

H1 : The bank size is positively related with liquidity coverage ratio.

According to [13], Current Account Saving Accounts (CASA) or low-cost funds are banking funds originating from savings and current accounts. The higher the CASA, the lower the cost of funds to be spent by the Bank, this will increase the efficiency of banking operations. [3] finds that LCR is cost effective in persuading banks in emerging markets to accumulate more stable retail deposits. The following hypothesis may be formulated:

H2 : The bank cheap fund or CASA is positively related with LCR

Capital Adequacy Ratio (CAR) is to measure a bank's ability to see the risk of loss that will be faced and meet the needs of depositors and creditors. The research of [14] and [15] states that capital has a significant negative effect on liquidity. However, research by [16], [17], and [18] showed that CAR had a significant positive effect on liquidity, while the results of the research of [19] and [20] using the dependent variable LCR showed that capital had no significant effect on liquidity. The following hypothesis may be formulated:

H3 : Bank capitalization is positively related with liquidity coverage ratio.

Non-Performing Loans (NPL) will reduce the bank's operating income from interest income. In addition, non-performing loans will also affect the stock of liquid assets in a bank. Research by [18], [15], and [17] shows that NPL has a significant negative effect on liquidity. [9] research also shows that NPL has a significant negative effect on LCR, which means that if there is an increase in NPL, it will have a significant effect on decreasing LCR. The following hypothesis may be formulated:

H4 : Credit risk is negatively related with liquidity coverage ratio.

Return on total assets (ROA) is one of the financial indicators showing the performance of banks. Banks with high ROA will generates a good reputation and attracts depositors and borrowers, reduce early withdrawals (before maturity), and increase working capital from retained earnings. Therefore, an increased ROA increases liquidity [21] and [22]. Study at Commercial Banks in Vietnam shows that ROA has a positive impact on the liquidity of Vietnamese commercial banks listed on the stock market. With a high ROA, commercial banks have more conditions to increase their working capital, more proactive in capitalization, and less dependent on mobilized capital, thereby reducing liquidity pressure due to withdrawal of deposits before maturity [8]. However, [18] found that profitability has a positive and insignificant effect on liquidity because profitability is long-term while liquidity is a short-term daily operational need for funds. The following hypothesis may be formulated:

H5 : Return on Assets is positively related with liquidity coverage ratio.

Operating Expenses to Operating Income (BOPO) is an efficiency ratio used to measure the ability of management to control operational costs against operating income. The smaller the BOPO means the more efficient the operational costs incurred by the Bank. [9] show BOPO has a positive and insignificant effect on LCR, this is in line with [16] which shows BOPO has a significant positive effect on liquidity.

H6 : Operating expense to operating income is negatively related with LCR

In addition, the macroeconomic context affects almost all actors in the economy. High economic growth (GDP) shows that investment is expanding, in which the need for loans to expand

production and investment increases credit growth of commercial banks, and credit risks and liquidity risks also increased. Research by [19] and [14] show that GDP growth has a positive effect on the level of liquidity holdings in a bank. Central bank rate is a policy in determining the interest rate determined and issued by the Central bank as a reference rate in the money market, banking industry and real sector. Research by [23] show that the central bank rate only affects the liquidity of the medium-sized banks, not for the large and small ones. When the central bank lowers the interest rate, the bank will lower the interest rate on savings, current accounts and time deposits. Hence, our last hypothesis is the following:

H7 : GDP growth indicator is positively related with LCR.

H8 : Bank Indonesia benchmark rate indicator is positively related with LCR.

3. Research methodology

3.1 Data and sample

The sample of this study is based on panel data that consist of 33 conventional commercial banks from the population of 65 conventional commercial banks by the end of 2021 data. This study only focuses on conventional commercial banks that already report and fulfil the regulatory limit of LCR. Banks specific variables such as assets size, third party funds, current account saving account (CASA), capital adequacy ratio, non-performing loan, return on asset, and operational costs are collected from quarterly financial reports that published on each bank's website. Meanwhile, for the macroeconomics variables such as GDP and BI 7 Days Reverse Repo Rate (BI7DRR) are collected from Statistics Indonesia and The Central Bank Indonesia. Once collected, the data were organized as unbalanced panel data.

3.2 Variable descriptions

The estimation equation of the study is generalized in equation (2).

$$LCR = \mathrm{a} + \beta 1 * SIZEi,t + \beta 2 * CASAi,t + \beta 3 * CARi,t + \beta 4 * NPLi,t + \beta 5 * ROAi,t + \beta 6 * BOPOi,t + \beta 7 * GDPi,t + \beta 8 * RATEi,t + \varepsilon it \quad (2)$$

In which: i represents banks, t is the quarters in each year of the study, β is the estimated coefficients and ε is the error in the model. Measurements of all variables in the study are describe in Table 1

Table 1. Measurement of Variables

Variable	Variable Name	Lables	Measurement	Expected Sign
Dependent	Liquidity Coverage Ratio	LCR	$\frac{HQLA}{Net\ Cash\ Outflow}$	
Independent	Total Assets	SIZE	Ln Total Aset	+
	Current Account Saving Account	CASA	$\frac{Current\ Account + Saving}{Total\ TPF}$	+

Capital Adequacy Ratio	CAR	$\frac{Capital}{RWA}\ X\ 100\%$	+
Non-Performing Loan	NPL	$\frac{NPL}{Total\ Loan}\ X\ 100\%$	-
Return on Assets	ROA	$\frac{Net\ Income}{Total\ Assets}\ X\ 100\%$	-
Operational cost on operational revenue	BOPO	$\frac{Operational\ Cost}{Operational\ Revenue}$	-
Economic growth	GDP	Percentage	+
Central Bank rate	RATE	Percentage	-

3.3 Methodology

This study uses a linear regression model with panel data to estimate the relationship between the independent tand dependent variable. The panel data model is a combination of cross-sectional data and time series data [24]. According to [25], There are several approaches that can be used to estimate panel data model, namely the Common Effect Model (CEM), Fixed Effect Model (FEM) and Random Effect Model (REM). The Chow test is used to show the most appropriate fit of the regression model between the CEM or the FEM method. Hausman test is used to show the suitability of the model between the FEM or REM method, and the Langrange Multiplier test is to find out the best model to use between REM or CEM method. After that, a hypothesis test was carried out through the T test to find out how far the influence of the independent variables partially on the dependent variable, the F test to find out whether all the independent variables simultaneously or simultaneously affect the dependent variable. Next, the coefficient of determination test (R2) to find out how well the regression line explains the dependent variable by using the coefficient of determination or the adjusted coefficient of determination [26].

4. Result

4.1 Descriptive statistics

The average value of LCR variable from KBMI 2, 3, 4 and foreign banks during 2018-2021 is 2,610 (261%). On average, the LCR value is far above the minimum requirement set by the regulator, which is 100%. The distribution of LCR values is in the range of a minimum value of 0.793 to a maximum value of 12,560. The lowest LCR value of 0.793 is owned by Bank J-Trust in the position of June 2020. While the highest LCR value of 12,560 is owned by ANZ Bank in the position of June 2021. Based on the Banking Industry Profile Report issued by the Financial Services Authority (FSA), LCR in the industry showed an increasing trend from 2018 to 2021, although there is a slight decrease from 2020 with an LCR of 267.91% to 257.79% in 2021.

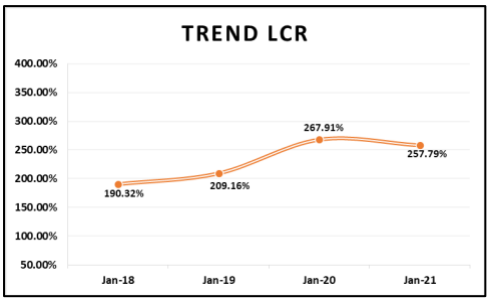

Fig. 1. Trend of LCR in Banking Industry

For the independent variables, Bank size (Size) is the result of the natural logarithm of the total assets owned by each bank. With a minimum value of 14.49 and a maximum value of 18.13, and having a standard deviation of 1.46, it can be seen that the characteristics of the total assets owned by various banks are quite diverse. Capital Adequacy Ratio (CAR) is a comparison between capital and risk-weighted assets (RWA). This variable has a minimum value of 0.11 which is owned by Bank J-Trust in the September 2021 position, while the maximum value of the CAR variable is 0.88 which is owned by Bank Oke for the June 2018 position. Average value of CAR is 0.24, above the threshold set by the Bank for International Settlements (BIS) of at least 8%. The average value of Non-Performing Loan (NPL) is 0.03. Based on the Banking Industry Profile Report, the trend of gross NPL has increased from 2018 to 2021. The gross NPL in December 2019 was 2.37%, while for December 2021 at 3%.

Regarding macroeconomic variables, the economic growth variable (GDP) has the highest standard deviation among the macro variables, the highest value of this variable is 5.2% in December 2018, and the lowest value is −2.1% in September 2020. The negative economic growth rate is caused by the pandemic Covid-19. Meanwhile, the BI 7 Days Reverse Repo Rate (BI7DRRR) has a minimum value of 3% and a maximum value of 6% with an average value 4%.

Table 2. Descriptive Statistics of the Variables

Variable Name	N	Mean	Standard Deviation	Minimum	Maximum
LCR	462	2.610	1.634	0.793	12.560
SIZE	462	18.127	1.465	14.492	21.154
CASA	462	0.412	0.184	0.114	0.929
CAR	462	0.242	0.097	0.110	0.884
NPL	462	0.031	0.016	0.000	0.102
ROA	462	0.013	0.015	-0.063	0.080
BOPO	462	0.872	0.206	0.467	2.921
GDP	462	0.024	0.031	-0.021	0.052
RATE	462	0.047	0.010	0.035	0.060

4.2 Regression analysis

According to Gujarati (2004), if the correlation coefficient between the independent variables in the regression model has values exceeding 0.8, the possibility of multicollinearity among the

variables in the model is high. Results in Table 3 show that the relative absolute value of the pairs of independent variables and the relative absolute value of the dependent variable (LCR) with the independent variables are both less than 0.8.

Table 3. Correlation Matrix

	ASET	CASA	CAR	NPL	ROA	BOPO	GDP	RATE
ASET	1.000000	0.588851	-0.500226	-0.118497	0.357646	-0.336535	-0.031881	-0.031994
CASA	0.588851	1.000000	-0.076889	-0.167947	0.432366	-0.353367	-0.066704	-0.072785
CAR	-0.500226	-0.076889	1.000000	-0.060790	0.141047	-0.102084	-0.056063	-0.116570
NPL	-0.118497	-0.167947	-0.060790	1.000000	-0.535888	0.517342	-0.179248	-0.230391
ROA	0.357646	0.432366	0.141047	-0.535888	1.000000	-0.773150	0.139115	0.177031
BOPO	-0.336535	-0.353367	-0.102084	0.517342	-0.773150	1.000000	-0.128197	-0.102705
GDP	-0.031881	-0.066704	-0.056063	-0.179248	0.139115	-0.128197	1.000000	0.651222
RATE	-0.031994	-0.072785	-0.116570	-0.230391	0.177031	-0.102705	0.651222	1.000000

For REM and FEM regression, the Hausman test provides Prob > Chi2 = 1.000 > 5% statistic value, with 95% confidence, thus there is enough basis to accept the null hypothesis, which means that results of the random-effect model are selected. The following is the result of the regression random effect model (Table 4).

Table 4. Regression Random Effect Model

Variable	**2018 - 2021**		
	Coeff.	**t-Statistic**	**Prob.**
C	-15.063	-2.933	0.003
SIZE	1.048	3.843	0.000
CASA	-1.005	-1.322	0.186
CAR	6.206	7.588	0.000
NPL	-10.724	-2.958	0.003
ROA	-24.330	-4.809	0.000
BOPO	-1.047	-3.432	0.000
GDP	-1.032	-0.715	0.474
RATE	-17.628	-3.359	0.000
R-squared			0.818
Adjusted R-squared			0.802
F-statistic			51.115
Prob (F-statistic)			0.000

Table 5. The Relationship of Independent Variables to LCR Before and During the Covid-19 Pandemic

Variable	**Before COVID-19**		**During Covid-19**	
	Relationship	**Significance**	**Relationship**	**Significance**
SIZE	Negative (-)	Not Significance	Negative (-)	Significance
CASA	Positive (+)	Significance	Positive (+)	Significance
CAR	Positive (+)	Significance	Positive (+)	Significance
NPL	Negative (-)	Significance	Positive (+)	Significance
ROA	Negative (-)	Significance	Negative (-)	Significance
BOPO	Negative (-)	Significance	Positive (+)	Not Significance
GDP	Negative (-)	Not Significance	Negative (-)	Not Significance
RATE	Negative (-)	Not Significance	Negative (-)	Significance

Total assets variable (SIZE) has a positive coefficient of estimation for the liquidity coverage ratio, with statistical significance of 5% and 10%, respectively. This means that the increase in bank assets can increase the LCR value, especially if the additional assets are the productive assets or assets that are included in the HQLA component. This result is consistent with study by [12] and [8]. Banks with large total assets will have the opportunity to diversify investments, not only focusing on credit. They can invest in government bonds and derivative contracts on the stock market to increase convertibility and increase liquidity. In addition, banks with large total assets are easier to attract customers to save their money in them, borrow money from interbank money market, etc. However, the relationship of LCR with bank size in before and during Covid-19 is negative, this finding is in line with the study by [21] and [22] that found the size of the bank has a negative coefficient with liquidity. The size of a bank's total assets (SIZE) has a positive impact on bank liquidity.

Current Account Saving Account (CASA) or cheap fund has a positive coefficient both in before pandemic (model 1) and during pandemic (model 2), with statistically significant at 5%. This result is in line with [3] study which found that LCR was effective in persuading banks in emerging markets to accumulate more stable retail deposits. Banks with high CASA indicate that their funding structure tends to be more stable and the cost of fund is relatively lower. This is because in general current account and savings have lower interest rate unlike the time deposits. In addition, savings and current account products are more diversified, unlike time deposits, where a customer usually places a large amount of funds in one certificate of deposit.

Capital Adequacy Ratio (CAR) has a positive coefficient with statistically significant of 5%. This is in line with the research of A[16] and [17] which show that CAR has a significant positive effect on liquidity. The higher the Capital Adequacy Ratio, the better the Bank's ability to bear the risk of any risky credit/productive assets. If the CAR value is high, the bank can finance operational activities and meet its liquidity obligations. Capital Adequacy Ratio (CAR) also has a positive coefficient both in before and after pandemic Covid-19.

The Non-Performing Loan (NPL) variable has a negative relationship and significantly affects LCR. These results are in line with research by [15], [17] and [9] which show that NPL has a significant negative effect on liquidity. High NPL will interfere their cash flow from principal and interest payments from loans, so it will have an impact on bank cash inflow, which will reduce the bank's LCR ratio. In addition, NPL is also an important factor in bank reputation risk. Customer more likely to trust save their money on bank with low NPL, so the bank liquidity is maintained. A high NPL also indicates that banks have a large credit risk and banks are required to establish reserves for bad loans. However, for during the pandemic Covid-19, NPL has positive relationship with LCR. This finding is in line with study of [27] and [28] that showed NPL has a significant positive effect on liquidity. These conditions may be due to the impact of pandemic in the economy and business which caused the business of debtors to decline and they have trouble in paying their debt to the bank. This results an increase in the NPL in banking sector. Meanwhile on the other hand, bank over liquid during pandemic because the increase growth of Third-Party Funds and they reduce lending because the business sector is not doing well. This condition make banking liquidity remains strong even though the NPL has increased.

Return on total assets (ROA) has negative coefficients and significantly affect LCR both in before and during pandemic Covid-19. Interest and principal income from lending is the main

income for banks. The greater the ROA of the bank, indirectly mean that the credit (long term) disbursed by the bank is also large. On the other hand, banks have an obligation to fulfil customer withdrawals (short term). This will result in a liquidity mismatch.

Operating expenses to operating income (BOPO) have a negative relationship and significantly affect LCR. One of the components of operating costs is the interest expense paid by banks to depositors on savings deposits, time deposits, demand deposits and other forms of third-party funds. Meanwhile, operating income is the income received by the bank for providing loans to debtors. The large BOPO value is caused by operating costs that are too large compared to the bank's operating income. Operational costs indicate that the bank is providing a sufficiently large interest to depositors so that it has large operating costs. In the LCR calculation, depositors who get interest on placement of funds are greater than the interest guaranteed by the Deposit Insurance Corporation (LPS), so they are included in the category of less stable deposits and have a higher hair cut value when compared to stable deposits. So, the greater the BOPO, the lower the LCR value of the bank. This is in line with the research of [14] which states that operational cost has a significant negative effect on liquidity.

The BI 7 Days Reverse Repo Rate or the reference interest rate has a negative and significant relationship to LCR. This shows that when Bank Indonesia increases the benchmark interest rate, the LCR will decrease. When Bank Indonesia increases the benchmark interest rate, banks will follow the change and apply it to their third-party fund interest rate. If the increase in interest rates causes their interest rates to be above the LPS guaranteed interest rate, then the percentage of the run off rate of TPF in Cash Outflow will change to a larger one because the funding will be included in the less stable deposit component.

5 Conclusion and Recomendations

The aim of the study was to identify the determinants of liquidity coverage ratio conventional banks in Indonesia. The study was performed by Random Effect Model regression with unbalanced panel data on a quarterly frequency of 33 conventional banks in Indonesia, for the period from Q1 2018 to Q3 2021. The results show that the determinants of liquidity coverage ratio of conventional banks are total asset (SIZE), saving account saving account per total third party funds (CASA), capital adequacy ratio (CAR), and non-performing loan (NPL), Return on Assets (ROA), Operational Cost on Operational Revenue (BOPO) and BI 7 Days RR Rate.

There are several differences in LCR determinants between before the COVID-19 pandemic and during the pandemic. Factors that affect LCR before the pandemic are CASA, CAR, NPL, ROA and BOPO. Meanwhile, during a pandemic, the factors that affect LCR are SIZE, CASA, CAR, NPL and ROA. The relationship between NPL and LCR before the pandemic was negative, while during the pandemic NPL was positively related to LCR.

The results of this study have important implications for managers at KBMI 1 group banks, policymakers and further research academics. For bank that in the future require to report and fulfil the regulatory limit of LCR, they need to maintain high quality liquid assets position in sufficient amount (not too much or too little) in order to meet the bank's liquidity needs over the next 30 days, design strategies that enable to attract significant retail deposits especially from saving account and current account products and maintain credit quality so that the number of

non-performing loans is not high. There are some advantages of using retail deposits to fulfil liquidity coverage ratio limit. First, retail deposits generally earn below market interest, thus will boost banks profitability with reduction in cost of fund. Second, retail deposits can to maintain banking sector stability due to the resilience of core deposits. Banks also need to maintain their maturity mismatch position so that the gap between assets and liabilities, especially for the short-to-medium term is not too large.

Reference

[1] Yankov V. The liquidity coverage ratio and corporate liquidity management [Internet]. Finance and Economics Discussion Series (FEDS) Notes. Washington: Board of Governors of the Federal Reserve System; 2020. p. 26. Available from: https://doi.org/10.17016/2380-7172.2509.

[2] Covas F, Driscoll JC. Bank liquidity and capital regulation in general equilibrium [Internet]. e Finance and Economics Discussion Series (FEDS). Washington, D.C: Divisions of Research & Statistics and Monetary Affairs Federal Reserve Board; 2014. Available from: https://www.federalreserve.gov/econresdata/feds/2014/files/201485pap.pdf

[3] Mashamba T, Magweva R. Basel III LCR requirement and banks' deposit funding: empirical evidence from emerging markets. Journal of Central Banking Theory and Practice, 2019;8(2):101-128.

[4] Dahlan S. Manjemen lembaga keuangan kebijakan moneter dan perbankan. 5th Edition. Jakarta: LP-FEUI; 2005.

[5] Muranaga J. Ohsawa M. Measurement of liquidity risk in the context of market risk calculation [Internet]. In: The measurement of aggregate market risk. BIS; 1997. Available from: https://www.bis.org/publ/ecsc07.htm

[6] Goodhart C. Liquidity risk management. Banque de France Financial Stability Review, 2008;11:39-44.

[7] Diamond DW, Rajan RG. Liquidity risk, liquidity creation, and financial fragility: A theory of banking. Journal of political Economy. 2001;109(2):287-327.

[8] Nguyen HT, Dut Van VO. Determinants of liquidity of commercial banks: empirical evidence from the Vietnamese stock exchange. The Journal of Asian Finance, Economics and Business. 2021;8(4):699-707.

[9] Sitepu RWB. Faktor-faktor yang mempengaruhi liquidity coverage ratio (LCR) sebagai penerapan basel III pada sektor perbankan di Indonesia [Master Theses]. Medan: Universitas Sumatera Utara; 2019.

[10] Ghemini A, Chaibi H, Omri MAB. Liquidity risk determinants: Islamic vs conventional banks. International Journal of Law and Management. 2020. Doi:10.1108/IJLMA-03-2018-0060

[11] Mohammad S, Asutay, M, Dixon R, Platonova, E. Liquidity risk exposure and its determinants in the banking sector: a comparative analysis between Islamic, conventional and hybrid banks. Journal of International Financial Markets, Institutions and Money. 2020;66(101196). Doi: https://doi.org/10.1016/j.intfin.2020.101196

[12] Umar M, Sun G. Determinants of different types of bank liquidity: evidence from BRICS countries. China Finance Review International. 2016;6(4):380-403. Doi: https://doi.org/10.1108/CFRI-07-2015-0113

[13] Narayanaswamy R. Financial accounting: a managerial perspective. 6th Revised Edition. New Delhi: PHI Learning; 2017

[14] Moussa MAB. The determinants of bank liquidity: case of Tunisia. International Journal of Economics and Financial Issues. 2015;5(1):249-259.

[15] Luvuno TI. Determinants of commercial bank liquidity in South Africa [Dissertation]. Pretoria: University of South Africa; 2018.

[16] Al-Homaidi EA, Tabash MI, Farhan NH, Almaqtari FA. The determinants of liquidity of Indian listed commercial banks: A panel data approach. Cogent Economics & Finance. 2019;7(1). Doi: 10.1080/23322039.2019.1616521.

[17] Mazreku I, Mornia F, Misiri V, Spiteri JV, Grima S. Exploring the liquidity risk factors in the Balkan region banking system. European Research Studies Journal. 2019;12(1):91-102. Doi: 10.35808/ersj/1409
[18] Ahmad F, Rasool N. Determinants of bank liquidity: empirical evidence from listed commercial banks with SBP. Journal of Economics and Sustainable Development. 2017;8(1):47-55.
[19] Cucinelli D. The determinants of bank liquidity risk within the context of Euro area. Interdisciplinary Journal of Research in Business. 2013;2(10):51-64. ISSN: 2046-7141.
[20] Deléchat C, Henao C, Muthoora P, Vtyurina S. The determinants of banks' liquidity buffers in Central America [Internet]. International Monetary Fund; 2012. Available from: https://www.imf.org/external/pubs/ft/wp/2012/wp12301.pdf
[21] El-Chaarani H. Determinants of bank liquidity in the Middle East region. International Review of Management and Marketing. 2019;9(2).
[22] Aldeen KN, Siswahto E, Herianingrum S, Al Agawany ZWM. Determinants of bank liquidity in Syria: a comparative study between Islamic and conventional banks. International Journal of Accounting, Finance and Business. 2020;5(26):33-49.
[23] Wuryandani G, Ginting R, Iskandar D, Sitompul Z. Fund management and the liquidity of the bank. Bulletin of Monetary Economics and Banking. 2003;16(3):231-258. Doi: https://doi.org/10.21098/bemp.v16i3.446
[24] Brooks C. Introductory econometrics for finance. Cambridge: Cambridge University Press; 2014.
[25] Gujarati D, Porter D. Essentials of econometrics. 4th Edition. New York: McGraw Hill; 2009.
[26] Widarjono A. Statistika terapan edisi pertama. Yogyakarta: UPP STIM YKPN; 2015.
[27] Choon LK, Hooi LY, Murthi L, Yi TS, Shven TY. The determinants influencing liquidity of Malaysia commercial banks, and its implication for relevant bodies: evidence from 15 Malaysian commercial banks. Kampar: Universiti Tunku Abdul Rahman, Faculty of Business and Finance Department of Finance; 2013.
[28] Laurine C. Zimbabwean commercial banks liquidity risk determinants after dollarisation. Journal of Applied Finance and Banking. 2013;3(6):97.