International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 06,
2020 ISSN: 1475-7192

Determinants Affecting the Liquidity of Commercial Banks in Vietnam: A Longitudinal Analysis

Ngo Ngoc Minh[1], Nguyen Ngoc Thuc[2], Bui Van Quang[3]

Abstract--- *The paper uses fixed effect model (FEM) to study the factors affecting the liquidity ratio of 34 Vietnamese commercial banks in the period 2005-2019. The empirical results show that the bank size, the ratio of equity to total capital, credit risk, the ratio of loans to total assets, the growth rate of gross domestic product variables negatively effect on liquidity ratio while the return on equity variable positively impacts on the liquidity ratio of commercial banks. On that basis, the paper proposes some policy recommendations to better manage liquidity, creating one of the prerequisites for a sustainable economic development in the long term.*

Keywords--- *liquidity ratio, liquidity risks, commercial banks, Vietnam.*

I. INTRODUCTION

Most commercial banks are interested in the liquidity because it is the vital issue of banks in the current period. In Vietnam, more than three decades, since the Vietnamese banking system has implemented the process of reforming commercial banks, there have been new developments in both quantity and quality, but the problem of liquidity risk seems to be paid not enough attention. One of the important tasks that bank managers need to perform is to ensure a reasonable liquidity for the bank. Banks have good liquidity, or in other words, they do not face liquidity risk when they always have available capital at reasonable costs at the right time. This means that if the bank does not have enough capital needed to meet the needs of the market, it can lose its solvency, discredit and lead to the collapse of the whole system. Therefore, it is necessary to study liquidity issues in the banking system. The good liquidity of banks not only helps the financial market be stable but makes the economy work well. Especially, in the current conditions of Vietnam, liquidity issues are of top concern and often raised from the beginning of each financial year so that facilitate management in practice. Based on these above reasons, the paper attempts to explore the answers for the questions of what determinants impacting on the liquidity of the Vietnamese commercial banking system in the past 15 years.

To this end, the paper is structured as follows. Section 2 reviews researches on factors affecting liquidity of commercial banks. Section 3 presents data, variables, model and the methodology. The empirical results will be analyzed in Section 4. And the Section 5 brings conclusion and suggests some implications.

II. LITERATURE REVIEW

There are many ways to measure the liquidity ratio, however, this paper uses formula hereafter as some studies' authors as Aspachs et al. (2005), Rychtárik (2009), Praet and Herzberg (2008):

$$\text{Liquidity ratio} = \frac{\text{Liquid assets}}{\text{Total assets}} \quad (1)$$

[1] *First and Corresponding Author. Ph.D, Faculty of Business Administration, Industrial University of Hochiminh City, Vietnam. Email: ngongocminh@iuh.edu.vn*

[2] *Ph.D scholar, Faculty of Business Administration, Industrial University of Hochiminh City, Vietnam. Email: nguyenngocthuc@iuh.edu.vn*

[3] *Ph.D, Faculty of Business Administration, Industrial University of Hochiminh City, Vietnam. Email: buivanquang@iuh.edu.vn*

This ratio reflects the liquidity of a bank. It provides how many percent of liquid assets in the total assets of a bank. If this ratio is high meaning the bank owns a good liquidity.

Liquidity ratios are related to bank size (Giannotti et al., 2011; Deléchat et al., 2012; Malik and Rafique, 2013; Roman and Sargu, 2015; Al-Homaidi et al., 2019). However, the impact of bank size on the liquidity ratio in banks is different in the studies. Some research suggests that small banks often maintain a high level of liquidity (Aspachs et al., 2005). However, Deléchat et al. (2012), when studying liquidity ratios at banks in Central America, Panama and the Dominican Republic, found a very strong and negative impact between bank size and liquidity ratio. On the contrary, there are studies which found that the large banks often maintain high levels of liquidity (Rauch et al., 2010; Malik and Rafique, 2013).

The empirical results conducted by Bunda and Desquilbet (2008) in 36 emerging economies, including Vietnam for the period 1995-2000, with data collected from 1,107 commercial banks showed that the capital coefficient, measured by equity to total assets, positively effect on the liquidity ratio. However, Horvath et al. (2012) emphasized that for banks with a small proportion of equity, under the pressure of Basel III often maintains a high liquidity ratio. This is consistent with the research results of Diana (2013) when surveyed at 5,715 banks in Europe and Switzerland during 2007-2011 period.

Valla and Saes (2006) showed that after-tax profit on equity negatively effected on liquidity ratio. That is, banks with high profit and profit growth will have low liquidity rates. However, Rauch et al (2010), when examining the factors affecting the liquidity of 457 banks in Germany from 1997 to 2006, concluded that an increase in profits would increase liquidity. Another study by Vovadá (2013) at banks in Hungary in the period of 2001-2010 also found that the ratio of net profit to equity (ROE) has a positive impact on the ratio of liquidity.

Malik et al. (2013) investigated the impact of credit risk on liquidity ratios at 26 banks in Pakistan from 2007 to 2011 and found that the credit risk has the negative effect on the liquidity ratio. The results also showed that if the bank has high credit risks, the liquidity will be seriously reduced.

A study conducted by Bonin et al. (2014) in 3 regions of Central and Eastern Europe, Southeast Europe and the former Soviet Union from 1995 to 2010 showed that the ratio of loans to total assets has a positive effect on liquidity ratio. This results is in line with those of Aspachs et al. (2005): banks will increase liquidity when lending opportunities decrease and vice versa.

The macroeconomic environment influences the liquidity ratio of banks (Aspachs et al., 2005; Vodová, 2013). Research by Isabelle et al. (2013) shows that the growth of gross domestic product (GDP) has a positive impact on liquidity ratio. However, the Bunda and Desquilbet (2008) study found the opposite results.

Liquidity ratios are related to marginal interest rates (Vodová, 2011; Deléchat et al., 2012). Chowdhury et al. (2016) determined the effect of liquidity risk on the profitability indicating net interest margin (NIM) variable of the conventional banks in seven banks in Bangladesh from 2011 to 2015. The findings of the study provided evidence that cash to asset ratio had a negative relationship with marginal interest rates but a loan to asset ratio had a positive effect. There was also a significant positive relationship between NIM and loan to deposit ratio. Singh and Sharma (2016) investigated bank-specific and macroeconomic factors that determine the liquidity of Indian banks by using OLS, FEM and REM on a dataset of 59 banks from 2000 to 2013. Findings reveal that bank ownership affects liquidity of banks. Based on panel data analysis, we suggest that bank-specific (except cost of funding) and macroeconomic (except unemployment) factors significantly affect bank liquidity. These include bank size, deposits, profitability, capital adequacy, GDP and inflation. Further, bank size and GDP were found to have a negative effect on bank liquidity.

Recently, Sopan and Dutta (2018) studied the determinants of liquidity risks in Indian banks by examining several bank-specific factors (profitability, funding costs, bank size, asset quality, deposit rates and capitalization rate) and macroeconomic factors (gross domestic products and inflation rate). The study found that bank-specific factors, such as size,

profitability levels, funding costs and asset quality, had a negative relationship with the liquidity risks, while capitalization rate and asset quality had a negative relationship with liquidity. In the case of macroeconomic factors considered in the study, inflation rate had a positive effect on liquidity, while gross domestic product had a negative effect on liquidity.

Subsequently, Al-Homaidi et al. (2019), in their study on the liquidity of Indian banks have investigated the liquidity determinants of Indian banks from 2008 to 2017, using data on commercial banks listed on the Bombay Stock Exchange and several statistical models, such as pooled ordinary least square (OLS), fixed and random effects regression analysis. The study found that while bank size, capital adequacy ratio, deposit ratio and operation efficiency ratio had a positive effect on liquidity, asset quality ratio, asset management ratio, return on equity ratio and net interest margin harmed liquidity.

For the case of Vietnam, some latest typical studies on the liquidity of commercial banks are presented hereafter. Diep and Lam (2017) investigated major determinants of the liquidity of commercial banks in Vietnam for the period 2009-2016 by using the OLS method over the data from the financial reports of 32 commercial banks. The empirical results found that three determinants, including bank size, the ratio of total loans to total deposits and capital to asset proportion, significantly affect the liquidity of a bank. Based on the results of this study, managerial implications for commercial banks in Vietnam are made for their sustainable development and some recommendations are also made for the State Bank of Vietnam to improve their relevant policies in controlling the whole banking system.

Tu et al. (2019) examined factors that explain the liquidity of commercial banks in the Vietnam banking system from 2010 to 2015. By using the OLS regression method, the empirical results found that: first, the interbank market helps commercial banks improve their liquidity; second, the larger the loan size, the higher the liquidity risk; third, good credit risk management has a positive impact on liquidity risk management; and fourth, long-term interest rate is negatively related to the liquidity of commercial banks. The research also makes recommendations on liquidity risk management policies to banks and policy-makers from the Government and the State Bank of Vietnam.

In summary, there have been few recent studies using Vietnamese data to investigate the liquidity of commercial banks. Moreover, most of these studies examine only the influence of internal variables without considering macro-economic variables, which are not consistent with the theoretical arguments and previous empirical evidence showing that bank liquidity depends on both internal and external factors. Therefore, the current research contributes to the literature by determining not only the internal factors of the banks but also the external factors, such as macroeconomic variables, then provide a comprehensive evaluation of factors affecting the liquidity of the banks in Vietnam.

III. METHODOLOGY

Data

Data were collected from annual financial statements of 34 out of 35 commercial banks in Vietnam (except for the case of Vietnam Bank for Agriculture and Rural Development). This bank did not have enough data to run the model for the period 2005-2019. The banks included in the sample account for over 97.1% of the total banks in the Vietnamese banking system. All financial reports used in this research were published by the banks and audited by external auditors, which validates the accuracy of financial data used in the research. The final sample includes 510 firm-year observations over the 15-year period, which represents a very good sample size for regression analysis. Besides, the paper used the data of GDP variable from the World Bank except the figure of the year 2019 is derived from General Statistical Office (GSO).

Variables and model

Table 1: Variables descriptions

Signed	Description	References	Expected mark
Dependent variable: $LnLIQ_{i,t}$	The liquidity ratio of bank i in year t, measured by percentage	Tu et al. (2019)	
Independent variables:			
$SIZE_{i,t}$	The size of bank i in year t, measured by 1,000 billions Vietnamdong	Diana (2013), Singh and Sharma (2016), Diep and Lam (2017)	-
$CAR_{i,t}$	The capital/asset ratio of the bank i in year t, measured by percentage	Diana (2013), Diep and Lam (2017)	-
$ROE_{i,t}$	Return on equity of the bank i in year t, measured by percentage	Aspach et al. (2005), Bonfim and Kim (2012), Al-Homaidi et al. (2019)	+
$CR_{i,t}$	The credit risks of the bank i in year t, measured by percentage	Délechat et al. (2012)	-
$LAR_{i,t}$	The loans/asset ratio of the bank i in year t, measured by percentage	Aspach et al. (2005)	-
GDP_t	Growth rate in year t, measured by percentage	Aspach et al. (2005), Vodová (2011), Singh and Sharma (2016)	-
IRM_t	Interest rate margin in year t, measured by percentage	Délechat et al. (2012), Al-Homaidi et al. (2019)	-

Source: Author's compilation

Eventually, the paper propose research model as following on the base of inheriting previous studies.

$$LIQ_{i,t}=\beta_0+\beta_1 SIZE_{i,t}+\beta_2 CAR_{i,t}+\beta_3 ROE_{i,t}+\beta_4 CR_{i,t}+\beta_5 LAR_{i,t}+\beta_6 GDP_t+\beta_7 IRM_t+\varepsilon_{i,t} \quad (2)$$

Methodology

The descriptive statistics are used to describe the basic characteristics of data as total number of observed samples, mean value, standard deviation, minimum and maximum values. For the regression analysis on panel data, the paper uses Wooldride test (2002) to detect autocorrelation phenomenon, then applies variance inflation factor (VIF) to detect multi-collinearity phenomenon. Finally, the study uses the Hausman test (1978) to choose between the random effects model (REM) and fixed impact model (FEM). The results show that the FEM model is consistent with the panel data in this study. In addition, the research also uses Wald test (Greene, 2000) to test the heteroscedasticity to select the appropriate research model.

Assuming each unit has its own characteristics that can affect the explanatory variables, FEM analyzes this correlation between the residuals of each unit and the explanatory variables. Thereby, it controls and separates the influence of individual characteristics (constant over time) from the explanatory variables so that we can estimate the net effects of the independent variables on the dependent variable. Estimated model is formed as:

$$Y_{i,t}=C_i+\beta X_{i,t}+U_{i,t} \quad (3)$$

In which:

$Y_{i,t}$ is the dependent variable observed for individual i at time t

$X_{i,t}$ is the independent variable observed for individual i at time t

C_i (i=1,2,3…,n) is the intercept for each individual

B is the slope of factor X

$U_{i,t}$ is the residual

IV. EMPIRICAL RESULTS

Statistical description

Table 2: Statistical description

Variables	Mean	Std.Deviation	Min	Max
$LIQ_{i,t}$	23.66	11.35	5.24	60.14
$SIZE_{i,t}$	7.39	0.61	5.57	8.81
$CAR_{i,t}$	11.64	6.91	3.82	46.39
$ROE_{i,t}$	11.12	7.57	-6.28	44.49
$CR_{i,t}$	1.21	0.63	0.01	3.70
$LAR_{i,t}$	52.39	13.02	19.41	85.27
GDP_t	6.11	0.65	5.25	7.13
IRM_t	2.88	0.54	1.94	3.69

Source: Author's estimation

Table 2 shows the statistical description of each variable in the model. Accordingly, liquidity ratio of banks is quite high, the average value (23.66%) is within the limit of the largest value (60.14%) and the smallest value (5.24%) with standard deviation of (11.35%). This ratio reflects the true situation of Vietnam's economy in the period of 2005-2019 with a very high inflation rate. Specifically, according to the GSO (2009), the consumer price index (CPI) in 2008 was 19.89%. In this period, the paradox is that small banks have higher liquidity than large banks. Specifically, the bank size reached the average value (7.39), of which the smallest and largest values are (5.57 - 8.81), with a standard deviation of 0.61. Equity over total capital has the average value (11.64%), in which the smallest value (3.82%) and the largest value (46.39%), with standard deviation of 6.91%. The ROE index is quite high, with average value of 11.12%. Credit risk of banks with average value of 1.21%, standard deviation of 0.63% and the minimum value equals to 0.01%. Credit risk indicator has the opposite effect with the liquidity ratio at commercial banks.

Lending to total assets ratio of banks is also quite high, averaging make account for 52.39%. Of which the smallest value (19.41%) and the largest value (85.27%), with a standard deviation (13.02%). In Vietnam, banks still rely on lending activities to make profits, so the loan ratio is always very high. This will affect the liquidity ratio.

The economic growth rate was not stable in the period of 2005-2019, due to the impact of the financial crisis in the United State in 2008. Especially, 2005-2019 was the most difficult period of the Vietnam's economy since the comprehensive economic renovation (GSO, 2019). According to the GSO, this period's average GDP growth rate was about 6.12%, with the highest and lowest growth rates recorded at 7.13% in 2007 and 5.25% in 2012, respectively. Due to macroeconomic difficulties, outstanding loan growth has been modest and strongly effected on capital mobilization of credit institutions. Similar to GDP, the marginal interest rate is also unstable, with an average value of 2.88%, the largest value reached 3.69% in 2007, according to this trend, which will affect the profits of the commercial banks.

Regression results

There are two common models to estimate regression of panel data as the REM and FEM. But when Wooldridge test was used, the paper found that the panel data of 34 commercial banks exist autocorrelation phenomenon, so the REM model was not suitable (Gujarati, 2004). Therefore, the paper use FEM model for the analysis. After correcting the autocorrelation phenomenon, the heteroscedasticity, and using the Robust command, the estimated results is presented in Table 3.

Table 3: The regression results

Dependent variable: $LnLIQ_{i,t}$	Coefficients
$SIZE_{i,t}$	-12.1519***
$CAR_{i,t}$	-0.2736*
$ROE_{i,t}$	0.3138***
$CR_{i,t}$	-2.3844*
$LAR_{i,t}$	-0.4168***
GDP_t	-1.6882**

IRM_t	0.3027
Constant	144.9068***
R^2	55.77%

Note: *, ** and *** asterisks denote the statistical significance at 10, 5 and 1 percents, respectively
Source: Author's estimation

The coefficient of bank size variable is -12.1519, statistically significant at the 1%. This shows that the bank size negatively impacts on the liquidity ratio. However, the decree of the effect is not high because if other factors constant, bank size increased by 1%, the liquidity rate decreased by 0.1215%. This indicates that smaller banks often hold higher liquidity ratios and the result is similar to the studies of Délechat et al (2012), Vodová (2013), Diana (2013), Chowdhury et al. (2016). However, it is contrary to the results of Rauch et al. (2010), Malik et al. (2013), Diep and Lam (2017) and Al-Homaidi et al. (2019).

The coefficient of CRi,t variable values at -2.3844, statistically significance at 10%, the largest value compared to the remaining statistically significant variables. As such, credit risk is an important and the strongly impacted factor on liquidity ratio. This result is similar to the studies of Délechat et al (2012), Malik and Rafique (2013), Chowdhury et al. (2016). This result reflects the true situation of Vietnamese banks where the banks with high bad loans ratio are all banks meet liquidity problems. The fact in Vietnam shows that small commercial banks are often subject to greater pressure on liquidity and higher liquidity risks than large banks because these banks have a narrow network, less able to mobilize capital so they have to maintain high liquidity rates.

Currently, the equity factor of the commercial banks in Vietnam is increasingly important. The coefficient of the $CAR_{i,t}$ variable is -0.2736 meaning that the ratio of equity to total capital inversely correlated with the liquidity ratio, being statistically significant at 10%. This is similar to the results in the studies of Délechat et al (2012), Vodová (2013), Diana (2013), Chowdhury et al. (2016). However, it is contrary to the results of Aspachs et al (2005), Bonfim and Kim (2012).

The regression results show that ROE is positively correlated with the liquidity ratio. The correlation coefficient is of 0.3138, statistically significant at 1%. This is consistent with the studies of Aspachs et al. (2005), Bonfim and Kim (2012). This result is explained as banks with high profitability will be able to offset good liquidity and at the same time create a reputation in the market to attract mobilized capital, thus helping these banks to stabilize liquidity ratio.

The results in Table 3 indicate that the ratio of loans to total assets is negatively associated with the liquidity ratio. The coefficient valued at 0.4168, statistically significant at 1%. This finding is similar with the results of Vodová (2013). Because of limiting this risk, banks must increase investment in liquidity assets to help neutralize risks, so this relationship is negative.

The coefficient of the GDP growth rate variable is -1.6882, statistically significant at 5% level. It means the GDP growth rate negatively effect on the liquidity ratio. This result is similar to the findings of Aspachs et al (2005), Vodová (2011) and Singh and Sharma (2016) but contrary to the results of Malik et al. (2013) and Diana (2013).

When the economy is on the downward path, banks tend to increase liquidity reserves to cope with market fluctuations. For instance, in the period of 2008-2009, GDP growth rate decreased from 5.56% to 5.40%, South Asia Commercial Joint Stock Bank increased the liquidity ratio from 19.79% to 34.11 %. Similarly, commercial banks An Binh, Tien Phong and some other banks also have similar moves as South Asia bank.

The coefficient of the IRM variable is not statistically significant, so it will not evidence on the relationship between interest rate and the liquidity ratio. This result is similar to that of Vodová (2011) when analyzing the determinants of the liquidity of commercial banks in the Czech Republic from 2001 to 2009.

V. Conclusion And Policy Implication

The study uses FEM model to estimate the liquidity ratio of 34 Vietnamese commercial banks over a 15-year period from 2005 to 2019. The empirical results obtained when studying a number of factors affecting the liquidity ratio of joint stock commercial banks in Vietnam are similar to previous studies and most in accordance with the expectations of the hypothesis. The results show that the bank size variables, the ratio of equity to total capital, credit risk, the ratio of loans to

total assets, the GDP growth rate negatively effect on the liquidity ratio and statistically significance. The profitability variable has a positive and significant effect on the liquidity ratio and there is not enough evidence to conclude that the marginal interest rate variable has an impact on liquidity. The degree of impact of the independent variables on the dependent variable in descending order is as follows: bank credit risk, GDP growth rate, lending to total assets, profitability, the ratio of equity to total capital and bank size. Based on the analyzed results, the paper suggests a number of recommendations to help Vietnamese commercial banks to better manage liquidity as follows:

First, banks need to reduce credit risks to reduce liquidity risks. However, if only focusing on reducing credit risks and limiting credit growth, bank profits will decrease. Therefore, commercial banks need to have a plan to improve the credit growth rate in a stable and sustainable manner with good quality.

Second, commercial banks, instead of reserve liquidity in cash, can deposit money at other banks or valuable papers with high liquidity like treasury bills. By doing so, it will both bring profits and ensure liquidity when necessary.

Third, banks need to continue to increase equity and bank size. Currently, there are many banks with small equity and capital such as Kien Long, Viet A, South Asia, etc. Therefore, the increase in equity is so important to expand the scale of operations and increase the mobilization capacity, ensuring safety of the bank's operations.

Fourth, the empirical results reveal that the ratio of profit to equity is positively correlated with the liquidity ratio. Thus, banks need to improve business efficiency to make liquidity improvement. Particularly, banks need to diversify their products and services to gain more other sources of income instead of relying overwhelmingly on credit because credit activity is sensitive to economic fluctuations.

REFERENCES

[1] Al-Homaidi, E., Tobash, M. I., Farhan, N. H. and Almaqtari, F. A. (2019). The determinants of Liquidity of Indian listed commercial banks: A panel data approach. *Cogent Economics and Finance,* 7, 1-20. https://doi.org/10.1080/23322039.2019.1616521

[2] Aspachs, O., Nier, E.W. and Tiesset, M. (2005). Liquidity, Banking Regulation and the Macroeconomy. Available at SSRN: https://ssrn.com/abstract=673883 or http://dx.doi.org/10.2139/ssrn.673883

[3] Bonin, J. P., Hasan, I. and Wachtel, P. (2014). Banking in Transition Countries. BOFIT Discussion Paper No. 8. Available at SSRN: https://ssrn.com/abstract=2416826 or http://dx.doi.org/10.2139/ssrn.2416826

[4] Bonfim, D. and Kim, M. (2012). Liquidity Risk in Banking: Is There Herding. European Banking Center Discussion Paper No. 2012-024. https://doi.org/10.2139/ssrn.2163547

[5] Bunda, I. and Desquilbet, J. (2008). The bank liquidity smile across exchange rate regimes. *International Economic Journal*, 22(3), 361-386. https://econpapers.repec.org/RePEc:taf:intecj:v:22:y:2008:i:3:p:361-386

[6] Chowdhury, A. N. M. M. H., Siddiqua, A. and Chowdhury, A. S. M. M. H. (2016). Relationship between Liquidity Risk and Net Interest Margin of Conventional Banks in Bangladesh. *Asian Business Review*, 6(3), 175-178. https://doi.org/10.18034/abr.v6i3.43

[7] Deléchat, C., Henao, C., Muthoora, P. and Vtyurina, S. (2012). The Determinants of Banks' Liquidity Buffers in Central America. Working Paper, WP12/301/IMF.

[8] Diana, T. (2013). Off - Balance sheet items in European banking: A panel data econometric model on risk and liquidity. Master Dissertation, Porto University, Portugal.

[9] Diep, N.T.N., and Lam, N.T. (2017). Determinants of Liquidity of Commercial Banks in Vietnam in the Period 2009-2016. *International Journal of Scientific Study*, 5(6), 237-241.

[10] Isabelle, D., Caroline, R. and Amine, T. (2013). Bank capital buffer and liquidity: Evidence from US and European publicly traded banks. *Journal of Banking and Finance*, 37(9), 3295-3317. https://doi.org/10.1016/j.jbankfin.2013.04.027

[11] Giannotti, C., Gibilaro, L. and Mattarocci, G. (2011). Liquidity risk exposure for specialised and unspecialized real estate banks: Evidences from the Italian market. *Journal of Property Investment and Finance*, 29(2), 98-114. https://doi.org/10.1108/14635781111112756

[12] Greene, W. (2000). *Econometric analysis*, Prentice-Hall, USA.

[13] Gujarati, D. (2004). *Basic Econometrics*, 4th edition, McGraw Hill, Boston.

[14] Hausman, J.A. (1978). Specification test in econometrics. *Econometria*, 46(6), 1252-1271.

[15] Horvath, R., Seidler, J. and Weill, L. (2012). Bank capital and liquidity creation: Granger-causality evidence. *Working paper series No. 1497*, European Central Bank.

[16] Malik, M. and Rafique, A. (2013). Commercial banks liquidity in Pakistan. *Romanian Economic Journal*, 16(48), 139-154. https://econpapers.repec.org/RePEc:rej:journl:v:16:y:2013:i:47:p:139-154

[17] Praet, J. and Herzberg, M. (2008). Market liquidity and banking liquidity: linkages, vulnerabilities and the role of disclosure. *Financial Stability Review, Banque de France,* 11, 95-109.

[18] Rauch, C., Steffen, S., Hackethal, A. and Tyrell, M. (2010). Determinants of bank liquidity creation. *SSRN Electronic Journal*. DOI: 10.2139/ssrn.1343595

[19] Roman, A. and 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.

[20] Rychtárik, S. (2009). Liquidity scenario analysis in the Luxembourg banking sector. Working papers No.41, Central bank of Luxembourg, Luxembourg.

[21] Singh, A. and Sharma, A.K. (2016). An empirical analysis of macroeconomic and bank-specific factors affecting liquidity of Indian banks. *Future Business Journal*, 2(1), 40-53. https://doi.org/10.1016/j.fbj.2016.01.001

[22] Sopan, J. and 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. https://doi.org/10.5958/2249-7323.2018.00043.3

[23] Tu, T.T.T., Yen, N.T., Thuy, N.T.H. and Long, T. (2019). The determinants of liquidity risk of commercial banks in Vietnam. *Banks and Bank Systems*, 14(1), 94-110. http://dx.doi.org/10.21511/bbs.14(1).2019.09

[24] Valla, N. and Saes, B. (2006). Bank liquidity and financial stability. *Financial Stability Review*, *Banque de France,* 9, 89-104. https://econpapers.repec.org/RePEc:bfr:fisrev:2006:9:5

[25] Vodová, P. (2011). Liquidity of Czech commercial banks and its determinants. *International Journal of Mathematical Model and Method in Applied Sciences*, 5(6), 1060-1067.

[26] Vodová, P. (2013). Determinants of commercial banks' liquidity in Hungary. *Financial Internet Quarterly*, 9(3), 64-71.

[27] Wooldridge, J.M. (2002). *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press, USA.

[28] The website of General Statistical Office, https://www.gso.gov.vn (accessed on April 15th, 2020).