

The Impact of Net Stable Funding Ratio (NSFR) Regulations of Basel-III on Financial Profitability and Stability: A Case of Asian Islamic Banks

^{*}Ulfat Abbas, Muhammad Imran Farooq, Amna Noor, Sadia Murtaza, Muhammad Waqas Ashraf

1 Lecturer, Department of Business Administration and Commerce, Institute of Southern Punjab Multan (PAK)

2 PhD Scholar, Faculty of Business, Economics and Social Development, UNIVERSITI MALAYSIA TERENGGANU (UMT)

3 Assistant Professor, Institute of Business Management & Administrative Sciences, The Islamia University Bahawalpur (PAK)

4, 5 PhD Scholar, Institute of Business Management & Administrative Sciences, The Islamia University Bahawalpur (PAK)

^{*} Corresponding author email: ulfat.abbas@iub.edu.pk

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This paper examines the effectiveness of Basel III framework by linking the Net Stable Funding Ratio (NSFR) with profitability and stability of Asian Islamic Banks. The formula for measuring NSFR was introduced in the Basel III accord. Data from 89 Islamic banks for the period of (2011-17), from 20 countries in the (southern, eastern and western) Asian regions where Islamic Banking System is applicable was collected. Two-step Generalized Method of Moments (GMM) model estimator is used in order to handle simultaneity bias and endogeneity problem. The result showed that the Islamic banks of Asian regions are stable. All the results validate Basel III NSFR as a significant safeguard regulatory step for stability and insignificant for profitability of the banks. It is proposed that Banking supervision committee must consider the different nature of Islamic banks and formulate a different criteria which will not affect their profitability as Islamic banks has one more layer of supervision in the form of Shariah Advisory board other than Central bank of any country.

Keywords: NSFR Regulations, Stability, Profitability, Asian Islamic Banks, Two-step GMM

1. Introduction

Banking sector is one of the important block for the economic growth of the countries. Hence, bank stability has become a key concern especially after global financial crisis 2007-2008 (Dwumfour, 2017). Banks play an important role in the socioeconomic development of any country. A sound banking system ensures a healthy and sustainable economy through investment in profitable and sustainable ventures. The global financial crisis exposed many weaknesses in the banking system. As a response, supervisors increased regulations to ensure the stability of banks, which is vital for the stable economy. Bank stability has also

become an important empirical concern for academic research (see. e.g., Hubbard and O'Brien, 2012; Dietrich, Hess & Wanzenried, 2014; Yan, Hall & Turner, 2012).

Sustainable development of any country depends on sound banking system. A sound banking system can be ensured by following best practices, standards, guidelines and international regulatory frameworks that are putative worldwide e.g. BASEL Committee for Banking Supervision (BCBS). The standards formulated by BCBS are accepted worldwide and national regulators include these measures as part of macro prudential regulation (Schwerter, 2011). BASEL III, which constitutes a comprehensive list of reform measures and guidelines in banking regulation, is proposed by the BCBS. It not only ensures sound financial system, but also prevents the spread of the financial problem to the real economy.

Capital requirement is an important component of BASEL framework. BASEL I and II required a minimum capital ratio of 8% for banks. BASEL III framework refines the capital ratio, adds three more ratios (leverage ratio, liquidity coverage ratio and the net stable funding ratio) and increased the minimum requirement for capital ratios from 8% to 10.5%. The 2.5% increase represents a mandatory capital conservation buffer that was created to enforce corrective action when a bank's capital ratio declines (Balin, 2008). The four ratios and the new capital requirement proposed in the BASEL III framework acts as a constraint for banks and can prevent financial crisis in future through restricting their investment options and risk strategies. Among all these ratios, Net Stable Funding Ratio (NSFR) focuses on funding risk (i.e. the inability of banks to raise funds when required). There are few recent studies that have studied the impact of NSFR on the stability of banks. However, these studies are in the context of conventional banks in developed economies and focus only on stability. This paper investigates the impact of the Net Stable Funding Ratio (NSFR) regulation on the profitability and stability of Islamic banks in South Asian countries. In particular, the relationship between (NSFR) and bank stability of Islamic Banks in Asian regions where Islamic Banking System is applicable is considered.

In order to avoid the biased results of OLS, the two-step Generalized Method of Moments (GMM) model was used in this study. The GMM model which was adopted by Arellano and Bover (1995) and Blundell and Bond (1998) not only to adjust the endogeneity problem but also avoid the simultaneity bias. This model is the solution of contemporaneous errors and autocorrelation of unknown of both either in panel or time series data types. According to scholars, Arellano and Bond (1991), Blundell and Bond (1998) and Roodman (2009), two-step GMM is asymptotically more efficient and the reported standard errors are severely downward biased. A finite sample correction to the two-step covariance matrix derived by Windmeijer (2005) through instrument variables is used for the study. This is the only method which allows simultaneous adjustment. In this case NSFR and stability are endogenous, which allow banks to adjust their NSFR and stability simultaneously. This model allows adjustment of NSFR, profitability and stability as well.

The study data of 89 banks from 20 countries (excluding banks from Afghanistan and Iran due to political instability and non-following of Basel regulations as well) is used. A positive and significant relationship between the NSFR and Z-score as measure of financial stability regions is found but there is insignificant relationship of NSFR and Z-Score with profitability in Asian countries. Among other bank specific covariate that are significant to profitability and stability are capital strength, operating efficiency and size of the banks. However, the result shows significant negative relationship of NSFR and Z-Score with GDP and inflation, real Gross Domestic Product and inflation with stability negatively Islamic banks in Asian regions. The empirical results support the implementation of the Basel III accord. Furthermore, banks from less developed market have less access to income source for intermediaries activities so that the requirement of NSFR have greater implication for those Islamic banks in Asian regions. The empirical work fills the gap by using data from Asian regions where Islamic banking system is applicable. Normally profitable banks are considered as stable institutions and vice versa but this study proves only one relation.

According to the Thomson Reuters (2014) around 80 percent of the global Islamic finance industry consists of Islamic banking assets. Islamic banking is the largest sector in the Islamic finance industry, contributing to 71%, or USD 1.72 trillion, of the industry's assets report 2019 which is far greater than world's top 1000 global banks which grew by only 4.9 percent in 2012 and 0.6 percent in 2013. Due to this rapid growth, many Islamic banks became important mainly in those countries where Islamic banks account for over 10 percent of the total bank assets (Islamic Financial Services Industry Stability Report, 2015b). The fundamental base between Islamic and conventional banks are the structure of their assets and liabilities. Conventional banks use one contract that is of loan but Islamic banks use variety of contracts depending upon the need of the customers. The solutions provided by Islamic banks are in line with Shariah and boost the economic activity in the country. Islamic banks are involved with their customers as partners in various cases. The use of real assets by Islamic banks provide safety net to the bank in the case of crisis. Islamic banks are not allowed to invest/finance in speculative activities and non-Shariah compliant activities (riba, gharar, Maysir, pork, etc.). Islamic banks have dual supervision: 1) by the Board of Directors of the bank 2) Shariah Board of the bank. On top of it the Islamic banks have to follow the Shariah guidelines/rules on top of the conventional banking regulations. All these activities increase the cost of the Islamic banking products but at the same time Islamic banks become more resilient.

2. Literature review

The quality of the approximation of the required regulatory capital is essential to the soundness of the banking system (Jarrow, 2007). Capital standard is a central component of the capital regulation of banks. Capital standards play a significant role in managing the solvency of financial institutions. This importance is even higher in imperfect markets as explained by the earlier work of Kahane (1977) and Sharpe (1978) on bank capital regulations. In order to protect the financial sector against future meltdowns, the BASEL committee on banking supervision (hereafter BCBS) initiated work on capital accords for banks in early 1980's. The BASEL Committee, at first, consisted of G-10 states. Currently, there exist twenty-eight countries which are part of the Basel Committee. The first capital accord proposed by the BCBS referred to as Basel I was issued in 1988. The major focus of the Basel I accord was to protect international banks against credit risk through adequate capital requirement. The Basel I accord sets a required 'minimum' percentage of risk-weighted assets to total bank capital (Santos, 2001). The accord was revised in 1997 to incorporate market risk in the calculation of risk-weighted assets and capital requirements.

Despite of these improvements, BASEL I was heavily criticized by analysts and policymakers on account of capital ratios to be uninformative and misleading about the bank's capital adequacy (Balin 2008, 5). In response to the criticism and increased pace of financial innovations, sweeping the banking industry worldwide, the BCBS introduced a new capital accord in 2004, known as the Basel II. The Basel II broadened its framework to measure capital adequacy and a minimum standard to be achieved by international banks in adopting countries. The key distinguishing feature of the Basel II was the inclusion of credit, market and operational risk in the calculation of minimum capital requirement. Banks were given more autonomy for the assignment of risk-weighting to assets based on expert systems.

The global financial crises of 2007-2009 provide evidence of shortcoming of Basel II accord. One of the major shortcoming of the Basel II accord was its narrow focus on bank-level stability through micro-prudential regulations (Ashraf et al. 2016). According to Jarrow, R.A. (2007), the revised Basel II required capital rule does not generate a good approximation to the ideal regulatory capital. The major problems are that the risk measure is not conceptually appropriate, and that the assumptions used to implement risk measure are inconsistent with market evidence. These shortcomings prompted the urgency of a revised

capital adequacy framework. As a result, in 2010, the new framework, known as Basel III, was issued by the BCBS.

Basel III is considered as a major step forward to enhance financial stability (Valderrama, 2015). According to Schwerter (2011) the Basel III accord provides more effective regulations to greater financial stability. Allen et al., (2012) suggests that the adoption of Basel III will decrease the risk of banking industry. These practices have the potential to transform business models, processes and governance of international banks. One of the key improvements in Basel II is the introduction of liquidity standards (Jayadev, 2013). There are two new main components of the liquidity standards as suggested by the Basel III. These include: the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). The LCR relates to the short term and requires banks to have sufficient high-quality liquid assets to survive the financial distress of 30 days. NSFR relates to the long-term funding of the assets of financial institutions (BIS 11).

The impact of various regulatory requirements on the profitability and stability of banks has been the subject of great interest among academic researchers. According to Pasiouras and Kosmidou (2007) total assets, capital ratios and cost efficiency (cost to income ratio) are main determinants of profitability. DeBandt, Camara, Pessarossi and Rose (2014) examined the impact of capital measures on profitability of banks and found a positive relationship between them. According to Eichengreen and Gibson (2001) liquidity risk is an important factor that determines the profitability of banks as more profitability is expected in case of lower amount of liquid funds. An empirical manifestation of this can be found in the study of Said (2014) which uses panel data of eight Malaysian commercial banks for the period 2005-2011. The profitability of eight Malaysian commercial banks was found to be affected by the new liquidity ratio which implies that the managing the liquidity of assets brings certain advantages to the banks. The study of Said (2014) also validates the findings of previous studies on bank-specific determinants of profitability.

As far as the role of capital regulation in ensuring bank stability is concerned, the earlier studies of Furlong and Keeley (1989) and Keeley (1990) indicate that high capital requirements decrease the benefits for taking of risk by a profitable bank and this supports to growth in bank stability. Similarly the study by Van Roy (2003) investigated the role of capital regulation on financial stability and soundness and found that strict requirement for capital helped to increase the financial stability as well as decrease the credit risk in Basel I duration. Bolt and Tieman (2004) contended that strict capital adequacy requirements lead banks to set stricter acceptance criteria for granting new loans thereby reducing their exposure to default risk. Other studies originated that high capital decreases banks' exposure to systemic risk and reduces the occurrence of financial crises (Miles et al., 2012).

The complete implementation of Basel III is expected by 2023. The actual impact of these new regulatory requirements will be known in the future when it will be fully implemented. However the potential impact can be known through empirical studies and there is a growing literature that attempts to discover the potential impact of Basel III on the stability of banks. According to Yan et. al., (2012), the potential impact of higher regulatory requirements under the Basel III framework is decrease in the probability of banking crisis as well as the economic loss that may occur in case of banking crisis. They based their findings on the retrospective calculation of the impact using data of 11 UK banks for the period of 1997-2010. In an international study involving 68 East Asian countries for the period of 2005 - 2009, an inverse relationship between the NSFR and risk-taking behavior of banks was found by Jiraporn et al. (2014). King (2013), however, provide some evidence of the unintended consequences that may arise if the NSFR regulation is implemented. The empirical evidence in his paper indicates adverse consequence of NSFR regulation on the economy due to possible strategies used by the banks as a response to the new liquidity regulation. These strategies as highlighted by King (2013) include: shrinkage of the balance, change in the composition or maturity of their loans, or change in the composition of investments. These strategies

to increase the NSFR were estimated to reduce bank profitability. He calls for more research in order to inform possible revisions before the NSFR is implemented in 2023.

A recent study by Giordana and Schumacher (2017) highlighted statistically significant decline in the default risk due to the introduction of new regulation related to NSFR. The major empirical focus of these recent and previous studies has been on the conventional banks of developed markets. Almost all such studies highlighted the potential positive impact of the NSFR on the financial stability and profitability of banks. This implies that the new regulatory requirements for risk management does helps encourage profitability and stability in the banking sector. The recent work of Ashraf et al. (2016), however, focus on Islamic banks using the data of modified NSFR of 136 banks from 30 jurisdictions between 2000 – 2013. They explored the potential impact of the requirements of NSFR on the financial stability of Islamic banks and found that the modified NSFR has a positive impact on the financial stability of Islamic banks during the sample period.

The literature review above mainly highlights the potential positive impact of NSFR regulation on the stability and profitability of banks. However, there is an evidence that this new regulation may lead to unintended consequences (King, 2013). Therefore it is necessary that more research shall be carried out in various country contexts so that the empirical evidence may inform the implementation of this new regulation. In this context, there is a need of a research that focus on the Islamic banks of the Asian regions as they have been ignored in the extant research. Islamic banks in the Asian region differs from the banks in other regions in terms of the sophistication level of their financial-management tools. Islamic banks in these regions may have to rely on traditional asset-liability matching for fund management. Therefore there is a need to assess the potential impact of NSFR regulation on the profitability and stability of banks in Asian countries. To deal with this, we developed the following hypothesis to measure the impact on capital requirement with profitability and stability of Islamic banks under Asian Regions.

H1: the NSFR requirement in the Basel III accord have impact on the profitability and stability of Islamic banks in Asian region.

3. Methodology

3.1 Definition of variables

Net Stable Funding Ratio

(NSFR) is a structural long-term relationship that addresses financing risks, i.e. inability of banks to raise funds when necessary. It covers items on and off and off-balance sheet and pushes a typical banks to finance long-term assets with long-term capital. Currency mismatches as well as cross-border risk regarding funding are only being communicated indirectly by limit of the assets given credit in above ratio. At the time of writing, the NSFR has not changed, and the initial implementation schedule will be in 2019 (BCBS, 2013b). The NSFR is a micro prudential regulation. The new regulatory requirement was developed with the objective of increasing the long-term resilience of banks through increase in the availability of liquid funds during the time of crisis.

Timeline for NSFR



Figure 1: Time timelines for implementation

Under the new regulatory requirement, the composition of assets, liabilities and off-balance sheet activities shall give due consideration to maintenance of stable funding. The ratio representing available stable funding (ASF_{it}) to the required stable funding (RSF_{it} .)

Calculation of NSFR is not without challenges. The two major issues are related to the available guidelines and data. In the absence of clear guidelines offered by the Basel III accord, one has to exercise judgment in the calculation of NSFR which leads to certain inconsistencies. In terms of data available for the calculation of NSFR, one has to face problem related to the format, categorization and other details which may lead to inconsistencies (Hong et. al., 2014). Several assumptions were made in this research, in line with the work of King (2013) for the categorization (stable and less-stable) of deposits and maturities of liabilities and assets. However, the work of King (2013) was based on NSFR 2010 methodology (See BCBS, 2010). Later on, the regulation was changed and converted into NSFR 2014. According to the study of IMF (2014), the revised regulation helped improve the NSFR for most banks. In a comparative study of the 2010 and 2014 NSFR methodology, the IMF staff calculated the NSFR for the 60 largest global banks, the result of the study showed that NSFR for the 60 banks averages 96% using the 2010 methodology whereas NSFR averages 103% using the 2014 methodology. The number of banks experiencing the shortfall in NSFR were roughly the same under both methodologies. This means that BCBS 2014 methodology for NSFR is better and that is the reason we are using this instead of BCBS 2010 methodology which was used in previous studies. The higher ratio of $NSFR_{it}$ implies a better funding situation hence we expect a positive correlation of $NSFR_{it}$ with profitability and stability of banks.

3.2 Stability Measure

Z-score ($STBL_{it}$)¹ is a financial statistic that measures the probability of bankruptcy. Z-score is extremely popular tool for risk assessment as indicated by its use in majority of existing studies that assesses the insolvency risk and financial stability of individual banks. Mathematically it measures the number of standard deviations of a bank's return-on-assets it would have to fall to deplete the sum of its equity and income. Financial stability can also be measured through other proxies like, non-performing loans or loan charge-offs. However, Z-score is better than these accounting-based measures of financial stability. It is calculated through expected return on bank assets $E(ROA)$, equity capital to asset ratio (CAR), and σ (ROA) is the volatility of return-on-assets. We used panel data set where i and t are cross-sections (banks) and time (years) respectively. Z-Score is directly related to a bank's instability hence the inverse of Z-score is the bank's level of stability. As it is widely argued in the literature that Z-score is highly skewed we used its log transformation in all empirical estimations (Laeven & Levine, 2009; Schaeck & Cihak, 2012, Dawood et al, 2015, Saba, 2017).

3.3 Profitability Measure

Bank's stability is mainly driven by the profitability of banks as profitability ensures stable income streams. This relationship, which is well documented by existing literature (King, 2013; Jiraporn et. al., 2014; Hong, 2014), is anticipated in our study as well. Various proxies for measuring bank's profitability has been used by existing literature (see. e.g., Goddard et. al., 2004; Athanasoglou et. al., 2008; Pasiouras and Kosmidou 2007; Naceur, 2003; Hassan et. al., 2003; Ben Naceur and Omran 2011). Profitability in our study is measured by three alternative variables²; return on assets (ROA), return on equity (ROE) and the net interest margin (NIM).

¹ $STBL_{it} = E(ROA)_i + CAR_{it}/\sigma(ROA)_i$ is measure of stability used by Lepetit and Strobel (2013) Ashraf et. al., (2016) and Fang et. al., (2014).

3.4 Other control variables that influence the profitability as well as stability of Islamic banks and stable funding adjustment

There are two main categories of other control variables that influence the profitability as well as stability of Islamic banks and stable funding adjustment. These categories include: bank-specific and country-specific variables. Bank specific variables include the size of the bank, cost of obtaining funds and capital strength. Country-specific variables include GDP and inflation. The justification of each variable to be included in the empirical model is given in the following section.

3.4.1 Bank specific variables

The composition of assets and risk-taking behavior is greatly influenced by the size of the bank. Larger banks, as discovered by Ashraf et. al, (2016) enjoy better franchise value and can easily diversify their portfolio in order to manage risk. Larger banks may also engage in excessive risk-taking due to the 'too big to fail' phenomenon as suggested by Schwerter (2011). Larger banks may also invest in riskier projects to earn risk premiums. These risk-taking and risk-managing behavior of banks indicates a positive relationship between the size of banks and their stability as anticipated in our study. We measure *SIZEit* as the natural log of total assets.

The profitability of the bank is greatly influenced by the cost of obtaining funds for banks. In the absence of stable and cheap funds banks have to use liquid assets or external funds for meeting the funding requirements. This would increase the cost of funding for banks which have direct implications for its profitability as increase in cost results in lower profits for banks. This is confirmed by Pasiouras and Kosmidou (2007) whom argue that the higher profitability of banks is associated with lower needs for external funds. Similar Jiraporn et. al., (2014); Goddard et. al. (2004) and Kosmidou (2008) argues for operating efficiency. The study measure *COSTit* as bank's operating expenses to total revenues. Capital strength of bank is another important factor that effects bank profitability. Increase in capital strength decreases the need for external funding as well as the bank's cost of funding due to the lower cost of bankruptcy. In this way, higher capital strength leads to increase in profitability (Kosmidou et. al., 2005). According to Said (2014), banks with capital strength experience decrease in funding cost in accordance with the concept of "expected bankruptcy cost hypothesis". This decrease in the funding cost outweigh the direct decline in the expected profitability, thereby resulting in increased profitability. Similarly, according to Bordeleau and Graham (2010) holding more liquid assets will likely improve banks' profitability through the decrease in their probability of default. Capital adequacy regulations reduces the risk of default (Barrell et. al., 2009; Miles et. al., 2011; Caggiano and Calice, 2011). In this way capital strength leads to financial stability. However, higher capital requirements may act as a constraint for banks which may lead to higher cost of doing business and financial instability (Agoraki et. al., 2011; Bolt and Tieman, 2004). On the basis of above discussion, there is positive relationship of capital strength profitability as well as stability. We measure *EQUITYit* as total equity to total assets.

Country-specific control variables

The stability of financial institutions is greatly influenced by the economic profile of any country. One of the macro-economic indicator is GDP growth which is found to influence the profitability and stability of banks as confirmed by the existing empirical studies (see. e.g., St. Clair, 2004; Shu, 2002; Ashraf et. al, 2016; Altunbas et. al., 2014; Said, 2014). We anticipate a negative relationship between GDP growth and profitability and stability of Islamic banks. Inflation is another macro-economic factor that influence the financial stability and profitability of banks. If the inflation rate of any country is low, companies may focus on long term investments. In an empirical study Borio and Lowe (2002) found a positive relationship

between low and stable inflation and financial profitability and stability. However, they also warned that if there is an unexpected change in the inflation rate then investors may withdraw their money from banks and invest their money in real assets that are safe from the effects of inflation. In our research, we control for the impact of inflation by utilizing the consumer price index (INF_{jt}). A negative coefficient of INF_{jt} with the Z-Score as a stability measure is expected.

Data was collected from the Islamic Banks of Asian Region countries. The sample of this study comprise of 89 banks from 20 countries for the period of (2011-17) where Islamic Banks were present. Analyzing the standard deviation of dependent variable, those banks who didn't had less than four years' continuous data were skipped from the study. Moreover, three countries which were having unstable political situation in their country and didn't had appropriate data were also skipped. These countries were Iran, and Afghanistan. Iran was skipped as it doesn't adopt the BASEL reforms. In addition to this, some observations which had incomplete figures were also eliminated from the study. For example, when sum of deposits or loan advances are zero, it was skipped. Due to the outliers in the data, it was necessary to winsorized the covariates in 95th and 5st percentile of the respective distribution.

Following table shows the details of data.

Table 1: Details of Sample

Detail of sample Description	No.
Total Countries of Asian Regions	49
Dropped Afghanistan and Iran	47
Total Countries which fellow Islamic Banking Sector	25
Countries of Islamic Banking in Asian Regions	21
Total Countries in this study due to availability of data	20
Total number of countries in Western Asia	11
Total number of countries in Eastern Asia	06
Total number of countries in South Asia	03
Number of Islamic banks in Asian Regions	89
Number of Islamic banks in Western Asia	51
Number of Islamic banks in Eastern Asia	25
Number of Islamic banks in South Asia	12
Sample size of Islamic Banks in Asian Regions	534
Sample size of Islamic Banks in Western Asia	306

Sample size of Islamic Banks in Eastern Asia	156
Sample size of Islamic Banks in South Asia	72

4. Analysis & Discussion

4.1 Econometric Models

We estimated the dynamic panel system GMM model with NSFR14 ;

$$NSFR14_{it} = \alpha + \beta_1 PRFTBY_{it} + \beta_2 STBL_{it} + \beta_3 COST_{it} + \beta_4 EQUITY_{it} + \beta_5 SIZE_{it} + \beta_6 RGDP_{jt} + \beta_7 INF_{jt} + \epsilon_{it}$$

$$STBL_{it} = \alpha + \beta_1 NSFR14_{it} + \beta_2 PRFTBY_{it} + \beta_3 COST_{it} + \beta_4 EQUITY_{it} + \beta_5 SIZE_{it} + \beta_6 RGDP_{jt} + \beta_7 INF_{jt} + \epsilon_{it}$$

Where, i refer to financial institution, t denotes to year, NSFR14 $_{it}$ the dependent variables that explains towards explained above in equation developed by (BCBS, 2014a) and $STBL$ is indicator of stability calculated by Z-score; NSFR $_{it}$, COST $_{it}$, EQUITY $_{it}$, and SIZE used as bank indicator specially for financial institution it shows panel data; GDP as well as Inflation factor are the country variables, and ϵ_{it} used as error term in above equation. We used panel data for analysis.

4.2 Descriptive Statistics: Asian Region Islamic Banks

Table: 2 Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	25%	Median	75%	Max
ZSCOR	534	3.286349	3.041931	0.297323	1.367534	2.271275	4.071657	12.75225
ROE	534	0.0334821	0.0233219	0.004399	0.01588	0.02637	0.044627	0.087
ROTA	534	0.0995713	0.0766882	0.0032	0.0392	0.0779	0.1552	0.2565
NIM	534	2.349657	1.962211	-0.664	1.0098	2.14625	3.31075	7.192
NSFR14	534	1.256968	0.8625517	0.137418	0.555072	1.115318	1.756803	3.329301
EQUITY	534	0.3962063	0.2511813	0.1135	0.17	0.3231	0.568	0.8989
COST	534	2.119846	1.968015	-0.15385	0.473	1.576344	3.37	5.99
SIZE	534	4.340158	1.140098	2.664671	3.538803	4.255841	4.846781	7.683045
LOGGDP	534	10.95515	0.6850321	0.60561	10.62325	11.14613	11.30103	11.716
INFL	534	5.071275	4.732816	-10.0675	1.9164	3.4592	6.4134	20.2861

(Data is sourced from Bank scope)

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Table 2 shows the descriptive statistics and includes quartile distribution along with mean and standard deviation due to this we can better understand the variation of data. we observed the behavior of Z-Score, the mean value of stability is greater than 3 and more than standard deviation, It means that on average sample banks are stable but volatile as well and we found lot of variation exist in different quartiles. NSFR mean value is 1.37 and median is 1.11 which shows large disparity in upper and lower half. NSFR shows that Islamic banks has sufficient funds in sample period.

Although on average all three proxies of profit i.e ROE, ROTA and NIM values are not very much high because of the reason that most of the Islamic banks started their operations during sample period and their mean values are greater than their standard deviation. GDP mean value is 10.95 and values of all quartiles are closer to mean it means dispersion of GDP among Asian countries are not very much high if we compare it with inflation where we see very high variation. That may be due to different political and economic conditions instability.

4.3 Correlation

The pairwise correlation matrix for the main variables is presented below:

Table: 3 Pair wise Correlation

	ZSCOR	ROE	ROTA	NIM	NSFR14	EQUITY	COST	SIZE	GDP	INFL
ZSCOR	1									
ROE	-0.0273	1								
ROTA	-0.0157	0.0145	1							
NIM	0.0619	0.1023*	0.1455*	1						
NSFR14	0.1663*	-0.0038	-0.0612	0.0049	1					
EQUITY	-0.0998*	-0.0461	-0.0019	-0.0567	-0.0408	1				
COST	0.0454	0.0943*	-0.0326	0.1595*	0.0844	-0.1053*	1			
SIZE	0.043	-0.0847	-0.0793	-0.1019*	0.1244*	0.0331	0.0369	1		
LOGGDP	-0.2191*	0.0305	-0.0446	-0.0223	0.0074	0.0372	0.0175	0.2206*	1	
INFL	-0.0343	0.0563	-0.0624	-0.073	0.078	-0.0173	0.0215	0.1064*	-0.0287	1

(This is pairwise correlation among variables in our study. As per standard rule *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$ which means that if our hypothesis is significant at 1%, 5% and 10% then it will show ***, **and * respectively).

Table 3. The correlation is in line with our expectations. Factors that can adversely affect the stability of banks on a stand-alone basis include the NSFR. ZSCORE has negative correlation with profitability but positive and significant with NSFR. Among the covariates that enhance the resilience of banks are the size of banks and profitability.

4.4 GMM Estimation: Overall results of Asian Regions

Banking behavior is persistence towards their management change and their policies are based on current financial and regulatory requirement which may affect their today's as well as future stability position of banking sector. (Jahn and Kick, 2012, Asraf et al, 2015) We used dynamic models to check the patterns of impact of NSFR on stability and profitability because of economic reasons. Dynamic models have endogeneity problems which is addressed through GMM approach using instrumental variables.

Table: 4 GMM Model Estimation

Estimation Method: Generalized Method of Moments (White Covariance)			
Included observations: 445, Total system (balanced) observations 890,			
Profitability Proxy	NIM	ROE	ROTA
	Coefficient	Coefficient	Coefficient
C (11)	1.438031	1.450376	1.463965
Profitability	0.008321	-0.731062	-0.212237
ZScore	0.061444***	0.061480***	0.061767***
Size	0.077660**	0.073964**	0.074671**
Equity	0.040316	0.038256	0.036716
Cost	0.033084	0.035431*	0.034322*
GDP	-0.082232	-0.078218	-0.079688
INFC	0.026573**	0.026346***	0.025837**
C	12.85686***	12.86429***	12.83961***
NSFR	1.183482***	1.202183***	1.199284***
Profitability	0.047896	-0.611409	0.263673
Size	0.211705	0.199901	0.203919
Equity	-1.106088*	-1.125727**	-1.126964**
Cost	-0.007585	0.000835	0.000444
GDP	-1.044420***	-1.030528***	-1.033733***
INFC	-0.067554*	-0.070420*	-0.070173**

NSFR is one of the Basel Committee’s key reforms to promote a more resilient banking sector. It demands to maintain a stable funding in relation to the composition of their assets and other balance sheet activities. In first equation, we can observe the relationship of NSFR with stability. NSFR has positive and highly significant relationship with stability in all three proxies of NIM, ROE and ROTA and same relationship can be analyzed between Stability and NSFR which proved the claim of Basel III who believed that it is key component of the supervisory approach of funding risk. We suggested that banks having regulatory capital requirements by preserving higher risk-weighted capital are more stable as related to their complements.

NSFR has insignificant positive with NIM and negative relationship with ROE and ROTA. These results are not supporting our second hypothesis. It seems the insignificance negative relationship of NSFR with profitability is due to the reason that as more capital requirement ratio does not impact the profitability of Islamic banks.

Similarly Z-Score has insignificant positive relationship with profitability. The macroeconomic indicator GDP shows the positive and significance relationship with NSFR as consistent with Graham (2010) and Bordeleau, Crawford and Graham (2009) and the INF indicates the negative significance relationship with capital requirement NSFR. In the ZS model as a dependent variable, NSFR have positive and bidirectional relation with Z-Score it means the capital requirement will be enhanced if the stability of Islamic banks increases. There is insignificant relationship of profitability with zscore, which indicates that profitability of the banks is not connected directly with its stability. Equity is significance with ZS which intended that capital strength also impact the stability of the Islamic banks of the Asian regions. Next, we used two macroeconomic indicators as country specific variables that affect the stability of the Islamic banks. INF rate is negatively and significance relationship, if the rate is higher it will decrease the stability of the banks in

country, these results are consistent with Borio and Lowe (2002). GDP have also negative relation with the stability of Islamic bank as (St. Clair, 2004; Shu, 2002; Psillaki et., al, 2016) found in their studies.

5. Conclusion

After financial crisis (2007-09), Basel Committee for Banking Supervision established new banking regulatory framework and suggested new ways of financial funding stability that meet a NSFR (Net Stable Funding Ratio). NSFR in this study which is based on latest version of BASEL III which is calculated on October 2014 by the BASEL accords. This study used Altman Z-Score as a measure of an Islamic bank's stability and the NSFR as a tool to increase and strengthen an Islamic bank's stability in Asian Regions. The new structural framework is same all types of banks, although there is lot of difference in traditional interest based financial sector of conventional banks and product nature based of Islamic banks. So, it is not justifiable to measure the formula of NSFR of Islamic Banks in same like traditional institutions.

According to this research banks which follows the NSFR regulations are more stable. As evident in the calculation of NSFR, which is more than 1 in majority banks of Asian regions, it means they are following Islamic banking regulations and Basel III capital requirement so that they are stable in South Asian Countries but they have low profitability and high stability in Eastern and Western Asian regions. Based on overall results, NSFR of Islamic banks is negatively associated with profitability except NIM but positively with stability.

It is proposed that Banking supervision committee must consider the different nature of Islamic banks and formulate a different criteria which will not affect their profitability as Islamic banks has one more layer of supervision in the form of Sharia Advisory board other than Central bank of any country. Different studies shows NSFR positive relation with profitability in case of conventional banks (Said, 2014). This study has certain limitations. Firstly, exclusion of Iran from data due to non-adoption of BASEL regulations. Most of the countries have less than 3 Islamic banks in their countries so that they are not appropriate for representation. The sample is of 20 countries and data is of 6 years which is sufficient but large data is better for comparison of different Asian regions. Future research shall address these limitations. In addition, future research may involve a comparative study on NSFR of Islamic bank using both NSFR 2010 and 2014 methodology in order to suggest improvements and inform the future implementation of this regulation.

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The Impact of Net Stable Funding Ratio...

Appendix A

$$NSFR_{it} = \frac{[(tregca_{it}) + \{(rdb5y_{it} + rd5y_{it}) \times 0.95\} + \{(rdq_{it} + rdyq_{it}) \times 0.90\} + \{(cdc_{it} + cd_{it}) \times 0.50\}]}{[\{(rml_{it} + oml_{it}) \times 0.50\} + \{(ocrl_{it} + ccl_{it} + o_{it}) \times 0.85 + \{(mobs_{it} + ox_{it} + clins_{it} + ocgl_{it}) \times 0.05\} + \{(ae_{it} + tacomd_{it} + toh_{it}) \times 0.65\}]}$$

Available Stable Funding (ASF)

tregca	Total regulatory capital	rdyq	Retail deposits 3 - 12 months
rdb5y	Retail deposits 1 - 5 years	cdc	Customer deposits - current
rd5y	Retail deposits > 5 years	cds	Customer deposits - savings
Rdq	Retail deposits < 3 months		

Required Stable Funding (RSF)

rml	Residential mortgage loans	grts	Guarantees
oml	Ordinary mortgage loans	aobs	Acceptances and documentary
ocrl	Other consumer retail loans	clins	Committed credit lines
ccl	Corporate & commercial loans	ocgl	Other contingent liabilities
ol	Other loans	ae	Trading assets - equities
mobs	Managed securitized assets reported off B/S	tacomd	Trading assets - commodities
oxp	Other off-balance sheet exposure	toh	Trading assets - others

(BASEL III 2014)

	Symbol	Measurement	Reference
Dependent Variable			
Stability			
Altman Zscore	ZS	Return on Assets plus Capital Adequacy Ratio divided by Standard Deviation of Return on Assets	Houston et al. (2010), Beck et al. (2013), Laeven and Levine, (2009), Lepetit et al. (2008), Ashraf et al (2016) and Fazio et al.(2015)
Profitability			
Return on Equity	ROE	Net Income divided by Total Equity of Bank	Said, (2014), Peng et al.,(2015), Berger (1995), Neeley and Wheelock (1997) and Angbazo (1997)
Return on Total Assets	ROTA	Net Income divided by Total Assets of Bank	Said, (2014), Guru et al, 2002), Ozili, (2015)
Net Interest Margin	NIM	Net Interest Income divided by Interest Earning Assets or Net Markup divided Total Assets	Said, (2014), King, (2013), Stiroh (2004), Guru et al, 2002), Ozili, (2015)

Explanatory Variable/Independent Variable			
Liquidity Requirement (Net Stable Funding Ratio)	NSFR	Available Amount of Stable Funding(ASR) divided by Required Amount of Stable Funding(RSF)	BCBS, (2014b), Gobat et. al., (2014), Schmaltz et. al., (2014) Ashraf et al (2016)
Control Variables			
Capital Strength	EQUITY	Total Equity divided by Total Assets	Kosmidou et. al (2005), Neeley and Wheelock (1997) ,Ashraf et al (2016)
Cost Efficiency/Operating Efficiency	COST	Operating Expense divided Total Revenues	Pasiouras and Kosmidou (2007), Kosmidou (2008), Bourke (1989), (Naceur, 2003), Shehzad, Haan, &Scholtens, 2010, Ashraf et al (2016)
Bank Size	SIZE	Natural Logarithm of Total Assets of Bank	Mishkin (1999), Demirguc-Kunt and Huizinga (2000), Goddard et al. (2004), Said, (2014), Naceur (2003), Bertay et al. (2015), Ashraf et al (2016)
Macro-economic Variable			
Gross Domestic Product	GDP	Natural Logarithm of Gross Domestic Product	Thomson (1992) and Aubuchon and Wheelock, (2010), Ayadi et al., (2015), Lozano-Vivas and Pasiouras, (2010); Pasiouras, (2008) Ashraf et al (2016)
Inflation Rate	INFL	Annual Inflation Rate	Thomson (1992) and Aubuchon and Wheelock, (2010), Ayadi et al., (2015), Lozano-Vivas and Pasiouras, (2010); Pasiouras, (2008) Ashraf et al (2016)

List of Asian Countries

Western Asian	Eastern Asia	South Asia
Bahrain	Brunei Darussalam	Bangladesh
Iraq	Indonesia	Maldives
Israel	Malaysia	Pakistan
Jordan	Mauritania	
Kuwait	Philippines	
Oman	Singapore	
Qatar		
Saudi Arabia		
Syrian Arab Republic		
United Arab Emirates		
Yemen, Rep.		