

Technology effects towards banks' liquidity risk on Southeast Asian commercial bank

Sarmila Udin

Imbarine Bujang

Siti Rahayu Beli

Universiti Teknologi Mara, Malaysia

Keywords

Liquidity, Technology, Southeast Asian and Banking Institution

Abstract

Liquidity in a banking system is relatively important when dealing with the survivability of the financial system. It is risky when a bank is unable to cover its financial obligation when it is due. Participation from public in banking through the use of technology could enhance the level of bank liquidity. This study is aimed at examining the relationship between the technology and banks' liquidity from the year 2012 to 2017 involving five commercial banks in selected Asian countries. This study was used the Internet subscriber, Mobile Cellular, Automated Teller Machine (ATM) and Internet security as proxies of technology. The static panel data technique was employed to test the significant effect between the variable using the fixed effect and random effect model. The findings show that the ATM, mobile cellular is significant with the bank liquidity ratio, hence it shows that the increasing number of ATM and mobile cellular will affect the bank deposit.

Introduction

The concept of financial intermediaries refers to a productive activity in which a financial institution incurs liabilities on its own account for the purpose of acquiring financial assets by engaging in financial transactions. The function of financial intermediaries is to channel funds from lenders to borrowers by intermediating between them. It was designed to account for institutions from depositing and channelling of funds between the surplus units to deficit units. Thus, the main function of commercial banks is channelling of funds (monetary) to its customers through loan activity. The bank has to be in a good position by having healthy liquidity position (Litter, Silber & Udell, 2004). Therefore, liquidity becomes the essential element for banks stability in the financial system because deposits can be withdrawn anytime, hence banks must manage their liquidity to ensure they can satisfy a deposit withdrawal without being forced to use the long-term liquidity.

Marozva (2015) stated the major reasons of bank failures is due to insufficient liquidity by holding liquid assets that has an opportunity cost of higher returns. From that point of view, liquidity is important for proper functioning of financial markets and the banking sector especially during the early "liquidity phase" of the financial crisis that began in 2007. During the crisis, many banks experienced difficulties because they did not manage their liquidity in a prudent manner. As liquidity problems of some banks during global financial crisis re-emphasised, liquidity is very important for functioning of financial markets and the banking sector. From that point, the Basel Committee on Banking Supervision (BCBS) provides a set of recommendations for regulations in the banking industry by introducing Basel III to ensure that financial institutions have enough capital on account to meet obligations and absorb unexpected losses.

Therefore, to enhance the level of banks' liquidity the participation from public in banking would emerge the liquidity level of the bank through the technology. The tremendous change has occurred in the banking sector mostly triggered by inventions in the world of technology. The electronic channels become most overwhelming trends in banking technology. The banking system embraced computerization to keep abreast with other institutions. Technology is a crucial agent of modernity. Most of the people are looking for online possibilities to be connected with their banks. Hence, technology will make the banks more accessible and convenient to save, make a payment and withdraw the money. In order to get more customers, banks as financial institutions naturally react very quickly to any change in technological

environment. Largest banks as financial intermediaries play essential roles in financing economic enterprises (Eghtesad Novin Bank, 2008). In relation to that, the Innovation Diffusion Theory postulated by Roger (1983) explains individuals' intention to adopt a technology and the factors determine adoption towards an innovation is: relative advantage, compatibility, complexity, trialability and observability. This theory is concerned with the manner in which a new technological idea and technique or a new use of an old one is a form of creation towards efficiency. Simon (2016) stated that many banks to adopt ICT in their operation in order to improve their efficiency and meet the customer needs. Therefore, the customers are able to access their accounts anywhere as long as they are connected to the internet.

The Association of Southeast Asian Nations (ASEAN) inaugurated in 1957 with four countries now includes 11 countries. The group's aim is to prevent conflict among member states by creating an integrated economic bloc through sustained modernisation. The core countries group in ASEAN account for four percent of world trade and achieved greater degree of economic and financial integration among themselves with the developed countries. They actively involve with trade, economic and financial regulations similar to those in newly industrialising nations (Chung, Ariff, & Shamsher, 2017). The banks dominate the development process to reform after bore the brunt from the two financial crises. It led to further reforms being implemented by diversifying their heavy reliance on the banking sector. Banks play a certain role in developing countries, more than in the developed countries.

Section two provides a brief review of the literature. Section three describes the data and methodology. Section four presents the result of the relationship between technology and banks' liquidity.

2. Literature review

2.1 Determinants of banks' liquidity and measurements

Bank liquidity can offer different of studies such as internal, bank specific or characteristics and external or macroeconomic factor. The empirical studies conducted by Bonfim and Kim (2012); Bonner, vanLelyveld and Zymek (2013); Delechatetal (2012) Dinger (2009); Munteanu (2012) and Tseganesh (2012) investigated that the bank specific and Macroeconomics as the variables determined the bank's liquidity. They further explained that macroeconomics variables consist of Gross Domestic Product (GDP), Inflation rate, crisis and unemployment rate. The bank specific factors include deposits, cost of funding, profitability, capital, bank size and ownership as the variables. Some of the researcher used the various liquidity ratios to measure the banks' liquidity risk such as liquid assets to total assets ratio (Bourke,1989; Molyneux & Thornton, 1992; Barth et al.,2003 and Demirgüç-Kunt et al., 2003). This ratio measures the overall liquidity position of the bank and measure the liquidity available to meet the expected demand for cash that includes cash in hand, balance with institutions and money at call and short notice. Another liquidity ratio is liquid assets to deposits ratio (Shen et al.,2001), loans to total assets ratio (Demirgüç-Kunt and Huizinga,1999 and Athanasoglou et al.,2006) that measures the liquidity available to the total deposits of the bank. The third commonly used liquidity ratio is net loans of customer and short-term funding ratio (Pasiouras and Kosmidou, 2007; Kosmidou, 2008 and Naceur & Kandil,2009) to measure a bank's ability to cover loan losses and withdrawals by its customers. Banks have to make sure there is an adequate liquidity to cover loans.

The new requirement set by the Basel Committee for Banking Supervision (BCBS), a college of central bankers and other financial regulators from the United States and other advanced economies in December 2010 proposed new liquidity requirements meant to promote the resilience of the banking sector. The new proposed requirement is to examine the new requirement namely the Liquidity Coverage Ratio (LCR) the Basel Committee's newly proposed minimum threshold for short-term liquidity. In 2011, Malaysia have outlined their plans to implement the Basel III reform package which comprises measures to further strengthen the existing capital and liquidity standards for banking institutions in Malaysia.

2.2 Technology and Banks' Liquidity

The previous studies have reviewed the impacts of technology towards the economic growth. However, only few analysed the impacts of technology on bank's liquidity led to little contribution to the literature. Nowadays banks are prone to technological obsolescence and therefore respond swiftly to variations in both economic and technological environment to not only maintain but also increase their customers' needs. The new technologies such as personal computers are complex, and an element of

uncertainty exists in the minds of decision makers. This is because people form attitudes and intentions toward trying to learn to use the new technology prior to initiating efforts directed at using. It is well documented now that the access to Internet, personal computers and other information technologies is highly unequal between countries. Hence, technology has increased transactions which ultimately have direct and indirect impacts on minimum banks' liquidity (Kajuju, N.K 2016). The current banking strategy practice is a new way of handling daily operations that enables banks to improve their ability to compete with their competitors, lower and manage the risk while at the same time satisfy the customers' needs and respond to the market changes (Laeven & Levin, 2010). The research conducted by Sanjeev, Dale and Kenneth (2005) used different measures of IT penetration - the usual measures in per capita terms and in per income terms. On top of this, they consider three generations of IT - mainframes, PCs and Internet. Internet banking (e-banking) is used to deliver a wide range of value-added products and services to bank customers (Ovia, 2012)

Numerous empirical studies about the review of the literature have attempted to address the aspects of adoption of technology (ICT) with the other variables by using the primary methods of collection. It has however, not adequately linked the technology towards the bank's liquidity. Studies conducted by Hassan et al. (2013) secondary data of six (6) banks in Nigeria between 2006- 2011 used the proxy of electronic banking products such as ATM and e-mobile. NK Kajuju (2013) used the ATM, POS, internet banking and Mobile banking as a proxy of electronic banking in Kenya and found that as the number of ATM transactions of the banks increased, the value of the transactions also increased significantly. The more the banks embrace ATM banking, the higher the liquidity of the banks and this could be partly due to more efficient automated cash deposit rather than the long queues in the banking halls. Ghodrati (2014) found that the electronic banking and the expansion of its scale from POSs and ATMs to telephone banking; mobile banking and internet banking have increased banking transactions, significantly. He investigated on the amounts of transaction of ATM Machines, POSs and PIN PADs as the most important means of electronic banking. While other researchers conducted the study using ATM, internet banking and mobile banking (Sarлак & Hastiani, 2011) and additional of Point of Sale (POS) (Abu bakar, Shagari & Olesegun, 2015).

3.0 Data & methodology

This research will focus on the Bank liquidity of five commercial banks in selected Asian country namely Malaysia, Indonesia, Philippines, Thailand and Singapore starting from the year 2012 to 2017. The variables used in this study are proxies of technology namely internet subscription, mobile cellular, Automated Teller Machine (ATM) and internet security. These variables were gathered from the World Bank. The liquidity risks were measured using liquid assets to deposits, liquid assets to total assets and loans to deposits which were translated into model 1, model 2 and model 3 (see table 1). These liquidity risks were collected from Fitch Connect, INCEIF Malaysia. The sampling technique was based on filtration process, taking into consideration only the bank that could fulfil the availability of the data from the period of 2012 to 2017. Table 1 shows the list of variables used in this study based on the following models. The Model 1, Model 2 and Model 2 representing the dependent variables, L1 was Liquid assets to total assets (liquid assets ratio), L2 was Liquid assets to deposit ratio and L3 was Loan-to-deposits ratio

Model 1

$$L1 = \alpha + \beta_1 IntUser_{it} + \beta_2 mobile_{it} + \beta_3 ATM_{it} + \beta_4 Intsec_{it} + \epsilon_{it} \dots (1)$$

Model 2

$$L2 = \alpha + \beta_1 IntUser_{it} + \beta_2 mobile_{it} + \beta_3 ATM_{it} + \beta_4 Intsec_{it} + \epsilon_{it} \dots (2)$$

Model 3

$$L3 = \alpha + \beta_1 IntUser_{it} + \beta_2 mobile_{it} + \beta_3 ATM_{it} + \beta_4 Intsec_{it} + \epsilon_{it} \dots (3)$$

Table 1: Variable used and expected sign of coefficient

Variables	Model 1 - L1	Model 2 - L2	Model 3 - L3
Internet Subscriber	Positive (+)	Positive (+)	Positive (+)
Mobile Cellular	Positive (+)	Positive (+)	Positive (+)
Automated Teller Machine (ATM)	Positive (+)	Positive (+)	Positive (+)
Internet Security	Positive (+)	Positive (+)	Positive (+)

As show in table 1 all the entire variables expected sign were positive because through the use of technology it can enhance the bank liquidity. The research studies conducted by Oliner and Sichel (2000), Jorgenson and Vu (2005) and Reuter (2010) found that there is a significant relation between technology and economic growth of country. This is similar to the bank liquidity that would enhance the level of bank's capability. The panel data analysis will be used to test the non-directional hypothesis whereby the null hypothesis indicates no significant relationship between the technology and bank liquidity. Meanwhile, the alternate hypothesis indicates a significance relationship between the technology and bank liquidity. Hence, the normality test was used to check on the normality of the data by looking into the rule of thumb in Skewness and Kurtosis. The logarithms (Ln) was conduct because the data is not normal. The static panel data technique is employed to test the relationship between the variables significant effect by using the Fixed Effect Model and Random Effect Model.

4.0 Finding & Analysis

4.1 Descriptive Statistics

Table 4.1 Descriptive Statistic

Variable/ Descriptive	Mean	Standard Deviation	Min	Max	Skewness	Kutosis
Intuser	51.834	22.750	14.52	84.45	-0.116	1.748
Mobile	1.23e+08	1.25e+08	8067600	4.59e+08	1.303889	3.582
ATM	58.492	28.687	18.885	117.279	0.785	2.712
Intsec	40221.93	87055.15	1146	338925	2.744	9.423
L1	33.071	22.191	15.38	106.65	1.846	6.247
L2	14.512	6.050	4.44	28	0.301	3.187
L3	99.252	29.551	68.47	190.32	5.201	1.566

Descriptive statistics as shown in Table 4.1 indicates the comparison mean of the dependent variable loan-to-deposit represent higher result of 99.252 and the maximum is 190.32 typically, the ideal loan-to-deposit ratio is 80% to 90%. A highest loan-to-deposit ratio of 100%, this means that the bank may not have enough liquidity to cover any unforeseen fund requirements. The normality of data distributions is analysed. It was found that the data were not normal and were transformed by using the natural logarithm.

4.2 Empirical finding

Table 4.2: Result on Regression Analysis Based on Pooled OLS

Dependent Variable: Bank's Liquidity (L1, L2, L3)

Variables	Model 1	Model 2	Model 3
dlnintuser			
β	34.2296	-6.030571	150.5611
stat	1.03	-0.60	2.98
Value	(0.314)	(0.552)	(0.007) ***
Inmobile			
β	-0.8273	-1.849247	1.92528
T-stat	-0.34	-2.50	0.51
P-Value	(0.740)	(0.021) **	(0.613)
Inatm			
β	-28.35524	7.201229	11.3793
T-stat	-5.10	4.30	1.34
P-Value	(0.0001) ***	(0.0001) ***	(0.195)

dlntntsec			
β	-4.793173	0.6551	-8.027276
T-stat	-1.21	0.55	-1.33
P-Value	0.241	(0.589)	(0.199)
Constant			
β			
T-stat	159.0419	19.0914	8.33424
P-Value	3.08 (0.006) ***	1.23 (0.234)	0.11 (0.917)
Stat	7.47	8.50	4.44
P value	(0.0001) ***	(0.0004) ***	(0.0099) ***
R Squared	0.5991	0.6297	0.4701
BP LM test			
P value	(1.00)	(1.00)	(1.00)
No of Observtion	30	30	30

Note: the values in the parentheses are p-values based on ***, **, * indicates significant at 99%, 95% and 90% respectively.

The Breusch-Pagan Lagrange Multiplier (BP LM) test was used to test for the poolability of the panel data. Table 4.2 shows the result of regression analysis between the three Model that determine the bank's liquidity ratio with the technology reject the null hypothesis, implying the data can be pooled to BP LM test. From the four variables only Automated Teller Machine has the significant relationship with the Model 1 and Model 2 that indicates the liquidity assets ratios and liquid assets to deposits ratio respectively. However, ATM was positively correlated with Model 3. This finding is consistent with Kajuju N.K (2016) the more the banks embrace ATM banking, the higher the liquidity of the banks and this could be partly due to more efficient automated cash deposit rather than the long queues in the banking halls. The mobile cellular shows that only Model 2 had the significant relationship, while Model 1 and Model 3 were explained differently. Based on the above table, Model 3 has positive correlation with the loan-to-deposit ratio. This shows that the increasing number of mobile cellular can enhance the ability of banks to cover loan losses and withdrawals by their customers. Banks have to make sure there is an adequate liquidity to cover loans. As for the internet security, all variables are insignificant and fail to reject the null hypothesis, except Model 2 which was positively correlated with the internet security. This research also reveals the result of rejected the null hypothesis of internet users towards the loan-to-deposits ratio. The number of internet users affected the bank liquid assets to deposit ratio to decrease, hence affecting the deposits. The decrease of deposits affected the bank's capability to meet the expected demand for cash and increased the liquidity risk of the bank which might not have enough liquidity to cover loans.

5.0 Conclusion and Recommendation

This research has examined the effect of technology towards banks' liquidity in five Southeast Asian commercial banks countries - Indonesia, Malaysia, Philippines, Thailand and Singapore. It is observed that the liquidity risk that become the essentials element for banks stability in the financial system. Management of deposits is crucial because it can be withdrawn at any time, so banks must manage their liquidity to ensure they are capable of paying the withdrawals. The enhancement of banks' liquidity through technology becomes the subject matter in the research when the change occurred in the banking sector mostly triggered by inventions from technology. Therefore, it can be seen that there must be significant relation between technology and bank's liquidity.

The finding in this paper shows that the model 1 of liquid assets ratio is significant with the ATM. Significance of ATM shows that the more the banks embrace ATM banking, the higher the liquidity of the banks and this could be partly due to more efficient automated cash deposit rather than the long queues in the banking (Kajuju N.K, 2016). As for model 2 of liquid assets to deposits ratio where the ATM and mobile cellular is significant on result, hence it shows that the increasing number of ATM and mobile

cellular will affect the bank deposit. The deposit is important because it might affect the bank's capability to meet the expected demand for cash. It also increased the liquidity risk of bank may not have enough liquidity to cover loans. The Model 3 of loan-to-deposits ratio is only significant with the internet. On the other hand, the internet security does not have significant relationship with the three models. The primary studies conducted by Al-nsour and Al-Hyari (2011) concluded that perception of security directly affect customer trust and perceived usefulness and affect perceived ease of use indirectly. Besides, Mia, Rahaman and Uddin (2007); Lichtenstein and Williamson (2006) also assessed that the challenged encountered by banks and their customers to improve internet banking. Amongst the reasons are lack of awareness of internet banking and its benefits, lack of internet confidence, competition with phone banking, difficult initial set up procedures, lack of trust, security and privacy risks and inadequate knowledge and support. So, this is why internet securities play as vital roles to improve the banking activity.

The conclusion of this paper highlights the impact of the technology towards the bank's liquidity. Despite the increasing number of internet users and mobile cellular without the internet security it affects perception of security. This happens when the depositors lack of trust and needed support for their privacy risks. Thus, the policy makers should therefore improve the internet security to build the trust among the depositors to allow depositors.

References

- Abubakar, A., Shagari, J. N., & Olusegun, K. L. (2015). The relationship between electronic banking and liquidity of deposit money bank in Nigeria. *International journal of economics, commerce and management*, 3(9), 830-847.
- Al-Nsour, M. and Al-Hyari, K. (2011). Internet Banking and Jordanian Corporate Customers: Issues of Security and Trust. *Journal of Internet Banking and Commerce*, Vol. 6 No.11 [online]. Available at: <http://www.arraydev.com/commerce/jibc/2011-04/Alnsour.pdf> (Accessed 10 February 2011).
- Athanasoglou, P, Brissimis, S. and Delis, M. (2005): Bank specific, industry specific and macroeconomic determinants of bank liquidity; *Journal of International Financial Markets*, Vol. 18, No.2, pp.121-136
- Barth, J.R., Caprio, G., Levine, R., 2004. Bank regulation and supervision: what works best? *Journal of Financial Intermediation* 13 (2), 205-248
- Basel Committee on Banking Supervision (2013), 'Basel III: the liquidity coverage ratio and liquidity risk monitoring tools', available at www.bis.org/publ/bcb3238.htm
- Bonfim, D., & Kim, M. (2012). Liquidity risk in banking: is there herding? *European Banking Center Discussion Paper*, 2012-2024.
- Bonner, C., van Lelyveld, I., & Zymek, R. (2013). Banks' Liquidity Buffers and the Role of Liquidity Regulation. *Journal of Financial Services Research*, 1-24.
- Bourke, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking & Finance*, 13(1), 65-79.
- Chung, T., Ariff, M., & Shamsher, M. (2017). Banking Liquidity and Stock Market Prices in Three Countries in ASEAN, *Social Sciences & Humanities* 25(1), 291-316.
- Eghtesad Novin Bank Risk Study Team (2008). Asset liability management and liquidity risk in financial institutions' Fra Sokhan publishing, 1th, Page 217.
- Ghodrati, H. (2014). *Management Science Letters*, 4, 1259-1270. <https://doi.org/10.5267/j.msl.2014.4.018>
- Kosmidou, K. (2008). "The determinants of banks' profits in Greece during the period of EU financial integration", *Managerial Finance*, Vol. 34, No. 3, p. 146-159.
- Kajuju, N. K. (2016). The Effect of Electronic Banking On Liquidity Of Commercial Banks In Kenya (Dissertation, UoN)
- Laeven & Levin, 2010 Ahmed, A. D. (2010). Financial liberalization, financial development and growth linkages in Sub-Saharan African countries: An empirical investigation. *Studies in Economics and Finance*, 27(4), 314-339.
- Lichtenstein, S. and Williamson, K. (2006) "Understanding consumer adoption of internet banking: an interpretive in the study of Australian banking context", *Journal of Electronic Commerce Research*, Vol. 7 No 2, pp 50-66.
- Litter L.S, Silber W.L and Udell G.F 2004, Principles of Money, Banking, and Financial.
- Marozva, G. (2015). Liquidity And Bank Performance. *International Business & Economics Research Journal (IBER)*, 14(3), 453. <https://doi.org/10.19030/iber.v14i3.9218>.
- Mia, M., Rahaman, M. and Uddin, M. (2007) "E-Banking: Evolution, Status and Prospects", *The Cost and Management*, Vol. 35 No. 1, pp. 36-48 , 3, 993-998. [https://doi.org/10.1016/S2212-5671\(12\)00263-8](https://doi.org/10.1016/S2212-5671(12)00263-8)

- Molyneux, P., Thornton, J., 1992. Determinants of European bank profitability: a note. *Journal of Banking and Finance* 16, 1173-1178.
- Munteanu, I. (2012). Bank Liquidity and its Determinants in Romania. *Procedia Economics and Finance*
- Naceur, S. B., and Kandil, M. (2009), "The Impact of Capital Requirements on Banks' Cost of Intermediation and Performance: The Case of Egypt," *Journal of Economics and Business*, Vol. 61, 70-89.
- Oliner, S.D., and Sichel DE. (2000). The Resurgence of Growth in the 1990. Is Information Technology the story? *The Journal of Economic Perspective*, 14(4), 3-22
- Ovia, J. (2012). Internet Banking: practices and potentials. Institute of Chartered Accountants of Ghana (ICAN) Lagos Sheraton Hotel & Towers, Ikeja. September 05.
- Pasiouras, F., and Kosmidou, K. (2007), "Factors Influencing the Profitability of Domestic and Foreign Commercial Banks in the European Union," *Research in International Business and Finance*, Vol. 21, 222-237.
- Rogers, R. A. (1984). Introduction Strategy for New Products with Positive and Negative Word-Of-Mouth. *Management Science*, 30(12), 1389-1404.
- Sarlak, M.A. & Hastiani, A.A.A. (2011). E-banking and Emerging Multidisciplinary Processes: Social, Economic and Organizational Models. Hershey: Igi Global.
- Sanjeev Dewan, Dale Ganley, and Kenneth L. Kraemer (2005). Across the Digital Divide: A Cross-Country Analysis of the Determinants of IT Penetration. *Journal of the Association of Information Systems*.
- Simon, V. T. (2016). Effect of Electronic Banking On Customer Satisfaction In Selected Commercial Banks , Kenya, 2(2), 41-63.
- Tseganesh, T. (2012). Determinants of Banks Liquidity and their Impact on Financial Performance: empirical study on commercial banks in Ethiopia (Doctoral dissertation, aau).