

The Effect of Bank-Specific Variables on NSFR of Malaysian Banks

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Abstract— The recent 2008 world financial crisis show how the liquidity problem in a particular region can easily affects the whole world. Following the crisis, both supervisory and regulatory bodies recommended various measures that will makes the bank's liquidity more vibrant. Liquidity crisis in a bank will undermines the performance, while non-performance of a bank will lead to failure. Studies were conducted on the factors affecting the liquidity risk in banks previously. The factors examine includes internal, external and ownerships; some studies indicated that before the 2008 crisis, liquidity risks in banks was not taken as one of the major priority by banks. At the outbreak of the crisis it was realized that liquidity is one of the major cause.; Thus, Basel committee on banking supervision (BCBS) come up with suggestions and structures that will makes the banks liquidity more powerful among which NSFR is included. it is noticed that, after the crisis, banks performance was improved, although some studies indicated that still the performance of some banks failed due to the lack of strong liquidity. This study uses secondary data from Fitch connect databases to evaluate the internal variables and ownership factors that determines the bank's Liquidity risk. The new liquidity rule (NSFR) act as dependent variable. The findings of the study through Panel corrected standard error (PCSE) model indicated that, all the banks in Malaysia over complied with newly introduced NSFR, the study further finds that, only capital and non-interest income are contributing factor to this over compliance. The implications of this is that maintaining an excessive liquid asset tend to lower the bank's profitability, thus it is recommended that the Banks need to find other ways to invest their excess liquid assets in order to be more profitable.

Keywords— *Liquidity, Ownership, Banks, NSFR, Crisis, Funding.*

I. Introduction

The last financial crisis started in 2007 increases the importance for a fundamental strengthening of Basel II framework. During the crisis; banks were highly leveraged and illiquid resulted in a failure of even largest banks such as Lehman Brothers and others. This causes the Basel committee on Banking Supervision (BCBS) to announce the introduction of the new accord (Basel III) in December 2010. Such efforts

are in order to strengthen the capital adequacy requirements and establishes new liquidity requirements for Banks (BCBS, 2013a).

Some statistics showed the amount of the mortgage origination in United Kingdom (UK) which its default leads to the crisis rose from \$190bn in 2001 to \$600bn in 2006. Such crisis which started with the failing of some big Banks in UK, spreads to other parts of the world, including Asian Countries. During this financial crisis, Malaysia and other South-east Asian countries had not been spared from it. The shock was transmitted to the Malaysian and other south-east Asian countries economy in the fourth quarter of 2008. With the slowdown of domestic economic activities, overall loan applications in the country showed a declining trend. Loan applications slowed down for both the business and household sectors, thus, Malaysian and other south-east Asian financial institutions were negatively affected by the crisis, as a result; various measures were taken to reduce its impacts (Khoon & Mah-Hui, 2010).

According to Dietrich, Hess, & Wanzenried (2014), unsustainable funding structure amid the recent financial crisis have demonstrated more prompt risk to the survival of even too big to fail financial institutions. There is adequate sufficient experimental proof that high use as well as the dependence of banks on unsustainable funding structures to back the extension of their asset are a key factor that leads to the increase of initial risk and its spread which leads to the crisis. Berger and Bouwman (2008, 2009) point to periods of abnormal liquidity creation that have preceded banking crises in the US. For the recent crisis, it was similarly found that the higher the banks reliance on non-deposit wholesale funding, the weaker the performance of their stock (Raddatz, 2010), the lower their return on assets (Demirguç-Kunt and Huizinga, 2009) and very importantly, banks with weaker structural liquidity in the pre-crisis period were more likely to fail subsequently (Bologna, 2011; Vazquez and Federico, 2012). Thus there is need for a Banks to have sustainable funding sources which will enable them to withstand short and long-term liquidity shocks and burst their performance.

Based on the above issues, two (2) new liquidity rules, liquidity coverage ratio (LCR) and Net stable funding ratio (NSFR) were developed in order to make sure that Banks have a sustainable funding structures to withstand any normal or stressed liquidity requirements.

1. The liquidity coverage ratio (LCR) requires banks to maintain an adequate level of “unencumbered, high-quality liquid assets that can be converted to cash to meet needs for a 30 calendar day time horizon under severe liquidity stress conditions specified by supervisors” (BCBS, 2010a, p.3). The standard requires that the value of the ratio should be no less than 100%, i.e. the stock of high-quality liquid assets should at least equal total projected net cash outflows.
2. The net stable funding ratio (NSFR) is designed to “promote longer-term funding of the assets and activities of banking organizations by establishing a minimum acceptable amount of stable
3. funding based on the liquidity of an institution’s assets and activities over a one-year horizon” (BCBS, 2010a, p.22). The ratio is defined as a bank’s available stable funding (ASF) divided by its required stable funding (RSF), which is required to be at least 100 per cent.

Compliance with the requirement in terms of the LCR and NSFR will impose a greater rapprochement between the weighted average maturity of assets and liabilities, thereby reducing the degree of maturity transformation. This will force banks to make greater use of medium-long term funding, which is more stable and more expensive, and/or to reduce their medium- long term assets (Blundell-Wignall and Atkinson, 2010). As a result; given a normal yield curve, characterized by an upward slope, reducing the maturity transformation activity will have a negative impact on bank profitability, partially damped by the perception of the increased stability of individual banks and the lower risk premiums demanded by the market on the more stable medium-long term funding.

Margin pressures for banks and expected shifts in their strategies are thus thought to have systemic effects mainly through a negative impact on economic growth when lending to the productive sector becomes scarcer. Researchers in fact generally foresee a negative impact on economic output which Angelini et al. (2011) estimate at 0.08% loss for each percentage point increase in NSFR. These negative effects are considered transitory, however, the authors of the Macroeconomic Assessment Group (2010) reason that as banks become less risky, both the cost and quantity of credit should recover, reversing the initial negative impact on consumption and investment. Gambacorta (2011), who estimates long-run relationship among a set of US macro-variables from 1994 to 2008, likewise shows that tighter capital and liquidity requirements have negative (but rather limited) effects on the level of long-run steady-state output. Studies of BCBS (2010b) and Yan et al. (2011), finally, argue that new regulations will lower probability and severity of future banking crises and associated losses of economic output. On balance, they thus foresee a significant net positive long-term effect on economic activity which subsequently will affect the performance of Banks positively.

Overall, the study of the effects of Basel III funding standards on foreign and domestic Banks liquidity remain a relatively scarcely researched topic. Previously, most authors appear to focus their attention on capital and leverage rules as it is clear that capitalization determines a bank’s resilience in the long-run, in additions; most of the previous studies uses a simple accounting measures to measure liquidity. This study attempts to close this gap by employing a new introduced liquidity measures (NSFR). By contrast, our research is motivated by the fact that unsustainable funding structures during the recent crisis have proven a more immediate threat to the survival of even well capitalized financial institutions includes Islamic Banks. Thus in this study; we set to investigate how the Micro (CAMEL variables), and ownership factors effects on the level of NSFR for foreign and domestic Banks in Malaysia. The study will use an annual data to compare NSFR between foreign and local Banks and finally to assess the overall effects on Malaysian Banks liquidity.

II. Theoretical and Empirical Background of the Study

Normally, banks are characterized with the short-term deposits and long-term financing structure. Thus in order for a bank to stay in an equitable position, it has to implement an efficient maturity transformation structure of its assets and liabilities. An efficient maturity transformation structure will improve the liquidity position of a Bank, this will protect the bank against insolvency risk; and it will subsequently enhance its performance (Efficiency and profitability).

The reverse of the above structure is called liquidity risk, it can be categorized into two types; namely, the market liquidity and funding liquidity risk. While the former refers to the risk of inability or difficulty of banks to convert a financial asset into cash, the latter refers to the lack of capacity of banks to fulfil their liabilities as they fall due or in a cost-effective way. (Ruozi & Ferrari, 2013, Drehmann & Nikolaou, 2013) and Iskandar, 2014).

Before the introduction of new liquidity risk measurement in late 2010 by BCBS, most of the previous studies on liquidity and banks performance employed a simple liquidity measures which are based on accounting perspectives such as the ratio of total deposit to total asset (in Sulaiman, Mohamad & Samsudin, 2013), cash to total asset (in Akhtar, Ali & Sadaqat, 2011; Anam, Hassan, Ahmed, Uddin & Mahbub, 2012; Abdel karim, 2013; Iqbal, 2012 and Ramzan & Zafar, 2014), capital to total assets (in Abdullah & Khan, 2012), and the ratio of current asset to total liabilities (in Ahmed, Ahmed & Naqvi, 2011) in investigating the impact of different factors on liquidity risk. From the perspective of investors, Buch and Goldberq (2015) measure market liquidity risk via money market spreads that capture investors’ expectations of movements in liquidity risk. From the perspective of regulatory monitoring, there are four empirical studies by Horrath, Seidler & Weill, (2012), Cucinelli (2013), Ramzan (2014), (Dietrich, Hess, & Wanzenried, 2014), Bruna and

Blahová (2016) and Abdul-rahman, Latifah, Mohd, & Sulaiman, (2017), some these recent studies look into account the latest liquidity risk measures by constructing a more complex formula proposed by Basel III, namely the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR). By contrast, this study will use Bank-specific variables to measure the effect of NSFR on local and foreign Banks in Malaysia.

In addition to the variables above, this study introduces the ownership factors to measure the level of newly introduced liquidity framework base on the bank ownership (Domestic or foreign). According to Javid and Iqbal (2008), the identity of ownership matters more than the concentration of ownership. This is so because ownership identity shows the behavior and interests of the owners. Ongore (2011) argues that the risk-taking behavior and investment orientation of shareholders have great influence on the decisions of managers in the day-to-day affairs of firms. According to Ongore (2011), the concept of ownership can be defined along two lines of thought: ownership concentration and ownership mix. The concentration refers to proportion of shares held (largest shareholding) in the firm by few shareholders and the later defines the identity of the shareholders (it maybe local or foreign). Morck et al. in Wen (2010) explained that ownership concentration has two possible consequences. The dominant shareholders have the power and incentive to closely monitor the performances of the management. This in turn has two further consequences in relation to firm performance. On the one hand, close monitoring of the management can reduce agency cost and enhance firm performance. In the other side; concentrated ownership can create a problem in relation to overlooking the right of the minority and also affect the innovativeness of the management (Ongore, 2011; Wen, 2010).

Comparing liquidity risk between domestic and foreign banks, Abdullah & Khan (2012) focused for the case of Pakistan for the period of 2001 to 2010. They measured liquidity risk using a different proxy, namely capital to total assets but included bank-specific variables similar to Mohammad Abdel Karim (2013). Their results showed that bank size and debt to equity ratio had positive relationships with liquidity risk for domestic banks while the debt to equity ratio and total loans to total deposits ratio had significant relationships with liquidity risk of foreign banks. As the debt to equity ratio showed positive relationship for both domestic bank and foreign banks, they suggested Pakistani banks to minimize the debt to equity ratio in order to reduce liquidity risk exposure.

Most previous studies on the determinants of bank liquidity risk focused more on the bank-specific characteristics devoid of ownership factors and uses traditional liquidity measures. Research done by Abdel Karim (2013) compared liquidity risk management between Saudi and Jordanian banks during the period 2007 and 2011. He proxied liquidity risk using cash divided by total assets and regress bank size, investment to asset ratio, capital to asset ratio, debt to equity ratio, loan to deposit ratio, the return on equity and return on

assets to liquidity measure. His findings showed that the debt to equity ratio and the capital to total assets had positive relationships while size and loan to deposit ratio had negative relationships with liquidity risk for Saudi banks. The Jordanian banks showed that the debt to equity ratio, return on asset ratio, capital to asset ratio were positively related while the investment to assets ratio, loan to deposit ratio, and return on equity were negatively related. Furthermore, they concluded that Jordanian banks have better liquidity positions as compared to Saudi banks.

Despite focusing solely on Islamic banks, Akhtar et al. (2011), Anam et al (2012), Iqbal (2012), made comparative analysis between conventional and Islamic banks on the same issue. Firstly, Akhtar et al (2011), focused on Pakistan banks covering a period of 4 years from 2006 until 2009 and testing whether the size, networking capital, return on equity, capital adequacy ratio, and return on assets affect liquidity risk. They showed that only return on asset can negatively affect liquidity risk (cash to total asset ratio). Using the same proxies as Akhtar et al. (2011) but with a later time period covering year 2007 to 2010, Iqbal (2012) added another independent variable, which is non-performing financing (NPF). The results are in contrast to Akhtar et al. (2011) in which all variables are negatively related, while NPF is positively related to liquidity risk for both Islamic and conventional banks. They show that a higher ratio of NPF indicates higher liquidity risk due to banks having large numbers of bad debts. Failure of banks to collect debt increases liquidity risk as greater amount of bad debts decrease liquidity position of the banks.

Secondly, Anam et al. (2012) compared liquidity risk between Islamic and conventional banks in Bangladesh covering five years' period, from 2006-2010. They only focused on bank-specific characteristic such as size, networking capital, return on equity, capital adequacy ratio, and return on assets. Using cash to total asset for liquidity risk measure, their results show that only size is negatively related to liquidity risk for Islamic banks while networking capital is negatively related to liquidity risk for conventional banks.

Against this background, most of the researchers used simple liquidity risk measures in investigating various factors affecting bank liquidity risk. For example, Akhtar et al. (2011), Anam et al. (2012), Abdel Karim (2013), Iqbal (2012), Ramzan et al. (2014) used cash to total assets as a proxy for liquidity risk. While Sulaiman et al. (2013) used total deposits to total assets, Asim and Khan (2012) adopted capital to total assets as liquidity risk measures. However, responding to the latest liquidity risk indicators proposed by Basel III, we adopt NSFR as the latest liquidity risk measures. NSFR is a measure of funding risks that extends beyond loans and that deter banks' excessive dependence on short-term wholesale deposits (Yi Wu, Elif Ture, Danial & Nicholas, 2014) and promote better mobilization of stable sources (Gobat, 2014). Although Cucinelli (2012) examined LCR and NSFR, this study differs from hers in the sense that she investigated factors affecting liquidity risk within the context of European countries and focusing only on conventional banks; while our study looks at

the post 2008 financial crisis and comparing the relationships between foreign and domestic banks that co-exist in a similar financial landscape using Bank-Specific variables. In addition, we comprehensively considered ownership variables, to measure the liquidity of domestic as well as foreign banks in Malaysia.

Furthermore; for the Malaysian context, the study for liquidity risk based on the newly introduced measures (LCR and NSFR) is still limited. Besides Sulaiman et al. (2013) that focused on macroeconomic cycles on top of a few bank specific variables, Ariffin (2012) analysed the relationship between liquidity risk and performance during the crisis by using only two variables, which are the return on assets (ROA) and the return on equity (ROE). She selected the top six Islamic Banks in Malaysia from 2006 to 2008 to examine the crisis period. Via the correlation analysis, she found that during the financial crisis, performance is negatively related to liquidity risk. The higher the liquidity risk, the lower will be the ROA and the ROE and vice versa.

III. Data

The sample is composed only of banks for which it was possible to measure the NSFR; the initial raw data sample for this research includes annual financial data of 200 Islamic and conventional Malaysian banks for the period from 2008 to 2016. In order to conduct econometric analyses, the data is subsequently narrowed down to achieve a more homogeneous sample of 37 banks from both conventional and Islamic banks operating in Malaysia. The sample was narrowed down because of 2 reasons. Firstly, there is enough qualitative data for banks throughout the sample period. This comprises nonstop observations of data series, which are important for the investigation of regression effects. At the same time, some banks disclosure does not allow a consistent calculation of NSFR in all the sample periods. The 2009 is chosen because this is the first year in which the Banks started taking measures in order to recover from the recent crisis, also if we consider years before 2009 the data to measure the NSFR are uncompleted and more estimations and rigorous evaluations will be required.

IV. Variables

Independent variables in this research are; capital ratio, the growth rate of loans, traditional liquidity measures, management efficiency, assets quality and the business model were proxied by non-interest income divided by total income. To analyze the relationship between capital and structural liquidity, equity over the ratio of assets will serve as a capital ratio which is based on leverage rules of Basel III. It is expected that banks with strong capital will have high NSFR because they are assumed to be more resilient whereby strong capital provide the banks with safe and sustainable funding structure. In addition, this relationship is also strengthened by fact that greater equity helps to automatically enhance the level of NSFR because the ASF-factor of equity is 100%.

Loan growth variable which is a proxy of past expansion in credit. Aggressive credit expansion by the banks is hypothesized to lower NSFR because these banks need to support their funding needs by using more short-term money market instruments.

The dependent variables used in the empirical analysis is newly introduced liquidity measure (NSFR). Based on previous studies (Giannotti et al., 2010; Van den End, 2010; Angora, & Roulet, 2011; Giordana, & Schumacher, 2012), the net stable funding ratio and the liquidity coverage ratio are the two dependent variables considered, which are the two liquidity measures proposed by the Basel Committee (2010). In this study; we decided to adopt only one (NSFR) in order to reduces the extent of assumptions and approximations in calculating LCR.

The net stable funding ratio (NSFR), which is a measure of structural liquidity (with a one-year time horizon) and is calculated as the ratio of available stable funding over required stable funding, the ratio is expected to be at least 100 per cent. A high value of NSFR ratios means high bank liquidity. Appendix E show the terms considered to quantify NSFR liquidity ratio proposed by the Basel Committee (2010) guided by the general availability of Banks data reported by Fitch-connect database.

The difficulty of including all terms required by the Basel Committee, which entails a precise calculation, is a main limitation of this method. However, the use of the NSFR measures instead of the balance sheet indices usually used in literature can more effectively indicate bank liquidity risk.

V. Methodology

The data for this research were elicited for the annual reports of Foreign and Domestic banks in Malaysia for the period between 2009 and 2016. The data was divided in to Foreign and domestic banks accordingly and descriptive test analysis was conducted. The local banks are the banks that more than 50% shares was owned by government or privates' individuals in Malaysia while the foreign Banks are the ones that were 50% of its shares was subscribed by foreigners. Thus, our descriptive analysis was done for domestic as well as foreign banks operated in Malaysia for the period of 2009 to 2016.

The study began by testing the mean independent variables in order to determine whether there are significant differences in the average values of these variables for domestics as well as foreign Banks in Malaysia. The following Bank specific variables were employed: capital buffer ratio and capital ratio as a proxy of Capital adequacy ratio the more banks maintains these ratios the better their NSFR level, Gross NPA /Net advances as a proxy to asset quality, the less this ratio is the better for banks NSFR, Total expenses to total revenue and Overhead/Total Assets as a proxy to management efficiency The lower this ratio the better NSFR for banks, Loan Loss Reserve, Loan growth and Non Interest Share as a proxy to earning the greater this ratio the better NSFR level of Banks. Ownership variables is measured by Dummy variable with a

foreign owner, if more than 50%; otherwise domestic owned and Dummy variable of state owner if more than 50% of the bank is owned by the state. The study then examines the impact of Bank-Specific variables on NSFR of both domestic and foreign banks in Malaysia by pooling our data to perform panel regressions for the whole study period as well as for the domestics and foreign banks during periods.

The empirical analysis of this study is based on the panel data that incorporates annual data series of both domestics and foreign commercial banks operated in Malaysia. The study established the evidence for liquidity-bank-specific variables link in these banks. This was done through estimates of the below equation:

$$LIQ_{it} = \alpha_1 + \alpha_2 DB_{2i} + \beta_3 CAR_{3it} + \beta_4 ASSET_{4it} + \beta_5 EFFICIENCY_{5it} + \beta_6 EARNING_{6it} + \mu_{it}$$

where DB is the dummy variable of the banking institutions, newly introduce measures of liquidity is measured by NSFR, Bank-specific variables include; capital buffer ratio and equity over total assets as a proxy of Capital adequacy ratio, NPLs /Gross loans and growth of gross loans as a proxy of assets quality, cost efficiency ratio, non-interest expenses over average assets and interest expenses on customer deposits over average customer deposits as a proxy of management inefficiency, non-interest income over gross revenue, interest earning ratio, operating profit over average equity as a proxy of earning ratio and ratio of 'available stable funding over required stable funding (NSFR) as a proxy of liquidity. Ownership variables is measured by Dummy variable with a foreign owner, if more than 50%; otherwise domestic owned and Dummy variable of state owner if more than 50% of the bank is owned by the state.

The $LIQ_{i,t}$ is a ratio of $NSFR_{i,t}$ which is the measure of bank i in the year t , α is a constant, $CAR_{i,t}$ indicates the capital adequacy of bank i in the year t , the $ASSET_{i,t}$ is a measure of asset quality of bank i at time t , $EFFICIENCY_{i,t}$ is the ratio of inefficiency of bank i in year t , and $EARNING_{i,t}$ measures to what extent bank i earnings in year t influences the level of NSFR, DB_{2i} , is the dummy variables linked to the domestic or foreign banks aspect.

VI. Empirical Findings

The empirical findings start with descriptive statistics (Table I). It shows the average values of the Bank-specific variables, the NSFR and capital adequacy ratios of domestic and foreign Banks. The analysis includes the mean values for the whole variables as well as the mean values of foreign and domestics banks, in between, the difference between the mean of foreign and domestic banks was reported, and finally the t-statistics of the mean differences between domestics and foreign banks was reported. Mean value refers to the average value of the variables in the entire sample.

The average value of net stable funding ratio over all the banks in the samples stood at 3.579. the minimum value of NSFR in the sample is 92.4% and the maximum value is

1509.3% (not reported). It should be noted that all the banks in the sample has exceeded the bank-year observations of NSFR value (i.e. greater than 100%). Thus, they fulfilled the new Basel III NSFR requirements.

The net stable funding ratio of foreign Banks is better than that of domestics Banks and the mean differences between the two is significant at 10% level. Since the net stable funding ratio (NSFR) is defined as the ratio of available stable funding (ASF) over required stable funding (RSF), this measure is a good reflection of the banks survival at the time of an extreme liquidity crisis. A higher average of net stable funding ratio for foreign banks suggests that foreign banks can withstand financial shocks more than the domestic's counterparts; it also indicates that foreign banks are stronger at the times of liquidity crisis. However, since holding excessive liquid assets (more than 100% threshold by recommended by Basel III) has the impacts of bringing down the profitability, although both the Banks have more than doubles of the NSFR recommended threshold of at least 100%, nevertheless, the ratio indicates that domestic banks maybe more profitable than foreign banks.

As for the equity over total assets, the ratio indicates how much a shareholder can receive if the company is to be liquidated, the higher this ratio the better, the mean average of both foreign as well as domestic Banks stand at 10.35 this ratio is quite good for all the banks; the mean figures between domestics and foreign Banks shows foreign banks to be statistically better than domestics Banks, the mean differences between the two categories is significant at 10%. This indicates that foreign Banks have better capital ratios than domestics ones and they can withstand the liquidity shocks more than domestics Banks.

TABLE I. DESCRIPTIVE STATISTICS FOR ALL THE BANKS IN MALAYSIA AND SEPARATELY FOR DOMESTICS WITH FOREIGN BANKS

Variables	T-Statistics
NSFR	-6.610***
Equity/Total assets	-8.600***
Non-Interest Income/ Gross Revenues	-7.992***
Growth of Gross Loans	-0.454
Non-Interest Expense/ Average Assets	-5.349***
Capital buffer ratio	6.840***
Cost efficiency ratio	0.310
Interest earning ratio	2.255
Int. Exp. on Customer Dep./ Av. Customer. Dep.	3.684***
Operating Profit/ Average Equity	8.385***
Impaired Loans(NPLs)/ Gross Loans	-1.416*

Note: asterisks *, ** and *** shows the significant level of 1%, 5% and 10% respectively.

See detail in Appendix A

With regards to the non-interest income over gross revenue, this ratio indicated the ability of the bank's earning that is not related to interest, the higher this ratio the good for bank's liquidity. The mean ratio for the whole banks in the study is 24.01, this indicates liquidity improvements for all the Banks, whereas the mean figure for domestic as well as

foreign Banks indicates a better performance in favor of foreign Banks, the mean difference is statistically at 10% level. This can be translated to mean a better liquidity position of foreign Banks compared to domestic one, because an increase in non-interest income can be used to burst the liquidity positions of Banks.

For the growth of gross loans variable as a proxy of assets quality, the mean figures between domestic and foreign Banks were not statistically different, this shows both banking categories experience the same growth on its financing activities. As for the proxy of management inefficiency, a ratio of non-interest expenses over average assets was used and the results also show foreign banks to be less efficient than domestic banks, the mean difference between the two is statistically significant at 10% level. For capital buffer ratio, the mean for the overall banks is high which indicates a high buffer for all the banks and they can withstand a long and short-term liquidity shocks if it is used appropriately. In particular, the mean ratios for domestic banks show more capital buffer than the foreign banks, the mean difference as indicated by t-test is statistically at 10% level.

As for the cost efficiency ratio and interest earning ratio, an insignificant difference was found between the two for both banking categories. This indicates that both domestic as well as foreign Banks maintained the same ratio of both cost efficiency and interest earning ratios during the period under study. The next variable which is the ratio of interest expenses on customer deposits over average customer deposits, the mean statistics indicated that domestic banks incurred more expenses on customer's deposits compared to foreign banks, the difference is statistically at 10% level. It shows that liquidity position of foreign Banks is better than that of domestic banks because increases in expenses may eat up liquidity.

Another ratio is the ratio which measure returns on equity (ROE) (proxy for earnings), it is expressed as operating profits over average equity, average mean figure of this variables shows domestic banks of have more earning than foreign banks, the mean difference is statistically at 10% level. As for the ratio of Non-performing loans over gross loans, the statistical difference is significant at 1% level in favor for domestic banks, this means, foreign banks incurred lost due to non-performance of loans more than domestic banks, and it means their liquidity position will be low compared to domestic banks.

Before conducting panel regression estimation using various models, we run a correlation analysis to ensure our data is free from severe multicollinearity issue (see Appendix B). In general, the coefficient correlations for all variables are less than 0.8, conjecturing that multicollinearity problem is not severe for our data sets.

VII. Findings

Table II shows the results of the panel regression analysis for the whole study, foreign banks and domestic banks respectively. Firstly, a regression analysis was run using

pooled OLS, in order to makes a comparison whether the results of the pooled OLS contains some standard errors which might cause inaccurate results, another regression was run using random effects for the same data and variables and then Breuch-Pagan test was conducted in order to test which is appropriate between pooled OLS and random effects regression analysis, the test shows the P-value is less than 0.05 which means the random effects is more appropriate than pooled OLS, furthermore, a fixed effects model was also run in order to know which is most appropriate if compared with random effects, to ascertain this, a hausman test was carried out which shows also the P. value of less than 0.05, this indicated that fixed effect is the most appropriate for our analysis (whole study, domestic and foreign banks).

After getting the most appropriate model for our analysis, some diagnostic tests were conducted on the model, firstly a test for Variance Inflation Factor (vif) was carried out, and the result shows a mean of less than 10 value for all the studies (whole study, domestic and foreign banks). This means there is no multicollinearity problems in all our data. A further test of Heteroskedasticity was done using Modified-Wald test for group wise, the results also for all the studies and shows a P.value of less than 0.05, this means, Heteroskedasticity problem existed in all our data before we diagnose our data, another test was conducted through Wooldridge test in order to test the presence of serial correlations in our data, the results of the test show a presence of autocorrelations in our data as the P.value is less than 0.05.

TABLE II. REGRESSION RESULTS (DIFFERENT MODELS) EXPLAINING THE DIFFERENT NSFR LEVELS AMONG ALL THE BANKS

Variables	Pooled OLS	
	Foreign Bank	Domestic Bank
Constant	-5.137 (-1.13)	-5.864** (-2.40)
Equity/Total assets	0.106 (3.27)***	0.169 (2.90)***
Non-Interest Income/ Gross Revenues	0.0742 (2.20)**	0.0134 (0.87)
Growth of Gross Loans	0.00370 (0.89)	-0.00141 (-0.61)
Non-Interest Expense/ Average Assets	-1.026 (-2.31)**	-0.541 (-1.88)*
Capital buffer ratio	-0.00411 (-1.61)	-0.000398 (-1.90)*
Cost efficiency ratio	10.78 (4.18)***	6.714 (3.51)***
Interest earning ratio	5.894 (1.24)	4.306 (1.69)*
Int. Exp. on Customer Dep./ Av. Customer. Dep	-1.321 (-3.11)***	0.319 (1.43)
Operating Profit/ Average Equity	0.0442 (1.17)	0.0312 (2.03)**
Impaired Loans(NPLs)/ Gross Loans	-0.0234 (-0.36)	0.0393 (0.90)

See detail in Appendix D

In order to rectify these errors in our data, an appropriate rectifications procedure were adapted to correct the data and then a new regression was conducted based on Panel corrected standard error (PCSE). And subsequent analysis was done on the data based on the results by PCSE.

The regression analysis based on PCSE results were showed for the whole study (see in Appendix A), domestic banks (see Table II) and foreign banks (see Table II).

In the first model which is the results for the whole study, the findings show the ratio of equity over total assets and non-interest income over gross revenue are positively related to the whole banks liquidity, the coefficient is statistically significant at 1% and 10% level respectively. In other words; as the banks' capital ratio increased, the banks liquidity positions also increased, this may be due to the facts that capital is among the main contributor to the liquidity of a bank which is used to settle both short as well as long term liquidity positions of a Bank, the results also indicated that as non-interest income of the banks increases, their long term liquidity position is also increasing, this may be due to the policy of the banks of turning income which is not related to the interest as a liquidity buffer, such buffer can be used at the time of liquidity needs. On the other hand; capital buffer ratio, interest expenses on customer deposits over average customer deposits ratio and NPLs over gross loans ratio has inverse or negative relationship with the long term liquidity ratio, the coefficient is statistically significant at 1%, 1% and 10% level respectively, this means, as the level of NSFR increased for capital buffer is decreasing, in other words, the banks are not using their capital buffer to improve their NSFR level. Further; also an increase in NSFR makes the ratio of interest expenses to reduced, this also may be due to facts that the banks use their liquid funds judiciously to generate more income that will lower their expenses on deposits, on the other hand it shows that an increased in interest expenses cause banks liquidity position to deteriorate, this may be due to the facts that expenses is to be taking care of by liquid assets maintained by the Banks. Lastly a negative relationship between NPLs ratio and level of NSFR shows that an increased in NPLs by banks decrease the liquidity level of a banks because NPLs eats the liquid assets of a bank.

Table II made comparative findings between domestic and foreign banks, the coefficient of the equity over total assets ratio for the whole study is consistent with the results of foreign banks but significant at 5% level. This seems to suggests that, although a positive but insignificant relationship was found with domestic banks, foreign banks uses its capital for its liquidity more than domestic Banks. As with regards to the ratio of non-interest income over gross revenue, same results were found as in the equity over total assets, it means that foreign banks used non-interest income to back up their long term liquidity more than domestic banks. This is understandable because, foreign banks have a parents' company overseas and always it comes to its rescue through its consolidated non-interest income to supports its long term

liquidity requirements while domestic banks may not have such privileged.

As for the next variable which is 'growth of gross loans' it is also a proxy of earning ratio, the coefficient for domestic banks differs from that of the whole study and foreign banks, the results show an inverse and significant relationship with NSFR, this means as the loans increased the long term liquidity positions of the domestic banks decreases. This hold true because an increases in financing activities eats up liquidity unless there is decreases in NPLs which may improves it which is not the case as looking at the results of non-performing loans shows a positive but insignificant relationship between NPLs ratio and NSFR level.

With regards to the non-interest expenses over average assets, the results for the domestic banks also differs from that of the whole study and foreign banks, while the former shows an inverse and significant difference with the level of NSFR, the later shows a negative and insignificant relationship between the variables. This means, although in all the banks, an increase in non-interest expenses eats up liquidity, the impacts is more on domestic banks, this may be due to the facts that they don't have a parent company abroad to assist them at the time liquidity problems. The next variable (Capital buffer ratio), findings for the whole study, domestic and foreign banks all shows an inverse relationship between it and level of NSFR at 10%, 5% and 1% level respectively. This means, as the liquidity level increases in banks, its capital buffer is decreasing, that mean an increase in NSFR of all banks is not financed by capital buffer maintained by the banks.

As regards to the cost efficiency ratio, the results show insignificant positive relationship for the whole study and positive significant relationship for domestic as well as foreign banks, this means the more efficient banks becomes in terms of reduced costs the more its liquidity positions will increase.

As for the interest earning ratio, only domestic banks have a significant impact on NSFR. This means only in domestic banks that interest earned is transferred to add to the long term liquidity position of the banks, as for the ratio of interest expenses on customer deposits over average customer deposits, the results of the whole study and that of the foreign banks shows an inverse and significant relationship while for domestic banks a positive and significant relationship was found. This means, for domestic banks, incurring more expenses does not affect the level of NSFR unlike in foreign banks, by contrast, foreign banks needs to reduce the ratio of their interest payments on customer's deposits in order to improve their liquidity positions.

With regards to the ROE, both domestic as well as the foreign banks shows a positive but significant effect on the level of NSFR, while for the whole study, a negative and an insignificant relationship was found, this means an increase in ROE of domestic and foreign banks individually is slightly improving the level of NSFR. As for the final variable under our study; (NPLs over gross loans), while the results for the domestic and foreign banks shows negative but insignificant

effects with the level of NSFR, the regression results of the combined study indicated a negative and significant level at 1%. Overall; it means for all the banks, higher NPLs results in banks to be less liquid. Thus, the banks are needed to take all the necessary measures that will reduce their ratio of NPLs.

VIII. Conclusions

Under Basel III, individual banks will have to maintain higher and better-quality liquid assets to better manage their liquidity risk. Therefore, the net stable funding ratio (NSFR) was designed to promote stable sources of funding on an ongoing structural basis. In this paper, we analyze how NSFR for 37 domestic and foreign banks in Malaysia have developed between year 2009 to 2016, which factors influence this ratio and in what way NSFR is impacting various activities of these banks.

The findings indicate that all the banks have exceeded the NSFR threshold of Basel III (i.e. 100%). The main recommendation is for banks to reduce their excessive liquidity positions in order to burst their profitability.

The panel regression shows capital ratio, cost efficiency ratio and ratio of non-interest income are the main factors that increase the long-term liquidity level of the banks. Capital buffer ratio, interest expenses on customer deposits over average customer deposits ratio and NPLs over gross loans ratio effects the NSFR negatively. Thus, it is recommended that interest expense on customer deposits and NPLs should be reduced and capital buffer should be used to enhance the NSFR.

Comparing between domestic and foreign banks. The results show that foreign banks use capital ratio and non-interest income to improve their long-term liquidity more than domestic Banks. For the loan growth ratio, the results indicate that increase in loans help to enhance NSFR position for foreign banks only. Thus, the recommendations are for the domestic banks to improve their asset quality. Non-interest expenses for both domestic and foreign banks reduce NSFR, thus it is recommended that Banks shall reduce their expenses. The study further found that only domestic banks uses interest earning ratio to improve their long term liquidity positions. The results of the ratio of interest expenses on customer deposits over average customer deposits shows that foreign banks need to reduce this ratio as it negatively effects their long-term liquidity.

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