BANK LIQUIDITY AND ITS DETERMINANTS IN VIETNAM

Msc. DANG QUANG VANG

HCMC University of Technology and Education

Abstract

The paper aims to identify determinants of liquidity of Vietnamese commercial banks by using the unbalanced panel data that cover period from 2004 – 2014 and Financing Gap to Total Assets (FGAP) model and others variables. The results show that the liquidity of commercial banks not only depends on bank specific variables but also macroeconomic variables. The liquidity of Vietnam's commercial bank liquidity increases with equity to total assets, external funding dependences, economy growth, inflation and money supply (M2). Liquidity of Vietnam banks decreases with interbank loans and loan loss provision to total loans. The relationship of bank liquidity and bank's size is ambiguous.

Key words: *Liquidity, liquidity risk, Vietnam's commercial banks.*

Introduction

Recently, the global crisis has proven that the lack of bank liquidity was the main trigger of all the negative events. Many profitable banks faced difficulties in managing their own funds due to the misunderstanding of liquidity risk. During the global crisis from 2008, Vietnam's economy has not solved the problems such as: low foreign currency reserve, high deficit state-budget, high bad debt at commercial banks, vulnerable financial markets,... a signal shows the vulnerable and unstable Vietnam's financial market has been credit system under poor liquidity during the past. The total loans to total deposits ratio was very high (the highest in Asia area only after South Korea, in period 2009 - 2010 this ratio was up to 131%). Thus, we can see Vietnam's commercial banks have potentially more liquidity risk than other countries in the region and more vulnerable if they will be impacted of external shocks.

Many banks struggled to maintain adequate liquidity in order to sustain the financial system, unprecedented levels of liquidity support were required from the central bank and forced into merger or acquisition. Under these circumstances, it is evident that liquidity is very up – to – date and important topic. The aim of this studying is therefore to identify determinants of liquidity of Vietnam's commercial bank.

The paper is structured as it follows: Section 1 reviews the related literature on determinants of bank liquidity, Section 2 describes the data and methodology used, including the variables selected for the analysis and econometrical model, Section 3 outlines the empirical results and Section 4 concludes this paper and offers comments for further research.

1. Literature reviews

Literature on the topic of the bank liquidity determinants offers a limited range of studies that empirically validate the influence of internal, bank specific and external, macroeconomic factors over the liquidity of bank. In 2005, an analysis over a panel English banks (O. Aspachs, E. Nier, M Tiesset, 2005)**,** bank profitability has negative correlation with liquidity that means the banks hold more liquid assets to cover liquidity demand, the ability to generate lower profits and vice versa.

Liquidity risk is also influenced by external factors such as the ability to be supported from the Lender of Last Resort to fund emergency liquidity assistance for particular illiquid institutions and to provide aggregate liquidity in case of system-wide shortage. If a commercial bank is assessed to receive a strong supporting from central bank, it had only little incentives to hold liquid assets which use them to invest in making profit.

Furthermore, the study over a time-series model of excess liquidity in Egyptian bank sector (D. Fielding, 2005) and the study over a panel of European banks (Lecchetta, 2007) confirmed that GPD and monetary policy interest rate (represented by short-term interest rates), which impact of positive on liquidity risk. Banks hold more or less liquidity depending on total assets and total deposits during periods of the GDP real growth was strong or weak. In other words, banks built liquidity buffers during economic downturns and removed buffers when the economy to recover. The bank liquidity buffer was affected by monetary policy when interest rates rose, the banks hold low liquid assets, and vice versa.

Bunda and Desquilbet (2008), analyzing determinants affected on bank liquidity from 36 merging countries including Vietnam in period from 1995 to 2004, confirmed that if big banks were seeing themselves as "too big to fail", this study would observe a negative coefficient (the bigger the bank, the less liquid and thus more vulnerable to a bank run). As result of study supports the view that a higher equity to total assets ratio is concomitant with higher assets liquidity. For the lending rate factor to be considered to evaluate ability to make bank's profit from lending, having a positive impact on the bank liquidity and a higher lending rate did not encourage bank to lend more in the case of the soft peg regime. However, a higher lending interest rate led to lower bank liquidity under managed floating.

In addition, the macro-economic factors also affected the liquidity risk as the public expenditures to GPD ratio, in the period crisis, banks anticipated the government could not be disposed in the future to deal with a liquidity crisis and responded accordingly by holding more liquidity. For the inflation had a positive expected on bank liquidity because the banks limited their credit activity and built up reserve in response to uncertainty as to the government behaviour and the dummy for financial crisis affecting the different bank liquidity (negative or positive impact) depending on exchange rate regime.

Vodová, P (2011), evaluating the liquidity of Czech commercial banks by using the penal data over the period from 2001 to 2009 and the regression analyzing to liquidity ratio in order to determine factors effected on bank's liquidity risk. The result showed that this was a positive link bank liquidity and capital adequacy, interest rate on loans and share of non-performance loans with argument that because the loans were not collected on time so bank should limit new loans.

However, this argument was contrary to the recent studies: Grauwe (2008) suggested that the confidence of depositors could easily evaporate when one or more banks in trouble payments due to non-performance loans and led to a withdrawal of deposits mutations could occur and cause a liquidity crisis, Ismal (2010) – a high non-performance loans was the source of asset–liability imbalance and because of that, bank may had difficulties providing liquidity to serve the liquidity withdrawal from depositors.

The result of study of Vodova, P (2011) also showed that the financial crisis, inflation and GDP growth linked positive bank liquidity risk. Meanwhile, the relationship between the bank's size and liquidity was very ambigous (Aspachs O., E. Nier, M Tiesset (2005), the size of the bank was used to divide the banks group by size (small, medium and large scale) not related to the bank liquidity; another factors such as unemployment, profitability and interest rate policy did not affect the liquidity of Czech. The results of this study contrasted with study of C. Rauch, S.Steffen, A.Hackethal, M. Tyrell (2010)

2. Methodology and Data.

As literature review mentioned above, especially empirical studies have explained the factors that affect the bank liquidity of some countries around the world. Based on previous studies, the authors selected the dependent variable (liquidity risk) and measurement methods as well as the factors affecting the dependent variable in the Vietnam's commercial banks.

2.1 Econometrical model

In order to empirically investigate the relationship between the selected variables, I use a linear multivariate regression model, which is widely used in the literature:

$$Y_{it} = c_i + \beta_1 SIZE_{it} + \beta_2 SIZE_{it}^2 + \beta_2 ETA_{it} + \beta_5 LRA_{it} + \beta_6 EFD_{it} + \beta_7 IBLOAN_{it} + \beta_8 TLA_{it} + \beta_9 LLPTL_{it} + \Lambda_3 GDP_t + \Lambda_4 GDP_{t-1} + \Lambda_5 INFL_t + \Lambda_6 INFL_{t-1} + \Lambda_7 M2_t + \Lambda_8 M2_{t-1} + \varepsilon_{it}$$

According to the model, the dependent variable is financing gap to total assets (FGAP) which is measured by average the difference between bank's loans and bank's deposits to total assets ratio. If financial gap is positive, the bank should be filling this gap by its cash funds through selling cash assets and borrowing from money market. Therefore, financial gap can be estimated by subtracting the borrowed funds from the cash assets. The financial gap represents financial needs of the bank after selling its cash assets. When the economy is under stagnation and financial market increasingly demands for cash funds, it is when the banks are more exposed on liquidity risk. Therefore in this study, it seems that financial gap is a more appropriate alternative for liquidity risk of the bank.

There are two groups of independent variables: the internal and external factors.

The first set of independent variables is representative of individual characteristics of commercial banks.

Bank's Size is measured by the natural logarithm bank assets **(SIZE)**. It can be an important determinant of its refinancing costs since larger banks are perceived to be less risky (because they are better diversified or because of too-big-to-fail conception) and may have access easily to alternative refinancing sources. To control for a nonlinear relation between a bank's size and its

holding of liquid assets we also include the squared size term ($Size^2$) as a control variable (Dinger, 2009).

***Bank liquidity reverses to bank total assets ratio (LRA)*:** Bank liquidity reverses are divided by two which is primary reserve and secondary reserve. This is a traditional liquidity management of commercial bank (Truong Quang Thong, 2012). The liquidity crisis of Vietnam's commercial banks has happened in 2008 and in the recent years let us can see that liquidity management is very important.

For controlling, commercial banks can reserve some asset as liquidity reverse and banks can sell or mortgage the liquid assets in order to arise fund, it means that reserve the liquid assets can increase liquidity. According to the theory, it is expected the relationship between liquidity and liquidity reserve is positive.

***External funding dependence (EFD*)** variable that are determined by total interbank borrowing to total capital ratio. Banks can rely on the interbank market where they borrow from other banks in case of liquidity demand. However, this strategy is strongly linked with market liquidity risk (Vodova, 2013a). Especially, bank can also borrow from interbank market even with the high rate interest during the liquidity crisis period. This problem happened to small commercial banks in Vietnam during in 2008-2012 and led to decrease banks profit. However, a bank's further borrowing to meet depositors' demand may place the bank's capital at stake. Thus, debt to equity ratio will rise, affecting the bank's effort to maintain an optimal capital structure (Arif A. and Anees A. N, 2012). According to the theory, it is expected the relationship between external funding dependence and liquidity is positive.

Equity to total assets (ETA) is considered as alternative variable to capital adequacy ratio in the framework of the capital adequacy regulation (Vodová, 2013). ETA may have opposite effects on liquidity, as shown by the debate on minimum capital adequacy requirements in emerging markets. On the one hand, the effect may be negative. The higher the equity ratio, the smaller the amount of liquid assets required for sound banking practice, in order to keep liquid liabilities and liquid assets in balance (Bunda and Desquilbet, 2008). Therefore, the bank may reduce its 'unprofitable' liquid assets in order to maintain or to increase the overall return on bank's equity. On the other hand, information asymmetries in the credit market may bring about credit rationing phenomena, reflecting the fact that banks do not necessarily increase profitability by lending more. Thus, a higher ratio of equity to assets may be compatible with higher asset liquidity (see, for example, Thakor 1996). This study expects the relationship between ETA and liquidity is positive.

Interbank loan to total assets (IBLOAN): Interbank market where banks can reach quickly the short-term funding, the bank can lend idle working capital in order to seek more profits in the short term. Therefore, this study expects the relationship between IBLOAN and liquidity is positive

Total loans to total assets ratio (TLA): Vietnam, and as well as banking in transition countries, banks focus on lending to enterprises and households and the loans have low liquidity. Thus, unexpected withdrawal of large money may lead to loss liquidity.

Loan loss provision to total loans (LLPTL) is used for assessing the impact of liquidity risk. Loan loss provision denotes the credit risk and the credit risk impact of profit and liquidity risk. The more cost for loss provision the more liquidity risk. Then, this study expects the relationship between LLPT and liquidity is positive.

Table 2.1: Specific variables definition

No	Variables/measure	Source	Estimate effect
1	Size: Total assets (Logarithm Size)	annual reports	+/-
2	$Size^2$: Total assets square (Logarithm $Size^2$)	annual reports	+/-
3	ETA: Equity to total assets	annual reports	+
4	LRA: Liquidity reverses to total assets	annual reports	-
5	EFD: External funding dependences (Interbank loans and other loans/ Total equity)	annual reports	+
6	IBLOAN: Interbank loans (Interbank loans/ Total assets)	annual reports	+
7	TLA: Total loans to total assets	annual reports	-
8	LLPTL: Loans loss provision to total loans	annual reports	-

The second set of independent variables is representative of external factors of commercial banks.

The rate of growth, for the theory, bank needs more liquid assets during the crisis when lending more risks. On the contrary, it take as indicating better perspectives for borrowers, and more lending by bank, thus reduce their assets liquidity. Meanwhile, the deposits may be decreased, and then leading to increase the financing gap. According to another studied result (Dinger, 2009) that the reserved assets liquidity has negative relation with the rate of GPD growth.

The rate of inflation, measures another incentives for banks to hold liquid assets: when banks give more importance to customer relations and increase long term lending, they make the nominal value of their assets stickier, and thus become more vulnerable to rise in inflation. This research, we expect a positive relation between rate of inflation and bank liquidity.

Money supply M2, according to Friedman (1963), the rate of the money supply must be equal to the rate of economy growth, an excessive money supply will be the root cause of inflation. The changes in money supply (M2) through the various tools of the central bank can affect the bank liquidity. Based on the theory, we expect a positive relation between M2 and bank liquidity.

In addition, to estimate how the impact on macroecomic policy lag I will take into the model some macroeconomic variables of a previous year such as GDP_{t-1}, $M2_{t-1}$ and INF_{t-1}

Table 2.2: External variables definition

No	Variables	Source	Estimate effect
1	GDP: growth rate of gross domestic product (GDP volume % change)	IMF	-
2	INF_t: Inflation rate (CPI % change), year t	IMF	+
3	INF_{t-1}: Inflation rate (CPI % change), year t-1	IMF	+
4	M2: Supply money M2, year t	IMF	+
5	$M2_{t-1}$: Supply money M2, year t-1	IMF	+

2.2 Data

This research used unconsolidated balance sheet and profit and loss data over the period from 2004 to 2014 were obtained from annual reports of 34 Vietnam's commercial banks within 274 observations. The panel is unbalanced as some of the banks do not report over the whole period. The macro variables were based on data from IMF reports.

3. Regression results

Table 3.1: Descriptive statistics

Variables	Mean	Std. Dev	Minimum	Maximum	Observations
FGAP	1.854	22.957	-55.980	91.939	274
SIZE	67.910	106.53	0.145	562.245	274
LTA	31.795	16.625	3.779	96.038	274
IBLOAN	24.319	16.212	1.215	94.503	274
EFD	25.542	18.993	0.001	132.831	274
ETA	12.993	9.552	2.044	71.206	274
LPTL	1.264	1.168	0.037	7.749	274

GDP	6.748	1.253	5.048	8.456	274
M2	27.698	10.074	11.942	49.106	274
INF	11.105	5.856	3.235	23.116	274

Source: Author's calculations

Vietnam's banks liquidity declined in both the level (average annual reduction at 4,5%) and fluctuations over the period 2004-2014. However, it was still quite large differences between banks and between years, approximately 22.95%, rotation of 1.85% and most distributed from 2006 to 2009.

Liquidity reserves to total assets (LTA) reached a high level, the average for the 34 banks obtained 31.80%, the highest 96.04% and the smallest 3.8%. This was a positive element of the banks when the LTA reached a high level, contributing to the prevention of adverse events, and stabilizing the bank system and using excess liquidity reserves to the contribution of capital in the system for interbank lending.

External dependence funding (EFD): includes interbank loans and other loans to total capital of 34 banks in Vietnam was relatively high, averaging 25.54%, particularly some banks reached the highest average was 132.83%. This suggests that the degree of dependence on external sources of capital and cross-linking between banks in Vietnam was quite strong. However, the degree of dependence of high external financing focused primarily on small-scale banks, meanwhile, the big banks, this dependence was lower.

Equity to total assets (ETA): This average ratio of Vietnam's commercial bank was 13%, the lowest and highest 2,04% and 71,2%, respect. For small–scale banks the rate was higher than big-scale bank.

Loans loss provision to total loans (LLPTL): the result showed that LLPTL was quite low (average 1,26%) and big-size bank had higher LLPTL than others.

External variables (GDP, INF, M2): The external variables strongly fluctuated in the period 2004 – 2014, GPD growth average was 6,79%, inflation rate was 11% and M2 was 27.698%. The economy had high growth in period 2004- 2007 and reached peak in 2007 at 8,46% but strongly declined until to 2014 at 5,05%. Meanwhile, inflation rate gradually increased from 2004 – 2007 and extremely rising in 2008 (23,16%) and continuing fluctuation in the coming years. The unstable inflation could start with two reasons: the first was the global financial crisis impacted on economy; the second was strongly changing in money supply (M2). These reasons were mutually supportive relationship in which M2 was high from 2004 to 2007 reached a peak of 49.11%, then fell sharply and continuously changed over the coming years. In contrast, since 2008, the indexes tended to decrease.

The fluctuations of money supply led to change in inflation, then impacted on bank liquidity that made a shock in Vietnam's commercial banks.

3.2 Estimating model

The result of correlation analysis between internal variables (Table 3.2) show that the statistical significant relationship between independent and dependent variables. The independent variables are correlated quite closely, especially between liquidity reserve to total assets (LTA) factor and interbank loans (IBLOAN) factor, these can be explained by the phenomenon of borrowing through the interbank market to help banks achieve short-term goals such as liquidity.

Table 3.2: The internal variables correlation matrixes

	FGAP	SIZE	LTA	IBLOAN	EFD	ETA	LPTL
FGAP	1	-0.276^{**}	-0.200^{**}	-0.190^{**}	0.348^{**}	0.281^{**}	-0.153^*
SIZE	-0.276^{**}	1	-0.184^{**}	-0.171^{**}	-0.261^{**}	-0.580^{**}	0.491^*
LTA	-0.200^{**}	-0.184^{**}	1	0.943^{**}	0.486^{**}	0.024	-0.191^*
IBLOAN	-0.190^{**}	-0.171^{**}	0.943^{**}	1	0.478^{**}	0.031	-0.149
EFD	0.348^{**}	-0.261^{**}	0.486^{**}	0.478^{**}	1	-0.030	-0.176^*
ETA	0.281^{**}	-0.580^{**}	0.024	0.031	-0.030	1	-0.301^*
LPTL	-0.153^*	0.491^*	0.191^*	-0.149	-0.176^*	0.301^*	1

Source: Author's calculations

The two models below are estimated by using GMM first – difference to evaluate the effect of internal variables and macro variables to Vietnam's banks liquidity. The result of estimation and test are presented at table 3.3

Tables 3.3: Regression in with and without external variables

Variables group	Variables	Model 1	Model 2
Internal variables	FGAP(-1)	0.084*	0.170**
	EFD	0.736*	0.782*
	ETA	0.954*	1.296*
	LOG(SIZE)^2	1.926*	0.712
	LOG(SIZE)	-11.176*	-6.917
	IBLOAN	-0.586*	-0.557*

	LTA	-0.165**	-0.241
	LPTL	-3.49*	-5.388**
External variables	GDP		17.594*
	M2		0.208***
	INF		2.967**
	GDP_{t-1}		-10.221**
	$M2_{t-1}$		-0.589**
	INF_{t-1}		2.382*
P-value	AR(1)	-0.086	-0.012
	AR(2)	0.023	0.006

Source: Author's calculations

Note: The starred coefficient estimates are significant at the 1% (*), 5% (**) or 10% (***) level

The estimation result of model 1 shows almost internal factors affect of bank liquidity with a high statistical significance, at 99%. Meanwhile, the model 2 (combining the internal and macro variables) shows that the SIZE, SIZE^2 and LTA factors have statistical insignificance.

Bank's size (SIZE, SIZE^2) have a strong influence on liquidity of commercial bank. Accordingly, the total assets have nonlinear effects to bank liquidity. Early stages, increase bank-size will increase bank liquidity but when total assets increase exceedingly their capable management will lead to decrease the liquidity. This is similar to the findings of Delechat et al (2012) as the coefficient of liquidity is related non-linearly with the size of the bank, but there is a point in which the increase size will have marginal impact on decreasing liquidity. This result implies the regulation of the total assets of the bank in accordance with their ability will play an important role in bank liquidity management.

A according to the results, bank liquidity is positively influenced by internal variables:

- The equity to total assets (ETA): equity to total assets ratio has strongly influence on liquidity. For each 1% increasing of ETA will impact of increasing at 0.95% of bank liquidity in the model 1 (only internal variables) and increasing at 1.29% of bank liquidity in the model 2 (both internal and external variables).

- External dependence funding (EFD): The EFD to total assets is concomitant with higher liquidity in two models.

On the contrary, some internal variables which are caused by poor bank liquidity. The result show that bank liquidity is negatively influenced by:

- Interbank loan (IBLOAN) which has highly significant negative influence on bank liquidity (i.e. higher interbank loan will reduces bank liquidity).

- Loans loss provision to total loans (LLPTL) is represented by credit risk has strongly impact of bank liquidity.

The current year's GPD growth increase bank liquidity. This coefficient effects very strongly, every 1% GPD growth will increase 17,59% of bank liquidity. However, GDP last year (GDPt_1) negatively correlate with liquidity in the current year and reduce liquidity at -10,22%. A stable economy growth will help to control stable bank liquidity.

Money supply (M2) increases the bank liqudity in the current year. For each 1% growth in M2 in the current year will increase 0.21% bank liquidity. Meanwhile, the money supply previous year ($M2_{t-1}$) reduces liquidity in the current year.

The inflation in current year (INF_t) and the inflation of previous year (INF_{t-1}) increase the liquidity in the current year. For every 1% increase in inflation in the current year will increase the liquidity 2.97% in the current year.

4. Policy implications

The estimation results indicate that bank liquidity is not only dependent on internal factors of the banking system such as the size of total assets, liquidity reserves, interbank loans, and equity to assets, but also is affected by the impact of macroeconomic variables such as economic growth, inflation, and money supply. Significant impact of macroeconomic variables is reflected not only by the latency of the current policy but also by the impact on the bank's internal factors altering the impact of these factors.

One notable result is the total assets having variable nonlinear effects to bank liquidity. The small banks are more liquid, this result also shows that the massive increasing bank capital according to Decree 141/2006/ND-CP has created unexpected effects. They are excessive liquidity, and then the continuous liquidity deficit requires the establishment and implementation of policies taking into account the specific, individual situations of the banks, the banking sectors in particular the increase of the charter capital increase of the bank's total assets.

One other implication from the model study results show that the role of stabilizing economy playing a very important role to secure the liquidity of the national banking system, especially the important macroeconomic variables as GDP growth, inflation and the money supply.

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