

The Determinants of Banks' Liquidity in Vietnam

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Abstract: This paper is aimed to identify the key determinants of commercial banks' liquidity in Vietnam, testing the hypotheses of trade-off between bank liquidity and profitability. The random effect model (REM) is applied with data of 140 observations from 20 Vietnamese commercial banks in period 2008 to 2014. The key findings are: First, there is no trade-off between liquidity and profitability, as banks have better profitability will pay more attention to keeping liquidity in safe level. Second, interest rate policy has good and positive impact on bank liquidity, implying the importance of discount window and open market operation in providing liquidity to commercial banks. Third, however, opportunity cost of keeping liquid assets has negative impact on banks' liquidity, which means that liquidity buffer should reflect the opportunity cost of keeping liquid assets instead of loans. Fourth, bank size is negatively related with banks' liquidity, which means that smaller banks are more concerned about the liquidity problems than big banks. This is the signal for Vietnamese policy makers to start avoiding the "too big to fail" problem when restructuring the banking system and the plan for increasing the bank size to regional and international levels. Lastly, GDP growth has negative impact on banks' liquidity. The better is the economic investment opportunities, the less the chance for banks to keep more liquidity. Customers will request more debts, while the demand of withdrawing cash from banks will be lower. Therefore, managing bank liquidity in Vietnam needs to pay attention to these characteristics.

Keywords: Bank liquidity, determinants, liquid assets, opportunity cost, profitability.

1. Introduction

Commercial banks involve in the process that they accept deposit which is typically short-term and transforming these liabilities into longer-term assets such as loan [1]. Liquidity risk arises from the role of commercial banks in the maturity

transformation of short-term liabilities into long-term assets [2]. Casu et al (2006) stated that liquidity of a bank relates to the ability of the bank to meet short-term obligations (unexpected and expected) when they come due [3]. Therefore, liquidity is an important topic for banks themselves and the stability of financial system. For individual banks, holding adequate liquidity is vital for preventing liquidity risk [4]. In the view of supervisory authorities and monetarists,

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ensuring banks have enough liquid assets is important to the financial stability [5].

In Vietnam, the banking system already faced with liquidity problem in period 2008-2011, with very high loans to deposit ratios (LDR), from 96% and 107% over the period. The interbank rate has been increased up to 18%/year, showing the liquidity problem of several banks at that period [6]. That liquidity problem has been solved from 2012, but may be back to threaten the banking system.

Therefore, controlling commercial banks' liquidity is a very important task and research about determinant of liquidity is necessary. As a result, this research attempts to study the determinants of commercial banks' liquidity in Vietnam. The key objectives of this research is identifying the determinants of commercial banks' liquidity after reviewing the theoretical framework and empirical studies in some other countries; using these determinants to form the appropriate model for the case of Vietnam and giving policy implementation for banks' liquidity

2. Literature review on bank liquidity and its determinants

Bank liquidity is the capacity of banks to have ready access to immediately spendable funds at reasonable cost and precisely the time those funds are needed [7]. To measure bank liquidity, Vodova (2013) and Rose et al (2013) proposed several ratios, of which three key ratios are:

- L1 (= liquid assets/total assets, of which liquid assets include cash, balance with other banks and central banks, government debt securities and similar securities or reverse repo). This ratio presents the ability to absorb liquidity shock of bank.
- L2 (= liquid assets / (deposits + short term borrowing)). This ratio is focused more on the sensitivity of bank to selected types of

funding: deposits of enterprises households, banks and other financial institutions and debt securities that are issued by the banks.

- L3 (= Liquid assets / deposits). This ratio takes into account only deposits to enterprises and households. Lower value of this ratio indicates that banks become more sensitive to deposit withdrawals [7, 8].

Determinants of commercial bank Liquidity

The determinants for liquidity of bank can be divided into 3 categories: Opportunity cost and shocks to funding, bank characteristics and macroeconomic fundamentals

Opportunity cost and shocks to funding

Liquidity management of banks as akin to inventory decisions problem at firms, for example Baltensperger [8]. The cost of holding liquid assets is compared with the benefit of reducing the risk of being "out of stock". The theory predicts that the size of liquidity buffer should reflect the opportunity cost of keeping liquid assets instead of loans. In addition, the size of liquidity buffer should also take into account the distribution of liquidity shocks, which banks may face. Particularly, it should be related to the cost of raising funds as well as the funding basis.

Opportunity cost of keeping liquid assets can be proxied by net interest margin as in Aspachs et al (2005) [9]. Net interest margin measures the difference between interests receives and interest paid. Aspachs et al (2005) conducted a research about the determinants of banks' liquidity in UK from 1985 to 2003 and reported that net interest margin had negative effect on liquidity holding of UK owned banks. Similar to Aspachs, Deléchat et al (2014) investigated the determinants of banks' liquidity buffer in Central America in the period of 2006 to 2010 and confirmed that liquidity holding have negative relationship with net interest margin [5]. Negative relationship between net interest margin and bank liquidity was also verified by Moussa (2015) as in his

research about bank liquidity in Tunisia [10]. He concluded that increase in net interest margins could stimulate banks to concentrate more on lending activity, leading to lower liquidity.

Liquidity shocks can be proxied by a measure of monthly volatility of total deposits in the banking system as in Agenor et al. (2004) [11]. The finding of this research shows that liquidity shocks have negative relationship with banks' liquidity.

Macroeconomic fundamentals

Keynes (1936) stated that a liquid balance sheet could empower firms to take on valuable projects when they arise [12]. In addition, he indicated that the level of liquidity of the firm's balance depends on the ability of firms to have access to external funding. In case of bank, this would mean that some banks, which want to make new loans, may be limited by the amount of funds they can raise because of financial frictions.

Basing on the theory of Keynes, Aspachs et al (2005) argued that when access of bank to capital markets is constrained, it suggests that bank's liquidity holding may link to the business cycle [9]. It may mean that banks hoard liquid assets during economic downturn and that they run down liquidity buffer during the period of economic expansions. It may also mean that financial constraint of banks can hinder the effect of monetary policy. Banks may decide to hoard the injection of liquidity that the central bank provides in order to stimulate the economy in the period of recession.

Aspachs et al (2005) stated that there are two macroeconomic variables that affect liquidity holding, which are GDP growth and policy interest rate. Finding of their research indicates that liquidity holding in UK had negative relationship with GDP growth and the policy interest rate, which is relevant with the expectations [9]. Likewise, Dinger (2009), investigated the impact of foreign banks on banking system's liquidity risk, found that

liquidity holding of banks in Eastern Europe had negative relationship with GDP growth [13]. The negative relationship between GDP growth and liquidity holding was also confirmed by Mousa (2015) [10]. Furthermore, Saxegaard (2006) and Vodova (2013) verified the negative impact of policy interest rate on liquidity holding in sub-Saharan Africa and Hungary [2, 14]. Vodova (2013) indicated that the decrease in the policy interest rate leads to higher lending activity, resulting in lower banks' liquidity [2]. In contrast, Fielding and Shortland (2005) find a positive relationship between policy interest rate, as in his studies about the relationship between excess liquidity and political violence in Egypt [15]. They argued that higher policy interest rate will increase cost of borrowing from the central bank. As a result, banks will reserve more liquid assets to meet the large unanticipated increase in withdrawals.

Bank characteristics

In the corporate finance theory, because of the existence of financial frictions, firms might use internal source of liquidity, such as cash flow from ongoing projects, to build up a liquidity reserve. According to Almeida et al (2004), financial constrained banks may tend to hold more liquidity [16].

Based on these theories, Aspachs et al (2005) pointed out some characteristics of bank that affect banks' ability to raise funds, and, thus, their demand for liquidity holding, such as bank size, profitability, loan growth [9]. Recently, Deléchat et al (2014) used profitability, bank size, capitalization to measure banks' ability to raise funds [5].

Bank size is measured by log of total assets of the banks. According to Aspachs et al (2005), the coefficient on size is not statically significant at conventional level [9]. In contrast, Kashyap and Stain (2000), using a large panel data of banks in US, verified the strong negative effect of bank size on liquidity holding. Kashyap and Stain (2000) suggested that smaller banks might face constraints in

having access to capital. Therefore, they tend to hold more liquidity assets [17]. Moreover, Iannotta et al (2007) some banks are “too big to fail”. Being guaranteed implicitly, these banks have low cost of capital, which allow them to invest in riskier assets. When these banks are lack of liquidity, banks can receive support from the central bank. In other word, big banks often hold less liquid assets [18]. The negative relationship between bank size and liquidity holding was also confirmed by Vodova (2013) as in his research about determinant of banks’ liquidity in Hungary [2]. Similarly, Truong and Phan (2015) reported that bank size had negative effect on banks’ liquidity in Vietnam [19]. In contrast, Rauch et al (2008) and Berger and Bouwman (2009) argued that small banks often focus on traditional banking activities, which is stable and low risk. Therefore, they will hold less liquid assets as possible. As a result, the relationship between banks’ size and banks’ liquidity is positive [20, 21]. The positive relationship between these variable is verified by research of Vala and Escorbán (2008) in the case of England, Lucchetta (2007) in the case of European countries and Bonfim and Kim (2011) in the case of Europe and North American [22-24].

Profitability is measured by the ratio of profit after tax to total equity. It is expected that profitable banks would hold less liquid asset because of their easier access to capital market. Finding of Aspachs et al (2005) stated that coefficient on profitability is not statically significant [9]. In contract, Moussa (2015) found that there is a negative relationship between profitability and liquidity holding in Tunisia [10]. Chen (2104) also confirmed that profitability had negative effect with liquidity holding in China [25]. According to Aspachs et al (2005), more profitable banks are expected to hold less liquid asset because they have easier access to capital markets [9]. Conversely, Bonner et al (2014) who investigated the role of liquidity regulation and the determinants of banks’ liquidity buffers in 25 OECD countries, found a positive relationship between

profitability and banks’ liquidity. They argued that this result may be driven by these banks which have higher franchise values and therefore less tendency to take on excessive risks [26].

Loan growth, which shows banks’ ability to raise new funds if loan business expand compared to the rest of the balance sheet, is measured by the growth rate of total loans to non-financial sector. The result of Aspachs et al (2005) shows that loan growth is negatively related to liquidity holding in UK [9]. Kashyap and Stein (2000) also come to the same conclusion with Aspachs et al (2005). They suggest that banks increase liquidity when lending opportunities are poor and vice versa.

Capitalization is measured by the ratio of equity to total asset. According to Dinger (2009) and Deléchat et al (2014), capitalization is expected to have positive impact on liquidity holding because better-capitalized banks may have more prudent business model [9] [5]. The result of Dinger (2009) stated that the ratio of equity to total asset has positive relationship with liquidity holding. Similarly, Vodova (2013) and Bonner et al (2014) also verified this result of Dinger (2009) [2][26]. In contrast, Deléchat et al (2014) verified a negative relationship between capitalization and total assets [5].

Literature review on bank’s liquidity in Vietnam

Several researches have been done on banks’ liquidity in Vietnam. Truong (2014), using data of 37 banks in Vietnam, conducted research about determinants liquidity risk in Vietnam from 2002 to 2011 [27]. The author used financial gap as a measure for liquidity risk. In this research, factors that affect liquidity risk are categorized into two groups: internal and external factor. Among the internal factors, assets size and liquidity reserve have negative relationship with banks’ liquidity risk, while the ratio of equity to capital has positive impact on banks’ liquidity risk. Among the external factors, growth rate and inflation have positive

relationship with banks' liquidity risk, while inter-bank loan and monetary policy have negative impact on banks' liquidity risk.

Another research of Truong and Phan (2014) investigated determinants of commercial banks in liquidity in Vietnam from 2009 to 2013 by using the data of 39 commercial banks. They reported that the ability of CEO, growth rate of raising fund of banks have positive relationship with banks' liquidity, while proportion of long term loans, total assets, the status of listed stocks of bank and rate of to deposit have negative impact on banks' liquidity. Overall, this research focuses on internal factors that determine banks' liquidity and ignores macroeconomic factors and factors that are related to opportunities cost [19]. In more detail, Truong and Phan (2015) did not take into account the impacts of net interest margin, profitability, loan growth, GDP growth and policy interest rate [28].

In addition, Vu (2015), using the data of 37 commercial banks, analyzed the determinant of bank's liquidity between 2006 and 2011. The author used the ratio of liquid asset to short-term funding ratio to measure bank's liquidity. Vu's research only focuses on internal factors.

The ratio of total loans to total deposits, the ratio of loan loss reserve to total loan, bank size, profitability ratio have positive impact on banks' liquidity, while the ratio of owners' equity to total asset, the ratio of nonperforming loans to total loans, profitability have positive relationship with banks' liquidity [29].

3. Data analysis for the case of Vietnam

Variables and model

After reviewing all the factors which determine the commercial banks' liquidity mentioned above, the general form of regression model explaining the commercial banks' liquidity can be summarized as below:

$$L1_{it} = \beta_0 + \beta_1 NIM_{it} + \beta_2 SIZE_{it} + \beta_3 P_{it} + \beta_4 CAP_{it} + \beta_5 LG_{it} + \beta_6 R_{it} + \beta_7 GG_{it} + \varepsilon_{it}$$

Where:

β_0 is the constant coefficient

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ are the regression coefficients

ε is the error term

Table 3.1. Expected signals on determinants of bank liquidity

Variables	Definition	Expected sign of independent variables
L1: liquidity	Liquid asset/total assets	
NIM: net interest margin	Different between interest receives and interest paid	-
SIZE: bank size	Log of total asset	-
P: Profitability	Profit after tax/total assets	-
LG: Loan Growth	Annual growth rate of total loan	-
CAP: Capitalization	Equity (accounting value) /total assets	+
R: Policy interest rate	Annual growth rate of real GDP	-
GG: GDP growth rate	Discount rate	-

Source: Authors summary from literature review

The data for this research has been collected from 20 commercial banks in Vietnam in the period of 2008 to 2014. According to the State Bank of Vietnam, There are 43 banks in Vietnam. Because of the limit in time and data available, this research only includes 20 banks,

which account for 46.5% banks in Vietnam and 52.65% total asset of the banking system. Therefore, the sample is large enough and can be considered as representative for all banks in Vietnam. List of banks in the research is shown as below.

Table 3.2. List of banks in the research

No.	Code	Name
1	ACB	Asia Commercial Bank
2	BIDV	JSC Bank For Investment And Development Of Vietnam
3	CTG	Vietnam Joint Stock Commercial Bank for Industry and Trade
4	EAB	Dong A Commercial Joint Stock Bank
5	EIB	Vietnam Commercial Joint Stock Export Import Bank
6	GDB	Viet Capital Bank Commercial Joint Stock Bank
7	HDB	Ho Chi Minh Development Joint Stock Commercial Bank
8	KLB	Kien Long Commercial Joint Stock Bank
9	MBB	Military Commercial Joint Stock Bank
10	MHBB	Housing Bank Of Mekong Delta
11	MSB	Vietnam Maritime Commercial Stock Bank
12	NVB	National Citizen Commercial Joint Stock Bank
13	PGB	Petrolimex Group Commercial Joint Stock Bank
14	SEAB	Southeast Asia Commercial Joint Stock Bank
15	SGB	Saigon Bank For Industry And Trade
16	TCB	Vietnam Technological and Commercial Joint Stock Bank
17	VAB	Vietnam Asia Commercial Joint Stock Bank
18	VCB	Bank for Foreign Trade of Vietnam
19	VIB	Vietnam International Commercial Joint Stock Bank
20	VPB	Vietnam Prosperity Joint Stock Commercial Bank

Source: Authors' description result from the dataset

Data of individual banks is obtained from financial statements of banks, which can be found in the websites of the banks. The data is reliable because the all banks commit to comply with Vietnamese accounting standard and have been externally audited. Financial ratios have been calculated based on the data in the financial statements. The financial ratio can also be collected from Stock plus- a well-known information provider in Vietnam and Vietstock- a well-known website about finance in Vietnam. Data about macroeconomic

condition will be collected from the IMF website and SBV website.

Descriptive statistics result of the variables

The mean of L1 is 24.03455, which means that banks hold 24.04% liquid asset to total asset. The gap between the maximum value and the minimum value of L1 is large as L1 varied from 4.37% to 61.1%. The minimum value of L1 belongs to Saigon bank in 2010. One year later, this bank faced liquidity problem and merged with Ficombank and Tin Nghia bank.

Table 3.3. Descriptive statistics result

Variable	Observation	Mean	Std. Dev	Min	Max
L1	140	24.03455	10.94029	4.365929	61.09721
NIM	140	3.311821	1.184157	0.5555043	7.094738
SIZE	140	11.02235	1.219875	7.985825	13.40188
P	140	10.6555	7.108672	0.07	29.12
LG	140	25.36418	30.54288	-31.72351	164.9063
CAP	140	10.83772	5.969665	2.905382	35.62436
R	140	9.25	2.638263	6.5	15
GG	140	5.767143	.4205756	5.25	6.42

Source: Authors calculation basing on dataset

The gap between the maximum and minimum value of LG, the gap between maximum and minimum value of P and the gap between maximum and value of CAP are also large. The standard deviation of these ratios is

also high. It suggests that these ratios are spread out over a wide range of value.

Following is the correlation matrix of related variables in the model:

Table 3.4. Correlation matrix

	L1	NIM	SIZE	P	LG	CAP	R	GG
L1	1							
NIM	-0.3361	1						
SIZE	-0.0072	-0.2052	1					
P	0.1098	0.3136	0.3540	1				
LG	0.1124	0.0465	-0.1523	0.2834	1			
CAP	-0.1098	0.4361	-0.7115	-0.28.31	0.0233	1		
P	0.2421	0.2551	-0.0437	0.2878	-0.1292	0.0360	1	
GG	0.216	0.0432	0.0649	0.2414	-0.0067	-0.0502	0.4192	1

Source: Authors calculation basing on dataset

L1 have the strongest positive correlation with NIM (-0.3361). Therefore, it may be the most important variable to explain the variation of L1. The correlation between L1 and SIZE (-0.0072) is considerable weak. It suggests that SIZE may be not meaningful in explaining L1. However, the correlation matrix cannot be considered as the complete evidence about the relationship between variables. Overall, the correlations between variables are not too high (lower than 0.8). It indicates that the model does not suffer from the problem of multicollinearity.

Both ROE and NIM can be used to measure profit. Therefore, they may be correlated. However, in this model, NIM is used to measure opportunities cost of holding liquid asset, and the correlation between them is lower

than 0.8. As a result, ROE and NIM can be included in the model at the same time.

Regression result

The most appropriate model is chosen based on three tests: Hausman test, Breusch- Pargan Lagrangian multiplier test and F test.

The result of Hausman test shows that p-value is lower than 0.05. Therefore, we cannot reject the null hypothesis that REM is more appropriate than FEM. Thus, REM is more appropriate than REM for this research. P-value of Breusch and Pagan Lagrangian multiplier test is lower than 0.05. It means that we reject the null hypothesis that Pooled model is more appropriate than REM for this research. As a result, REM is more appropriate than pooled model. P-value of F test is lower than 0.05,

which indicates that we can reject the null hypothesis that Pooled model is more correct than FEM. Thus, FEM is more appropriate than pooled model for this research. From these

results, we can conclude that REM is the most appropriate model for this research. The result of Random effects model is shown in the following table:

Table 3.5. Regression result of the random effects model

Dependent variable: Liquidity (L1)		Observations per group: 7
Number of observations: 140		Number of groups: 20
Variables	REM1	REM2
NIM	-3.881962***	-4.242905 ***
SIZE	81.06874***	-2.392028 **
P	0.429489**	0.4446141 ***
LG	-0.0134145	
CAP	-0.2527173	
R	1.281682***	1.339152 **
GG	-3.653691**	-3.808277 ***
Cons	-3.307762	69.2902
R square	25.69%	28.60%

Significant level 1%: ***
Significant level 5%: **
Significant level 10%: *

Source: Authors calculation basing on dataset

REM1 and REM2 were random effects model with robust adjustment for heteroskedasticity error. REM1 model includes all 7 variables NIM, SIZE, P, R, GG, CAP and LG, in which NIM, SIZE, P, R and GG are statically significant while LG and CAP are insignificant. R square of model REM1 is 25.69%. In model RE2 all the insignificant variables in model RE1 is removed to ensure accuracy. Thus, model REM2 only contain 5

variables, which are NIM, SIZE, P, R and GG. The result shows that R square is equal to 28.60% and all 5 variables are significant. Overall, the most appropriate model which is used to interpret and explain the theoretical framework in the case of Vietnam is REM2 with all statistical significant dependent variables. The final result of regression is summarized in the following table:

Table 3.6. Summary result of determinants of banks liquidity in Vietnam

Variable	Expected sign	Actual sign	Result/ Significant	Coefficient	Hypothesis tested
NIM	(-)	(-)	1%	-4.242905	Accepted
SIZE	(-)	(-)	5%	-2.392028	Accepted
P	(-)	(+)	1%	0.4446141	Accepted
R	(-)	(+)	5%	1.339152	Accepted
GG	(-)	(-)	1%	-3.808277	Accepted
CAP	(+)	-	Insignificant	-	Rejected
LG	(-)	-	Insignificant	-	Rejected

Source: Authors calculation basing on dataset

The random effect model (REM), which is applied with data of 140 observations from 20 Vietnamese commercial banks in period 2008 to 2014, shows that there are 5 determinants of bank's liquidity in Vietnam, which are opportunity cost of keeping liquid assets, bank size, profitability, GDP growth rate and Policy interest rate.

4. Major findings

Following is the major findings of the regression result.

First of all, NIM is statistical significant at 1% level of confident. The coefficient of NIM is -4.24, so that relationship between loan opportunities, which is proxied by Net interest margin, with banks' liquidity is negative. The negative relationship is relevant to the expectation that liquidity buffer should reflect the opportunity cost of keeping liquid assets instead of loans. This result is also consistent with finding of Deléchat et al (2014), Aspachs et al (2005), and Moussa (2015) [5, 9, 10].

Second, SIZE is statistical significant at 5% level of confident. The coefficient of SIZE is -2.39. It shows that banks' size measured by log of total asset has a negative effect on banks' liquidity in the examined period. This result is consistent with the findings of Vodova (2013), Kashyap and Stain (2000), and Truong and Phan (2015). The negative relationship between banks' size and banks' liquidity confirms the expectation that smaller banks might face constraints in having access to capital, thereby, having the tendency to hold more liquidity assets [2, 17, 19]. The negative relationship between bank size and banks' liquidity also suggests that the merging of small banks into bigger banks, which is an important part of bank reform activity, may not lead to higher banks' liquidity. The apparent effect of bank merge is the increase in term of asset size. However, bank size has a negative impact on bank liquidity. This negative relationship between bank size and banks' liquidity is also

relevant to the view of Iannotta et al (2007) some banks are "too big to fail" [18]. Truong and Phan (2015) stated that in Vietnam, the government often gives preferential credit facilities to the state owned companies [28]. Because of the domination of commercial banks in the financial market, commercial banks are very important to the implementation of preferential credit facilities. As a result, biggest commercial banks in Vietnam, whose shares are held by the State Bank of Vietnam, are more likely to be supported by the SBV when they face liquidity problem. This fact reinforces the incentive of these banks to hold less liquid assets.

Third, P is statistical significant at 1% level of significant. The coefficient of P is 0.44, which means that banks' profitability measured by ROE has a positive effect on banks' liquidity. It is not similar to the expectation that profitability has a negative effect with banks' liquidity. According to Aspach (2005), profitability may have positive effect on banks' liquidity because profit can be considered as a source of liquidity for commercial banks [9]. Second, higher profitability with enable banks to gain good reputations, which help banks to attract more funds. As a result, it can be concluded that there is no trade-off between liquidity and profitability, as banks have better profitability will pay more attention to keeping liquidity in safe level.

Fourth, R is statistical significant at 1% level of confident. The coefficient of R is 1.33 which means that policy interest rate have positive effect on banks' liquidity. It is not in line with the expectation that that the decrease in the policy interest rate leads to higher lending activity, resulting in lower banks' liquidity. However, this result is consistent with the finding of Fielding and Shortland (2005) [15]. They argued that higher policy interest rate would increase cost of borrowing from the central bank. As a result, banks will reserve more liquid assets to meet the large unanticipated increase in withdrawals. The positive relationship between banks' liquidity

and the policy interest rate also suggests that when the central bank decreases the policy interest rate to stimulate the economy, the lower policy interest rate will lead to an increase in the monetary base. The reason is that banks have the tendency to lower the size of liquidity buffer on their balance sheets, thereby transmit the addition liquidity to the economy.

Fifth, GG is statistical significant at 5% level of confident. The coefficient of GG is -3.80, which means that GDP growth rate have a negative relationship with banks' liquidity. It is relevant with the expectation that banks hoard liquid assets during economic downturn and that they run down liquidity buffer during the period of economic expansions. It suggests that banks' liquidity is counter-cyclical. Banks hoard liquid asset during economic downturn and that they run down liquidity buffers during the period of economic expansions. In more detail, banks tend to build up liquidity buffers in the period of economic downturns and draw them during the period economic upturns.

Six, CAP is not statistically which means that capitalization does not have impact on banks' liquidity. This result is not consistent to the expectation that CAP has negative impact on bank's liquidity. It also suggests that the merging of small banks into bigger banks, which is an important part of bank reform activities, may not lead to higher banks' liquidity. Besides leading to higher total assets, bank merging also lead to higher equity but there is no relationship between that capitalization and banks' liquidity.

Seven, LG is also not statistically which means that loan growth does not have impact on bank liquidity. This result is not consistent to the expectation that LG has negative impact on bank's liquidity.

5. Discussions and policy implications

Discussions

As in regression results, opportunities cost of holding liquidity has negative impact on

banks' liquidity. It implies that liquidity buffer should reflect the opportunity cost of keeping liquid assets instead of loans.

Among the macroeconomic fundamental factors, GDP growth is found to have negative impact on bank's liquidity, which means that that banks' liquidity is counter-cyclical. Furthermore, interest rate has positive relationship with banks' liquidity, which indicates that discount window and open market operation is very importance when providing liquidity to commercial banks.

Among bank characteristics factors, bank size is negatively impacted on bank's liquidity, implying that small banks face constraints in having access to capital, thereby, having the tendency to hold more liquidity assets. In contrast, profitability has positive relationship with Vietnamese banks' liquidity, which indicates that there is no trade-off between liquidity and profitability.

Basing on the determinants of banks' liquidity, policy implementation for banks and SBV are summarized as followed:

Policy implications for commercial banks

First, the negative relationship between NIM and banks' liquidity buffer shows that liquidity buffer should reflect the opportunity cost of keeping liquid assets instead of loans. This finding suggests that banks can apply the principle 4 for liquidity management of Basel Committee. Banks should include the liquidity's benefit, cost and risks in the in their process of performance measurement, internal pricing and new product approval for all significant business activities.

Second, banks must forecast their liquidity need based on the economic condition because the negative relationship between GDP, which indicates that the better is the economic investment opportunities, the less the chance for banks to keep. Therefore, banks should keep enough liquidity even in good economic condition.

Third, maintain a high profit is important to banks' liquidity because of the positive impact

of profitability on banks' liquidity. According to principle 10 of Basel liquidity management, banks should conduct scenario analyses or stress tests regularly to identify and measure bank's exposures to future liquidity stresses, as well as identify possible effects of liquidity stress on the institution's profitability and liquidity position. As a result, these measures can help banks to assess its profitability more correctly to make decision about their liquidity position [30].

Finally, the negative relationship between bank size and banks' liquidity also suggests that the merging of small banks into bigger banks may not lead to higher banks' liquidity. Therefore, banks should focus on increasing their liquid assets instead of merging with other banks to increase their asset size when facing liquidity problem. It also means that big banks will be more dependent on external funding sources such as interbank or repos when they need liquidity rather than keeping liquid assets.

Policy Implications for State Bank of Vietnam (SBV)

SBV should evaluate the adequacy of both banks' liquidity position and their liquidity risk management and should take immediate action if a bank appears to be deficient in either area.

Furthermore, SBV should supervise strictly the operation on banking system, especially big banks that have SBV as their shareholder. The SBV and government should consider effacing the special statutes for state owned banks and the preferential credit facilities to the state owned companies if they want to improve banks' liquidity.

Finally, SBV should use discount window and open market operation effectively and timely for monetary policy and provide liquidity to commercial banks when essential. SBV shall maintain high lending interest rates if they want banks to keep more liquid asset because of the positive impact of policy interest rate on banks' liquidity.

References

- [1] Pilbeam, K., Finance & Financial Markets, Mac Milan, 2010
- [2] Vodova, P, Determinants of commercial banks liquidity in Hungary, The Central European Journal of Social Sciences and Humanities 9 (2013).
- [3] Casu, B., C. Girardone, and P. Molyneux, Introduction to Banking, Pearson, Harlow, 2015
- [4] Diamond, D., and P. Dibaig, Bank runs, Deposit Insurance, and Liquidity. The Journal of Political Economy 91 (1983)
- [5] Deléchat, C., C. Henao, P. Muthoor, and S. Vtyurina, The Determinants of Banks' Liquidity Buffers in Central America. Monetaria. WP/12/301 (2014)
- [6] Tran T.D., Reality of Management and Governance of State Bank of Vietnam in period 2011-2015, National Economics University Press (2015)
- [7] Rose, P.S. and S.C. Hudgins (2013), Bank Management and Financial Services, McGraw Hill, London, 2013
- [8] Baltensperger, E., Alternative approach to the theory of the banking firm, Journal of Monetary Economics 6 (1980)
- [9] Aspachs, O., E. Nier, and M. Tieset, Liquidity, Banking Regulation and the Macroeconomy: Evidence on bank liquidity holdings from a panel of UK-resident banks, BIS (2005)
- [10] Moussa, M., The Determinants of Bank Liquidity: Case of Tunisia, International Journal of Economics and Financial Issues 5 (2015)
- [11] Agenor, P.R., Aizenman and A.W. Hoffmeister, The credit crunch in East Asia: what can excess liquid assets tell us?, Journal of International Money and Finance 23 (2004)
- [12] Keynes, J.M., The General Theory of Employment, Interest and Money, Macmillan Cambridge University Press, 1936
- [13] Dinger, V., Do Foreign-owned Banks Affect Banking System Liquidity Risk?, Journal of Comparative Economics 37 (2009)
- [14] Saxegaard, M., Excess Liquidity and Effectiveness of Monetary Policy: Evidence from Sub-Saharan Africa, IMF Working Paper, International Monetary Fund WP/06/115 (2006)
- [15] Fielding, D. , and A. Shortland, Political Violence and Excess Liquidity in Egypt (2015)

- [16] Almeida, H., M. Campello, and M. Weisbach, The cash flow sensitivity of cash, New York University (2004)
- [17] Kashyap, A. and J. Stein, What do a million observations of banks say about the transmission of monetary policy, *American* 90 (2000)
- [18] Iannotta, G. and G. Nocere, A. Sironi, Ownership Structure, Risk and Performance in the European Banking industry, *Journal of Banking and Finance* 31 (2007)
- [19] Truong, L. and M. Phan, Liquidity Control of Commercial Banks in Vietnam for Financial Stability, *Journal of Economics and Development* 216 (2015)
- [20] Rauch, C., S. Steffen, A. Hackethal, M. Tyrell, Determinants of bank liquidity creation - evidence from savings banks, Working Paper (2008)
- [21] Berger, A.N. and C.H.S. Bouwman, Bank Liquidity Creation, *The Review of Financial Studies* 22 (2009)
- [22] Valla, N. and B. Escorbian, Bank Liquidity and Financial Stability, *Banque De France* 9 (2006)
- [23] Lucchetta, M., What Do Data Say About Monetary Policy, Bank Liquidity and Bank Risk Taking?, *Economic Notes by Banca Monte Dei Paschi Di Siena SpA* 36 (2007).
- [24] Bonfim, D. and M. Kim, Liquidity Risk in Banking: Is there Herding?, https://www.bportugal.pt/sites/default/files/2013c_fi_paper6_e.pdf (2013)
- [25] Chen, T. (2014), The effect of excess lending on bank liquidity: Evidence from China. *International Review of Economics and Finance* 36 (2015) 54
- [26] Bonner, C, L. Lelyveld, and R. Zymek, Banks' Liquidity Buffers and the Role of Liquidity Regulation, Working Paper of De Nederlandsche Bank, https://www.dnb.nl/en/binaries/Working%20Paper%20393_tcm47-296774.pdf (2014)
- [27] Truong, T., Factor Affecting liquidity risk, the case of commercial bank in Vietnam, *Finance and Monetary* 21 (2014)
- [28] Truong, L. and M. Phan, Liquidity Control of Commercial Banks in Vietnam for Financial Stability, *Journal of Economics and Development* 216 (2015)
- [29] Vu, H., Determinants of bank Liquidity in Vietnam, *Development and Integration Magazine* 23 (2015).
- [30] BIS, Principles for Sound Liquidity Risk Management and Supervision, Basel: Bank for International Settlements (2008).