Impact and Implications of Capital Adequacy Ratio on the Financing Behaviour: Evidence from Islamic Banks in Pakistan

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Abstract

The purpose of this study is to examine the impact of the Basel capital standards on financing behaviour of Islamic banks in Pakistan. Literature has depicted mixed results on this issue (Bernanke and Lown, 1991; Ben Naceur and Kandil 2009, 2013). This topic gains importance in the Islamic banking sector of Pakistan where capital adequacy ratio (CAR) is, on average, above than the minimum capital requirements (MCR) under Basel. We have used Ben Naceur and Kandil (2013) model which is based on Berger and Udell (1994) approach with some adjustment to specifically convene to sample composition of 5 full-fledged Islamic banks for the period of 2005-2014 by using Panel data technique. The results of the study confirmed a negative impact of capital adequacy ratio on the financing behaviour of Islamic banks in Pakistan. It is also evident from the results that Islamic banks tend to reallocate their assets portfolio towards secured instruments e.g. government securities like ṣukūk which led to their restricted financing activities and ultimately result in slower economic growth. The study provides significant policy implications to regulators and bankers on the imposition of CAR and its trade-offs in terms of stability at the cost of the credit crunch and reallocation of assets portfolio by crowding out private sector financing in Pakistan.

Keywords: Basel Accord-III, Capital Adequacy Ratio, Financing Behaviour, Credit Crunch, Islamic Banks, Pakistan.

1. Introduction

Basel Accord II and III aimed at promoting the stability and soundness in the financial systems of G-10 countries[1] which may ultimately foster their economic growth. While Basel accord was originally negotiated among the developed countries, it has become a major component of banking

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regulations throughout the world and specifically in developing countries, setting uniform rules for regulating the capital a bank must hold and defining risk-based minimum capital requirements.

In this context, several concerns were raised by academic and financial practitioners (e.g. Bernanke and Gertler, 1995; Ben Naceur and Kandil, 2013) about the adverse or positive impacts of capital regulations of the Basel II and III on the lending practices of the banking system which leads to slow /rapid economic growth in developed and as well as in developing countries. Over the years, this debate took the form of a key question: What is the reaction of banks' lending behavior after the imposition of excessive capital regulations of Basel Accord? The excessive regulations may have a trade-off. It serves as prudential measures that mitigate the effects of economic and financial crises on the stability of the banking system. Nonetheless, it also hampers the bank's ability to expand credit and contribute to economic growth. There is plenty of literature available on the response of conventional banks' lending behavior to Basel Accord in the context of developed countries. However, there is a growing concern in the developed as well as in developing countries with regard to the impact of banks' capital adequacy on the financing behavior of Islamic banks. Despite its importance, empirical work on the topic is either scant or mixed, particularly in the context of developing countries and more so in the context of Pakistan.

The significance of the study increased in the context of Pakistan where growth of Islamic banking assets continued at the rate of 11% per annum compared with 7.3% growth of global Islamic financial services industry in 2015. Furthermore, Islamic banks in Pakistan have been adequately maintaining the regulatory minimum capital requirements (MCR) of 10% set by State Bank of Pakistan. This high proportion of CAR maintained by Islamic banks may have impacts on the financing behavior in terms of the application of credit crunch hypothesis in the banking sector of Pakistan. Therefore, it is pertinent to write on the subject in the context of Pakistan's Islamic banking industry which is observing the Basel capital requirement and thus may be more influenced by its financing behavior due to capital regulatory impositions and its trade-off.

It is evident from the literature that the increase of capital adequacy ratio (CAR) may result in a reallocation of commercial banks assets portfolio. To fulfil CAR requirement banks are more inclined to invest in Government securities. This implies that Basel capital accord is followed by commercial banks by investments in Government securities at the expense of the private sector which may be deprived of the financing. The

situation seems to be worse for Islamic banks where reallocation of assets portfolio may result in a contraction in their financing behavior and ultimately slower growth in the economy. Therefore, the present study aims to analyze the impact of Basel capital-II and III on banks' financing behavior of Islamic banks in Pakistan. For this purpose, the present study used Ben Naceur and Kandil, 2013 model which was based on Berger and Udell (1994) framework to analyze the relationship of banks financing with CAR by using panel data for the sample of 5 Islamic banks for the period of 2005-2014. The study would have significant contribution due to following reasons. First, it adopts and extends the Ben Naceur and Kandil, 2013 and Berger and Udell (1994) model and framework to one of the developing countries Pakistan with emerging Islamic banking and for which, to our knowledge, the study is a novel extension to the existing literature on Islamic banks. Second the study uses three proxies of financing behaviour[2] providing robustness to the results of the study. Third, the study provides policy implications to regulators and bankers for weighing the stability by reallocation of assets portfolio at the cost of depriving the credit to private sector. Therefore, the study also provides a significant contribution to the existing knowledge by filling the gap in terms of literature on Islamic banking behavior towards CAR.

The next second section reviews the existing theoretical and empirical literature on capital adequacy-lending/financing nexus. The third and fourth sections present theoretical framework and methodology, followed by the results and discussion section. Finally, the sixth section presents the conclusion and policy implications of the study.

2. Literature Review

2.1 Basel's CAR and Lending Behaviour of Banks

Banks are the heavily regulated industry, particularly with regard to the capital adequacy requirement where Bank of International Settlements (BIS) has set the minimum ratio to be followed by the banks. However, banks optimally increase their capital adequacy ratios to remains resilient and sound for their stakeholders (Berger, 1995). Recent literature on banking blamed the higher capital requirement for the reduction in lending activities. It is stressed that due to higher capital requirement the banks are forced to contract loan supply, resulting in a credit crunch. If banks are unable to comply with the higher capital requirement, they opt to shrink

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[2] Net financing to total assets (NF), gross financing to total assets (GF) and growth rate of financing (GRGF).

their credit supply and financing activities. This argument implicitly demonstrates the failures of Modigliani-Miller (1958) proposition which implies that for a given portfolio of assets, changes in the composition of a bank's liabilities should not affect the overall cost of funds for the bank, and therefore the supply of credit.

The theoretical underpinnings for credit crunch argument are articulated in Bernanke and Gertler (1995) work. It has been observed that much of the literature on impact of capital requirements on bank lending emerged after the US recession in the early 1990s. A numbers of studies investigated the link between capital regulations and credit availability[3].

Therefore, imposition of capital requirements of Basel may affect the lending behavior of commercial banks and loans volume slowdown which may finally affect the credits to the private sector and hence the economy of developed and as well developing countries (Gambacorta & Mistrulli, 2004) where financing by banks to the private sector is considered essential for the growth of the economy (Berger *et al.*, 1995).

Moreover, the Macroeconomic Assessment Group (2010)[4] assessed the impact of higher regulatory capital and liquidity requirements under Basel III, by using the methodology of Francis and Osborne (2012) amongst others to arrive at a series of estimates across different jurisdictions for the impact of a one percentage point increase in the target capital on lending volumes in banks. The study concluded that for an increase in the capital requirement taking place over two years, these estimates ranged from a 0.7% to a 3.6% fall in lending. Contrary to the above, several studies provide evidence of a positive impact of capital requirements on lending practices (Ghosh & Ghosh, 1999; Roy, 2003; Ben Naceur & Kandil, 2009). The results of these studies provide evidence for a significant increase in credit growth following the implementation of capital regulations. Sharpe (1995) argued that the

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[3] E.g. Bernanke & Lown (1991); Furlong (1992); Haubrich & Wachtel (1993); Hancock & Wilcox (1994); Berger & Udell (1994); Brinkmann & Horvitz (1995); Peek and Rosengren (1995 a,b, 1997, 2000) on the subsidiaries of Japanese banks located in United States; Lown & Peristiani (1996); Pazarbasioglu (1997) on Finland; Ediz, Michael and Perraudin (1998); Ghosh and Ghosh (1999) on East Asia; Woo (1999) on Japan; Furfine (2000)on US data ; Kishan & Opiela (2000); Chiuri, Ferri & Majnoni in (2001) on 16 emerging countries; Rime (2001) on Swiss banks; Barajas & Steiner (2002); Dionne and Harchaoui (2003) on Canada; Van Roy (2003) on G-10 countries; Konishi and Yasuda (2004) on Japan; Barajas, Steiner, and Cosimano. (2005) on Latin America; Van den Heuvel (2012) and Francis and Osborne (2012) on UK banks.

[4] Established by the Financial Stability Board and the Basel Committee on Banking Supervision.

evidence in favour of a capital crunch is not particularly conclusive; he singled out the tightening of bank regulatory standards and heightening market scrutiny of bank capital as the major factors behind credit slowdowns.

2.2 Capital Adequacy Ratio, Basel Accord III and Islamic Banks

Islamic banking and finance is now a part and parcel of the global finance (Ayub, 2012). Basel Accord makes no distinction between conventional and Islamic financial institutions for capital requirements (Errico and Farahbaksh, 1998). The literature showed that the Islamic banks are the best-capitalized banks in the world (Rajhi, 2012). Globally, 22 Islamic banks now have US $ 1b or more in shareholder equity with Capital Adequacy Ratio (CAR) ranging between 14 and 26 (Ayub, 2015). Bashir and Hassan (2004) also argued that Islamic banks have better capital asset ratio and require lesser risk-weighted assets (RWA) than the conventional banks under Basel-III. The trading book business and short selling are prohibited in Islamic banking. Moreover, the major part of the additional RWA in Basel-III is linked to such instruments that Islamic banks do not hold in their portfolios [5] (Harzi, 2012). Similarly the study conducted by Kara (2011) indicated that Islamic banks are better capitalized due to requirement of Sharīʿah compliance and holding large capital under Tier 1. As Islamic bank's sources of financing consist of 'own capital', 'demand deposits' and 'profit sharing investment' so deposit insurance is not necessary and it reduces the cost of financing (Boumediene, 2011).

   Although there are several studies in the literature that highlighted the implication of Basel accord on lending practices for conventional banks, there are a few studies such as Ismail (2009) in the context of Basel Accord II, where he argued that Malaysian Islamic banks increased their capital ratios by reducing their volume of financing. He found that Malaysian Islamic banks effectively increased their capital ratios by reducing their riskier assets and shifting to 20% risk-weighted category from higher risk categories. Similarly, Bitar (2011) assessed the impact of Basel-III on Islamic and conventional banks using panel data of 11,487 conventional and 146 Islamic banks in 76 countries during the period 2005-2011 and found that impact of liquidity, leverage, and capital is not significantly correlated between Islamic and conventional banks while their risks also vary. Further, Mastura and Kabir (2014) analyzed the relationship between capital requirements and loan growth in Islamic and

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[5] Such as Collateralized Debt Obligation (CDO), Credit-Default Swap (CDS), Repurchase agreement (repos) or interest rates swap.

conventional banks of four OIC countries for the period 1999 to 2009 by using panel data technique of Generalized Least Square (GLS) with fixed effect model[6]. They found a strong positive relationship between capital requirements and loan growth for both Islamic and conventional banks. They further concluded that the banks that cannot meet Basel Accord may resort to credit crunch to reduce their risky assets in line with the capital adequacy ratio.[7]

2.3   Capital Adequacy Ratio and Islamic Banks in Pakistan

Despite the extensive literature in commercial banking, there is little debate on the impact of capital requirements on the supply of financing specifically in the context of Islamic banks in Pakistan where Islamic banking emerged as a response to both religious and economic needs. Currently, there are five (5) full-fledged licensed Islamic banks and seventeen (17) conventional banks having licenses to operate dedicated Islamic banking branches. The total assets of Pakistan's Islamic banking industry are over 1,495 billion Rupees as of June 2015. State Bank of Pakistan (SBP) has over the years attempted to develop a supportive regulatory framework which has a special emphasis on Sharī'ah compliance and alignment with the best international practices. The SBP provides a level playing field and has allowed Islamic banks to operate parallel with conventional banks with the primary objective to provide diversified banking opportunities to build a sound financial system rendering the economic development opportunities through Sharī'ah compliant financial operations (Rashid, Khaleequzzaman, and Jabeen, 2015).

In the context of Pakistan where most of the Islamic banks are well above the regulatory minimum capital requirements (MCR) of 10% set by SBP, there is a dire need to analyze the situation wherein the highly capitalized Islamic banks are increasing their capital adequacy ratio by reducing financing to private sector at the expense of investments in Government securities. Therefore, Islamic banks in Pakistan provide an interesting case study for this investigation. As such, this paper aims to estimate the extent to which higher capital requirements may affect financing and credit growth in Islamic banks. Hence, based on the above

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[6] The empirical evidence suggests that capital requirements have a significant impact on the deposit and lending behaviours of the 52 Islamic banks (IBs) and 186 conventional banks (CBs) in the sample.

[7] This study considers countries that have both Islamic and conventional banking services; however their sample excludes Pakistan.

discussion regarding impact of capital requirements on lending/financing behavior, following hypothesis has been drawn;

H_0: Capital adequacy ratio (CAR) has no significant effect on the financing behavior of Islamic banks in Pakistan.

H_1: Capital adequacy ratio (CAR) has a significant effect on the financing behavior of Islamic banks in Pakistan.

The literature showed that some bank-specific and macroeconomic variables also affect the financing behavior of banks; therefore this section discussed some of them to capture the effects of credit supply and demand side factors. In literature, bank loan loss provisions, investments in Government securities and lending/financing rates are used as supply side factors while GDP is used as demand side factor to determine their effect on financing behavior of banks.

2.3.1 Provisions for Non-performing loans (PNPL) and Lending Behavior of Banks

PNPL is used as bank specific variable due to its negative relationship with bank's lending behavior (Agung et al., 2001; Guizani, 2014). It is evident from the literature that if the bank's management perceive higher credit risk they will retain higher provisions for non-performing loans in their portfolio which may lead to restricted credit supply by the bank in the economy (Kendall & Levonian, 1992). Therefore, based on the literature on the impact of PNPL on lending/financing behavior following hypothesis has been drawn:

H_0: Provisioning for Non-performing loans (PNPL) has no significant effect on the financing behavior of Islamic banks in Pakistan.

H_2: Provisioning for Non-performing loans (PNPL) has a significant effect on the financing behavior of Islamic banks in Pakistan.

2.3.1. Government Securities to Total Assets (GSTA)[8] and Lending Behavior of Banks

Berger and Udell (1994) proposed the reallocation of bank portfolio from lending activities to government securities and a negative relationship between lending and investment activities was suggested. Further several studies supported that the banks with high ratios of government securities in their asset portfolios exhibited lower levels of lending (Aggarwal & Jacques, 2001;Hussain & Hassan, 2006). Therefore, the following hypothesis has been drawn in this regard:

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[8] In Islamic banks GSTA refers to the investments in Islamic Government securities i.e. GoP *Ijārah Ṣukūk*.

H_0:   *Government Securities to Total Assets (GSTA) ratio has no significant effect on the financing behavior of Islamic banks in Pakistan.*

H_3: *Government Securities to Total Assets (GSTA) has a significant effect on the financing behavior of Islamic banks in Pakistan.*

2.3.2   Lending/Financing Rates and Lending Behavior of Banks

Lending/financing rates have a significant impact on lending behavior (Košak, Li, Lončarski, and Marinč, 2013). It is evident from the literature that credit growth is negatively correlated with the lending rate (Demirguc-Kunt and Detragiache, 1998). It is also argued that higher interest rates may adversely affect the repayment capacity of borrowers and raise credit risk which in turn has a negative effect on lending practices (Karim, 2011)[9]. However, Olokoyo (2011) in Nigerian context and Laurine and Roux (2013) in Zimbabwean commercial banks study found an insignificant relationship of lending rates with the lending practices in the presence of minimum capital requirements of Basel Accord. Therefore, based on the mixed results in literature on the impact of lending/financing rates on lending/financing behavior following hypothesis has been drawn;

H_0:   *Lending/financing rates have no significant effect on the financing behavior of Islamic banks in Pakistan.*

H_4: *Lending/financing rates have a significant effect on the financing behavior of Islamic banks in Pakistan.*

2.3.3   GDP Growth and Lending Behavior of Banks

Several studies supported the positive relationship between GDP growth with lending practices of banks (e.g. Berrospide & Edge, 2010; Gambacorta & Mistrulli, 2004; Guizani, 2014; Košak et al., 2013; Olokoyo, 2011). This implies that increase in GDP would increase the bank's lending to business as an expanding economy would entice banks to lend more. However, studies (e.g. Gennotte & Pyle, 1991) also showed that the credit supply of well-capitalized banks is less dependent on the business cycle. Therefore, based on the mixed results in literature on the impact of GDP on lending/financing behavior following hypothesis has been drawn:

H_0:   *GDP has no significant effect on the financing behavior of Islamic banks in Pakistan.*

H_5: *GDP has a significant effect on the financing behavior of Islamic banks in Pakistan.*

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[9] He investigated the impact of interest rate on bank lending in Malaysian context.

3. Theoretical Framework

The theoretical underpinning of the present study is based on the framework of Ben Naceur and Kandil (2013) which was inspired by the work of Berger and Udell (1994). This framework depicts the relationship between the capital adequacy ratio and financing behavior of Islamic banks in Pakistan. Further, the study used provision for nonperforming loans to total assets ratio (Guizani, 2014) , government securities to total assets ratio (Aggarwal & Jacques, 2001; Hussain & Hassan, 2006) , lending/financing rates (Košak, Li, Lončarski, and Marinč, 2013) as bank specific variables and growth in GDP (Berrospide & Edge, 2010) as a macroeconomic variable.

Figure 1   Theoretical Framework of Financing Behavior
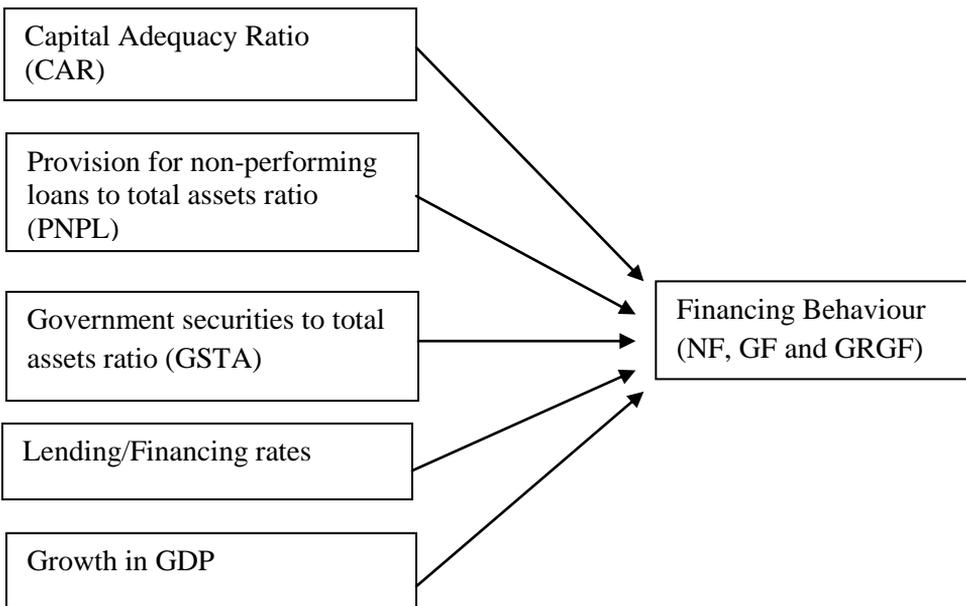
4. Methodology

Methodology section consists of model specification, data required for analysis, data sources and definition and construction of variables and estimation techniques.

4.1 Model Specification

To investigate the impact of capital adequacy ratio on the financing behavior of Islamic banks and to know whether loan supply contracted as a result of the Basel Accord, we used a specification similar to that of the

Ben Naceur and Kandil, 2013 and Berger and Udell (1994) who assumed that bank loans responded to lagged risk factors; when risk increases, banks subsequently contract their lending activities. Their findings indicated that the risk-based capital related credit crunch hypothesis explained the bank credit reallocation of the 1990s in US banking sector. Although there are other models as well that depicted the relationship between capital requirements and lending behavior such as Bernanke and Lown (1991) and Peek and Rosengren (1995a, b), but Berger and Udell (1994) model takes a close look at micro-bank level data to examine how bank portfolios changed in the early 1990s from the 1980s and how these changes are related to risk-based capital ratios and other key variables. Further, the present study used three proxies of financing behavior adopted from the studies of Ben Naceur and Kandil (2009, 2013) i.e. net financing to total assets (NF), gross financing to total assets (GF) and growth rate of financing (GRGF).

From literature (Bateni, Vakilifard, & Asghari, 2014) two proxies of capital ratio i.e. CARW2 and CAR1 have been adopted to reflect the capital adequacy position of Islamic banks. Bank specific variables (i.e. provisions for non-performing loans/financing (PNPL), Government securities to total assets (GSTA) and lending/financing rates (L Rates) are used in the financing model as it is hypothesized that they may also influence the financing behavior of commercial banks (Bateni et al., 2014). GDP, a macroeconomic variable is also used in the model. GDP in the Model intends to capture the business condition in Pakistan as a business cycle variable (Zeitun, 2012). Hence, in order to analyze the impact of capital requirements on financing behavior of Islamic banks in Pakistan following models are employed:

$$NF_{it} = \gamma_0 + \gamma_1 CARW2_{it} + \gamma_2 PNPL_{it} + \gamma_3 L\_Rates_{it+} \gamma_4 GSTA_{it} + \gamma_5 GGDP_{it} + \varepsilon_{it}, \ldots \ldots (4.1)$$

$$GF_{it} = \delta_0 + \delta_1 CARW2_{it} + \delta_2 PNPL_{it} + \delta_3 L\_Rates_{it+} \delta_4 GSTA_{it} + \delta_5 GGDP_{it} + \varepsilon_{it}, \ldots \ldots (4.2)$$

$$GRGF_{it} = \eta_0 + \eta_1 CARW2_{it} + \eta_2 PNPL_{it} + \eta_3 L\_Rates_{it+} \gamma_4 GSTA_{it} + \eta_5 GGDP_{it} + \varepsilon_{i,t} \ldots \ldots (4.3)$$

In above equations (4.1), (4.2) and (4.3) financing behaviour is measured by NF, GF and GRGF respectively. Where CARW2 = Capital Adequacy ratio (total capital (Tier 1+ Tier 2) to total risk-weighted assets), and CAR1 (capital to total assets) are used as proxies to measure capital adequacy ratio (Aggarwal & Jacques, 2001; Saadaoui, 2011) ; PNPL =

Provision of nonperforming loans to total assets ratio; GSTA = Government securities to total assets ratio; L Rates = Lending /Financing rates and GGDP = Growth in GDP and subscripts i denote individual banks[10], t time period (t = 2005… 2014). The robustness of the above models is checked by estimating the equations using another proxy of capital ratios (i.e. CAR1). In the above model γ_0, δ_0 and η_0 are constants and γ_1, δ_1, η_1 are the coefficient to be estimated of explanatory variables, and ε_{it} is disturbance term.

4.2 Data

The study employed a sample of all 5 full-fledged Islamic banks in Pakistan. The data is extracted from the annual reports of Islamic banks for the years 2005-2014 covering the period after the implementation of Basel capital regulation in Pakistan[11].

4.3 Estimation Technique

The study used panel data technique i.e. fixed effects and random effects model to estimate financing models. Panel data was preferred because it controls for individual heterogeneity, fewer collinearity variables and tracks trends in the data.

5. Results and Discussion

Table 1 depicted the mean values of key study variables for the period 2005-2014. The reported mean value for capital adequacy ratio (CARW2) is 15.7% for 2014 for Islamic banks in Pakistan. This means that the CAR of sample banks remained high from the MCR of 10% set by SBP. This result is in-line with the work of Kara (2011) and Rajhi (2012) where they argued that Islamic banks are highly capitalized banks. The mean values for financing behavior ratio (NF) are 49.3% whereas the ratio of government securities to total assets is 23.7% for 2014. The reported mean values of financing behavior and investments in government securities for 2005-2014 further validate the work of Berger and Udell (1994) and Ismail (2009) where they argued that banks tend to reallocate their assets portfolio from lending to secured investments.

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[10] (i = 1,2, . . . ,5: Meezan Bank Limited , Al-Baraka Bank (Pakistan) Limited , Dubai Islamic Bank Pakistan Limited , Bank Islami Pakistan Limited and Burj Bank Limited)

[11] Relevant data of Islamic Banking Branches of conventional banks for CAR calculation is not yet published separately.

Table 1.   Mean values (%) of study variables for Islamic banks in Pakistan: 2005-2014

[a and b]*Mean values are based on the data of Meezan Bank Limited and Bank Islami Pakistan Limited.*

Variable	2005[a]	2006[b]	2007	2008	2009	2010	2011	2012	2013	2014
CARW2	5.3	31.1	31.1	29.2	25.6	21.3	22.0	16.4	15.0	15.7
CAR1	25.0	49.6	29.3	23	18.5	13.4	11.6	8.8	7.4	7.8
NF	33.6	21.5	43.6	48	42.1	44.7	42.3	39.8	44.7	49.3
GSTA	2.6	4.6	20.2	18.1	17.1	27.0	36.7	40.3	31.2	23.7
PNPL	-0.07	-0.05	0.01	0.25	0.6	1.5	1.1	1.2	1.4	2.3
L-Rates	9.1	11	11.8	12.9	14.5	14	14.4	13.5	12	11.7
GDP	5.8	5.5	5	0.4	2.6	3.6	3.8	3.7	4.1	4.2

Table 2 depicted the overall descriptive statistics i.e. mean, standard deviation, skewness and kurtosis of all the variables (dependent and independent) included in financing behavior models. Where the reported values of mean for capital adequacy ratio (CARW2) is 23.1%, and the standard deviation is 13.2% for the entire period of ten years. Whereas, the reported values of mean for financing behavior (NF) is 42.940%, and the standard deviation is 13.416% for the entire period of ten years. Skewness and kurtosis values in table 2 showed that all the variables are asymmetrical and confirm the normality of data[12]. The study also conducted skewness kurtosis (Jarque-Bera) test to check the normality of the data where Prob>chi^2 i.e. 0.752 which is not under the standard significant threshold of 0.05. Therefore, based on skewness kurtosis (Jarque-Bera) test the assumption of normality is also accepted:

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[12] For a data to be normally distributed, the range for measure of skewness is −1 to +1 whereas it is −3 to +3 for kurtosis (Bai, & Ng, 2005).

Table 2   Descriptive Statistics of study variables: 2005-2014

Variable	Mean	Std. Dev	Skewness	Kurtosis
NF	42.940	13.416	-0.148	2.279
GF	42.081	15.740	-0.241	2.112
GRGF	710.558	2667.77	0.617	2.361
CARW2	23.143	13.235	0.335	2.714
CAR1	18.544	17.581	0.368	2.714
PNPL	0.9854	1.440	-0.555	2.526
GSTA	24.937	11.845	0.283	2.960
L_Rates	12.49	1.635	-0.555	2.526
GGDP	3.874	1.484	-0.978	2.655

Further, the explanatory variables are tested for multicollinearity based on a correlation matrix, variance inflation factor (VIF) and tolerance (1/VIF). As depicted in Table 3 and 4, all the correlation coefficients are lower than 0.70[13] , VIF values are less than 10 and tolerances is above than 0.1 for all the regressors in the model. Therefore, it is concluded that there is no colinearity problem exists in variables of the financing model in the study.

Table 3   Correlation Matrix for Financing Behavior Models

Variables	CARW2	PNPL	GSTA	L_RATES	GGDP
CARW2	1.000				
PNPL	0.056 (0.722)	1.000			
GSTA	-0.163 (0.241)	0.069 (0.662)	1.000		
L_RATES	0.070 (0.734)	0.063 (0.527)	0.353* (0.006)	1.000	
GGDP	-0.174 (0.837)	0.081 (0.727)	0.079 (0.965)	-0.456* (0.000)	1.000

***, ** and * represent statistical significance at 1%, 5% and 10% level respectively.

Table 4   Test for Multicollinearity of Study Variables

Variables	VIF	1/VIF
CARW2	1.07	0.937
PNPL	1.03	0.974
GSTA	1.28	0.779
L_Rates	1.58	0.630
GGDP	1.42	0.706
CAR1	1.13	0.884

The study used Haussmann test for the most significant model and consistent effects for assessment. Haussmann test signifies whether the

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[13] According to Tabachnick and Fidell (1996), the independent variables with a correlation more than 0.70 should not be included in multiple regression analysis.

random effect is suitable for study or fixed effect is appropriate for the specific research. There is an assumption for random effects that is: there is no covariance among the independent variables and the error terms. This is null hypothesis in Haussmann specification test. If probability values are less than 0.05 then an alternate hypothesis is accepted and it will be preferred to use fixed effect. On the other hand, if the values of probability are greater than 0.05 then random effect model will be applied to explain the results of the aforesaid study (Hausman, 1978). Results in table 5 show that the null hypothesis of Haussmann specification test is accepted so random effect is used to apply the most accurate results for the hypotheses of in this study.

Table 5   Haussmann Specification Test

Variables	Fixed	Random	δ^2 (Diff.)
CARW2	-0.537	-0.348	-0.188
PNPL	-0.993	1.165	-2.158
GSTA	-0.424	-0.499	0.075
L_Rates	-1.473	-0.763	-0.709
GGDP	-0.722	-0.961	0.239
Prob>Chi-Sq.	0.1911		

Tables 6, 7 and 8 present the results from using the Random effect and Pooled OLS panel data technique. The results show that financing behavior (NF, GF and GRGF) is inversely related to capital adequacy ratio (CARW2).

Table 6   Results of the Islamic banks for the Financing Behavior by using Random Effect

Variables	NF, GF and GRGF as the Dependent Variables					
	NF_{it}		GF_{it}		$GRGF_{it}$	
	Parameter est.	t-Stat	Parameter est.	t-Stat	Parameter est.	t-Stat
$CARW2_{it}$	-0.348***	-3.35	-0.344***	-3.28	-10.651***	-2.98
$PNPL_{it}$	1.165	1.38	-2.000**	-2.34	-6.045***	-2.57
$GSTA_{it}$	-0.499***	-4.17	-0.448***	-3.71	-0.137***	-3.45
L_Rates_{it}	-0.763*	-1.65	-0.608	-0.52	2.188	0.59
GDP_{it}	-0.961	-0.93	-0.996	-0.95	2.801	0.49
R-sq	0.476		0.453		0.520	
Wald Chi2	32.81		29.82		37.98	

***, ** and * represent statistical significance at 1%, 5% and 10% level respectively.

The coefficient of capital adequacy ratio is -0.348% significant at 1% level in net financing model. This means the 1% increase in capital adequacy ratio leads to a reduction of -0.348% in the financing activities of Islamic banks. Similar results are evident from the use of other proxies of financing behavior for Islamic banks. Therefore, based on the above result it may be concluded that significant but inverse relationship exists between financing behavior and capital adequacy ratio in case of Islamic banks of Pakistan. These results are robust while using another proxy of capital requirements (i.e. CAR1) as evident from the Table 7. This finding is in accordance with the work of Bernanke and Lown (1991), Hancock and Wilcox(1994), Peek and Rosengren(1995a) where the imposition of capital requirements caused a credit crunch in commercial banks.

Table 7 Robustness of Results using CAR1 Proxy for the Financing Behavior by using Random Effect Model

Variables	NF, GF and GRGF as the Dependent Variables					
	NF_{it}		GF_{it}		$GRGF_{it}$	
	Parameter est.	t-Stat	Parameter est.	t-Stat	Parameter est.	t-Stat
CAR1 $_{it}$	-0.386***	-3.30	-0.381***	-3.22	-7.112**	-2.04
PNPL $_{it}$	0.899	1.06	-1.737	-1.03	-1.734	-0.75
GSTA $_{it}$	-0.540***	-6.14	-0.488***	-3.93	-0.092***	-3.11
L_Rates $_{it}$	-0.986	-0.84	-0.829	-0.70	-6.097**	-2.55
GDP $_{it}$	-1.025	-0.99	-1.01*	1.96	-3.928	-0.86
R-sq	0.472		0.448		0.642	
Wald Chi2	32.28		29.28		62.93	

***, ** and * represent statistical significance at 1%, 5% and 10% level respectively.

Table 8   Results of Pooled OLS for Financing Behavior of Islamic Banks

Variables	Islamic Banks (Pooled OLS)	
	Parameter est.	t-Stat
CARW2 $_{it}$	-0.348***	-3.35
PNPL $_{it}$	-0.969**	-1.77
GSTA $_{it}$	-0.499***	-4.17
L_Rates $_{it}$	-2.068**	-1.77
GDP $_{it}$	-0.367	-0.42
R-Square	0.730	
F-Stats	25.16	
Prob>F	0.000	

***, ** and * represent statistical significance at 1%, 5% and 10% level respectively.

There are also a number of bank-specific variables used in the model to capture the supply side factors effect on the financing behavior of banks. Among them, Government securities to total assets (GSTA) showed a significant inverse relationship with all the proxies of financing behavior. The coefficient of GSTA is -0.499% significant in net financing (NF) model at 1% level. This result is robust with all the proxies of financing behavior and with another proxy of capital (i.e. CAR1) as evident from Table 7. Therefore, based on above discussion and results in table 1 it may be concluded that there is shift/reallocation in Islamic banks assets portfolio from financing activities to the investments in Government securities after the implementation of Basel capital requirement. This result is in accordance with the work of Ismail (2009) in the context of Malaysian Islamic banks and Rodrigues (1993) in the USA context. This is mainly due to the 20% risk weight of Islamic Government securities which are mostly risk-free investments and hence required less capital under Basel Accord II and III by Islamic banks in Pakistan.

Another bank specific variable provisioning for nonperforming loans to total assets (PNPL) showed an inverse result with the proxies of financing behavior. This implies that with the increase in PNPL Islamic banks' management will perceive a higher inherent risk in financing transactions that may lead to a contraction in their financing volume. This result is consistent with the work of Agung et al. (2001); and Guizani (2014) where a high level of non-performing financing requires the Islamic banks to increase provisions for loan loss that decreases the banks' revenue and reduces the funds for new financing. In developing countries like Pakistan, Islamic banks aggressively extend financing in order to increase their business and to obtain market power. Due to their less sophistication in risk control, the growth in financing ends up in a vicious cycle of non-performing loans in Islamic banks. However, the result is not robust with another proxy of capital requirement i.e. CAR1 where PNPL showed an insignificant relationship with all the proxies of financing behavior.

The bank-specific variable lending/financing rates (L_Rates) showed a negative significant relationship with financing behavior (NF) as the coefficient of lending/financing rates is -0.763%, significant at 10% level. This is consistent with the work of Košak et al. (2013) which suggest that credit growth is negatively correlated with the interest rate as an increase in interest rate discourages the new borrowers to raise loans/financing. Moreover, higher financing rates may adversely affect the repayment capacity of borrowers and raise credit risk which in turn has a negative

effect on lending/financing in the Islamic banking sector of Pakistan. Lastly, macroeconomic variable GDP has no significant impact on the financing behavior of Islamic banks in Pakistan.

To sum up, there exists a negative relationship between capital adequacy ratio and financing activities of Islamic banks in Pakistan which led to the confirmation of credit crunch in Islamic banks after the imposition of capital adequacy ratio under Basel Accord II and III. Moreover, the results of the study confirmed the reallocation in the assets portfolio of Islamic banks from financing activities to investments in government securities.

6.   Conclusion and Policy Implications

Based on aforementioned findings it may be concluded that Basel capital adequacy ratio plays a significant role in reallocating banks' assets portfolios, by having a profound negative impact on the financing behavior of Islamic banks in Pakistan. Towards meeting capital requirements, Islamic banks either need to raise capital, reduce their asset portfolio, or invest in less risky government securities. However, raising new equity capital is costly for Islamic banks, thus they limit their risk exposure by contracting financing activities and reallocating the assets portfolio to government securities to appear as highly capitalized banks in Pakistan. This shift in financing behavior of banks has policy implications for the regulators to check whether resilient and high CAR is achieved at the cost of crowding out of private sector financing in Islamic banks which is the engine of the growth of a country. It is recommended that Pakistani Islamic banks may need to increase the required capital under Basel-III through retained earnings or equity issues and also need to improve their financing risk management processes rather than shifting their assets portfolios to secured investments.

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