Different dimensions Bank performance comparisons IBs vs CBs – Quatar case

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Abstract

This paper contributes to the empirical literature on interest-free finance by investigating the feature of interest-free (IB) and conventional banks (CBs) in **Quatar** over the period 2005–2014. To distinguish between IBs and CBs, we use at first stage two-sided **t-test**. With **univariate descriptive analysis**, compaired to CBs, IBs are found to be *riskier* and *less stable*, but have a *higher liquidity*, and are *more solvent*. Then, **multivariate regression based comparision** say that IBs are found to be *riskier*, less liquid except for *Large IBs*, less solvent except *large IBs*, *more capitalized*, *less profitable post GFC* (except *High share* IBs), and *more stable*. At third stage, **PVAR-X** specifications analysis revealed that IBs are found to be *more capitalized*, *less profitable*, and *less stable* except *Small IBs* and *Post GFC*. It is the *Small IBs* wich are *less solvent* even post GFC while *higher market share IBs* are *more solvent*.

JEL classification: G01 G21 G28 G32 Z12
Keywords: Quatar case, Financial stability, Profitability, Liquidity, Credit and Insolvency risk, interest-free banking, small banks, high share banks, 2008 **GFC**, t-test, linear regression models, PVAR-X(1) specifications, GMM, SURE, 2LS.

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I. Introduction

Islamic banks might vary significantly across different size buckets. Smaller Islamic banks might be more affected by the higher cost inefficiency of Islamic banks as the design of Sharia-compliant products and compliance costs might involve scale economies. Similarly, the absence of risk diversification tools might affect **smaller** more than **larger Islamic** banks. (Čihák & Hesse, 2010) find significant differences in stability between small and large Islamic banks, with the former being more stable and the latter being less stable than conventional banks.[2]

The differences between Islamic and conventional banks are more prominent for **smaller** Islamic banks. This variation is partly due to the difference in the **market share** of Islamic banks in considered countries which is likely to reflect the different levels of maturity, sophistication and competitive behavior of their banks (See (Beck, Demirgüç-Kunt, & Merrouche, 2013)). (Maggiolini & Mistrulli, 2005) survey, showed a correlation between the **life duration** of a bank and the **market share** of *larger* banks: the life duration of a bank is higher when there is a lack of banks on the market, and smaller in the opposite case.

In time of downturn, Islamic banks are expected to suffer more than conventional banks. It would be interesting to empirically test this hypothesis and to compare between the performance of Islamic banks vs conventional banks **before and after the 2008 economic downturn (GFC)**. For 25 Gulf Council Countries' (GCC) banks classified as Islamic and conventional for the period 2001-2013, (Al-Deehani, El-Sadi, & Al-Deehani, 2015) analysis revealed statistically significant difference in performance between the two types of banks.

This paper contributes to the empirical literature on interest-free finance by investigating the feature of interest-free (IB) and conventional banks (CBs) in Quatar over the period 2005–2014.

In this research we use an array of variables which are carefully selected based on the consultation with the existing literature. Our purpose is to examine the differences (in terms of Profitability, Liquidity, Credit and Insolvency risk, and

[2] In terms of stability, the proposition of 'too big tofail' might prompt a larger bank To assume more risk and hence the relationship between size and stability is expected to be negative (Miah & Uddin, 2017).

Stability) between Islamic and conventional banks in Quatar. Our sample contains 9 banks (6 conventional and 3 Islamic) operating in Quatar for the calendar years 2005–2014.

To distinguish between interest-free and conventional banks, 12 financial ratios are used in this study. We classify these ratios into six general categories: **profitability** ratios (ROA, and ROE), **liquidity** ratios (CTA, and CTD), **credit** risk (LLR, NPL, LTA, LTD), **insolvency risk** (DTA), **Reglementary risk** (CAP), and asset **structure** ratios (FAA, OBSIA). We use also the Z-score as measure of bank **stability.**

For the comparisons study, three technics are considered:

i) Univariate analysis based on t-test comparisons,
ii) Multivariate Regression based comparisons analysis,
iii) Quantitative analysis based on PVAR-X specifications.

Regression based comparisons analysis concern **five differents dimension**. First, we Compare interest-free and conventional banks (CB) controlling for *bank* ***characteristics***. Second, we Compare islamic banks (IB) and CB cross different ***Size groups***. Third, we do analyse ***cross IB*** difference. Forth, we take account of ***Market share*** side for islamic banks. Fiveth, we take account of ***post 2008 Global Finance Crisis*** (GFC) effect on IBs caracteristcs.

PVAR-X specifications will be estimated to test for comparisons between IBs and CBs in controlling for *bank characteristics*, between small and large banks, between High share banks, and between Pre and Post the GFC for all banks.

This paper is organized as follow. After a brief introduction (section I) listing different technic to be used, section II gives some principles of islamic banking. Section III describes the data and defines the ratios used in the study. It gives also a univariate descriptive comparative study between IB and CB based on *t-test* statistic. Section IV presents some OLS *linear regession* model results, while Section V discusses results for Panel *VAR-X model*. Section VI concludes.

II. Principles of Islamic banking ; what difference with conventional ones ?

Islamic financial system is based upon a commerce law known as **fiqh al-mu'amalat**. This law considers issues of **social justice, equity, and fairness** in

all business transactions, and promotes the entrepreneurship, protects the property rights and emphasizes the transparency of contractual obligations according to divine **law of Allah** and his **last messenger Muhammad** (PBUH≡ﷺ). It is based on **Shariah** approved products which do not involve **Riba** (interest/usury), **gharar** (uncertainty), **maisir** (gambling), and **non-halal** (prohibited) activities. Although Islam has allowed the profits, but the pre-determined **fix amount of returns** is not allowed. Risk of loss and variability of profits must be faced to get the returns ((Ariss, 2010) and (Salman & Nawaz, 2018)). The Islamic banks have regulations of two types; first is the government and the central bank that govern the conventional banks as well and the other is the **Shariah Supervisory Board** that approves the products of the Islamic banks and keeps a check over the implementation of the rules defined by the board (Salman & Nawaz, 2018).

(Khan, 1987) argues that the theoretical model of Islamic banks (IBs) can successfully fill the failure of CBs in maintaining **stability**. In fact, IBs are assumed to separate investment funds from demand deposits and apply 100% reserve on the latter. IBs are different from CBs because they operate upon the principles of the Islamic law (the Shari'ah) which prohibits the payment or receipt of interest (riba) and encourage risk sharing.

CBs use both debt and equity to finance their investments, while IBs are expected to depend primarily upon equity financing and customers' deposit accounts, i.e., current, saving, and investment. (Hanif, 2011) provides a detailed discussion on the differences and similarities in Islamic and conventional banking. The following Table summarizes that discussion :[3]

	CB		**IB**	
	Return	**Risk bared by**	**Return**	**Risk bared by**
Savings	Interest	Bank	Profit	Saver
Finances	Interest	Spender	Profit	Spender

IB cannot charge fixed interest in advance, they operate by participating in the profit resulting from the use of bank funds. The concept of interest is replaced by profit and loss sharing (PLS). Based on these practices, savers face limited risks with a CB because savings are considered liabilities. However, savers face

[3] Comment : Interest and profit charged are comparative and almost equal. For an IB risks are transferred to savers and spenders.

unlimited risks with an IB because savings are considered neither a *liability nor equity*. In addition, the cost of capital in conventional banks represents the cost of debt and equity. While, the cost of capital in Islamic banks is replaced by profit and loss sharing by depositors and equity holders in Islamic banks. Islamic banking proposes two major types of contracts: non-participatory or asset-based contracts (Murabahah, Ijarah, Istisna, and Salam) along with the risk-sharing or equity-based contracts (Musharakah, Mudharabah).

Islamic banking is **risk sharing**, since IB should operate only using profit/loss sharing arrangements (PLS).[4] The two most popular forms of PLS are **Mudaraba** and **Musharaka.** IB receive funds from the investing public on the basis of Mudaraba (profit sharing).[5] Then, it find borrowers (entrepreneurs) who will use the funds for **investments** that are approved by the bank (Musharaka).[6] The entrepreneurs share the **profit/loss** with the IB. The bank then pools all profits and losses from different investments **and shares the profit** with depositors of funds according to a predetermined formula. IB are partners with both depositors and entrepreneurs and they share risk with both; see (Olson & Zoubi, 2008). Moreover, Islamic banks use some asset-backed debt instruments, such as Murabahah (sale of merchandise on credit) and Ijarah (operating lease), instead of such joint-venture financing modes as Musharakah (profit and loss-sharing) and Mudarabah (profit-sharing contract); see (Louhichi & Boujelbene, 2016).

The difference between IBs and CBs should also be reflected on the **asset side** since IBs have developed interest free financing instruments based on two **principles**: **Profit and loss sharing** (PLS) and **markup** principle ((Hassan, Farhat, & Al-Zubi, 2003); (Zaher & Hassan, 2001)) and they have different risk profiles. However, it seems that the practice of IBs is not diverging from that of CBs since all over the world IBs are relying more on markup financing modes rather than PLS based financing instruments (Siddiqi, 2006). Islamic financial

[4] In addition to the PLS activities, Islamic banks may engage in other activities like lease and fee-based services. For example, Islamic banks may receive fees through: (i) consultation and professional services, fund placements and trust services (**Ju'ala**), (ii) agency contracts (**Wakalah**), (iii) lease contracts (**Ijarah**), (iv) purchase and sales contracts (**Murabaha**) (Doumpos, Hasanb, & Pasiourasa, 2017).

[5] The bank is allowed to use the funds in any activity that the management feels appropriate, so long as the activities are not forbidden by Islamic laws.

[6] Islamic banks replace loans with investments that are generally riskier than secured interest bearing loans.

modes based on mark-up (e.g. Murabaha, Ijaras, and Istisnaa) require that a real asset underlies the financial transaction. Consequently, financial assets and derivatives based on other debt financial assets cannot be traded. This linkage with the **real economy** reduces leveraging and prevents the exposure of IBs to speculative behaviour that leads to **instability** (Bourkhis & Nabi, 2013).

Islamic banks should hold *better quality assets* than conventional banks for two reasons. First, under (PLS) contracts, the Islamic bank does not require collateral from the entrepreneur to mitigate credit risk (Bourkhis & Nabi, 2013). Second, For debt-based contracts (mark up), once the loan is issued, the bank cannot sell it or shift the risk to a third part by any means because **debt selling is prohibited** under Islamic finance principles ((Ahmed, 2009) and (Zainol & Kassim, 2012)).

The composition of the assets portfolio of IBs also differs from the one of CBs. CBs may diversify their portfolio by allocating part of their funds to nonlending investments like interest-bearing bonds that have different risk-return characteristics. However, IBs are not allowed to invest in such interest-bearing securities, and they can only invest in Islamic bonds (i.e. Sukuk).[7] At the same time, this means that IBs **lack liquid** securities on the asset side (Saeed & Izzeldin, 2016).

III. Descriptive data analysis and univariate comparisons

Our sample contains 9 banks (6 conventional and 3 Islamic). List of Quatarian banks is given at Annexe, see **Table A 1**. We have 90 observations, or bank-years of data, for banks operating in Quatar for the calendar years 2005–2014. There are 60 observations for conventional banks (CB) and 30 observations for Islamic banks (IB). 12 financial ratios are used in this study. [8] All are defined in **Table 1**. We classify these ratios into six general categories: **profitability** ratios (ROA, and ROE), **liquidity** ratios (CTA, and CTD),[9] **credit** risk (LLR, NPL, LTA, LTD), **insolvency risk** (DTA), **Reglementary risk** (CAP), and asset **structure** ratios

[7] Sukuk issues do not earn interest payments as conventional Western bonds. Instead they are asset-based securities and they are not considered debt instruments.

[8] Source : Bankscope. Panel data are unbalanced.

[9] Liquidity means how quickly a bank can convert its assets into cash at face value to meet the cash demands of the depositors and borrowers.

(FAA, OBSIA).[10] To ensure that our results were not driven by the presence of some outliers, we do correct all variables (we did not eliminate extreme values).[11] We use also the Z-score as measure of bank **stability**;

$$\text{Z-score}_{it} = \frac{\text{ROA}_{it} + (\text{EQ/TA})_{it}}{\sigma_{\text{ROA}}}$$

where the subscripts 'i' and 't' represent individual banks and time period, respectively, ROA is the standard measure of return on asset, Equity to Assets ratio (ETA= EQ/TA), and σ_{ROA} is the fluctuation of ROA indicated by the standard deviation, and the subscripts 'i' and 't' represent individual banks and time period, respectively.[12] The **higher** the Z-score the **lower** is the bank's default risk.

We present **descriptive statistics** (average value for conventional and interest-free banks for each variable, number of observation, as well as standard deviation) and Difference t-test p-value between two means of each variable (mean for IB and for CB) at **Table 8** (see Annexe). Difference is significant for Cash to deposits CTD, Loans to assets LTA, Loans to deposits LTD, Debt to assets DTA, and Z-score.

The risk ratios indicate some important differences in operational characteristics. Interest free banks (IFB) extend more loans or equivalents relative to deposits and relative to asset (LTD and LTA) than conventional banks. For each credit risk ratio in everage, the difference is significant at the 5% level and may suggest **greater risk** for Interest free banks.

Also, the **liquidity** ratio is significantly different between types of banks. Interest free banks keep more cash relative to **deposits** (CTD). The cash to deposit ratio in everage for the Interest free banks was **94.198**% which is higher than **9.649**%

[10] Regarding the later ratios, we use fixed assets to assets ratio, and off-balance sheet items to assets ratio to account for the operating leverage, and off-balance sheet activities, respectively. These ratios are used in the previous empirical banking literature (see (Srairi, 2010) and (Ben Khediri, Charfeddined, & Ben Youssef, 2015)).

[11] To control for the remaining outliers, we'll use a robust estimation technique (an alternative method) as a superior estimation method, less sensitive to outliers, proposed by (Rousseeuw, Hampel, Ronchetti, & Stahel, 1986).

[12] Z-score (which has been widely used in the literature [see for example (Laeven & Levine, 2009), (Houston, Lin, Lin, & Ma, 2010), etc) indicates the multiple of a **bank's equity buffer** before it falls into the state of default.

ratio of Conventional banks. For this ratio, the difference is significant at the 5% level and may supports the **better liquidity** performance for the Interest free banks.

High debt to assets ratio (DTA) is assumed to be indicator of **high** leverage and therefore **higher risk** of insolvency. Hence, a **low** value of DTA implies that the bank is more capitalized and so **more solvent.** The deposit to asset (DTA) ratio in everage for the Interest free banks was **9.093**% which is lower than **18.61**% ratio of Conventional banks. The difference is significant at the 5% level and may supports the **better solvency** of IBs.

The higher the Z-score is the lower is the bank's default risk. Conventional banks have higher Z-score (**3935.873%** vs **1880.527%**) with significant difference in 1% level. Then in line with most empirical studies, CBs are more **stable** than IBs.[13]

From a brief look at Figure 1, we conclude that : **Z-score average** evolution from 2005 to 2014 for islamic banks (IB) is different from one's of conventional banks (CB). The pattern of latter path is **decreasing** from **2009** (post GFC) and increasing pre GFC, while the former has a **decreasing** path pre and post GFC. CB have higher Z-score in mean than IB **during** period of study.

From **Figure 2**, mean of **Zscore** comparisions in different dimensions say that: IB are **less stable** than CB, Large IB are less stable than Small IB,[14] Large CB (with islamic window) are also less stable than Small CB, Islamic Banks are **less stable** Post GFC 2008, and all Banks are **less** stable Post GFC. Between year comparison show that Zscore in mean has recently the **lowest** values, and between Quatarian banks (ID),[15] 94 ≡ Al Khalij Commercial Bank is the **more** stable bank while 102 ≡ Arab Bank Group outlet is the **less** stable bank.

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[13] Most empirical research employs the Z-score variable for comparison of stability between the both types of banking. For a review see (Boyd & Runkle, 1993); (Čihák & Hesse, 2007); (Iwamoto & Mori, 2011); (Laeven & Levine, 2009); (Lown, Osler, Sufi, & Strahan, 2000); (Maechler, Worrell, & Mitra, 2007) ; and (Alqahtani & Mayes, 2018).

[14] A bank is said to be large if its size > median,
94 ≡ Al Khalij Commercial Bank, 95 ≡ Barwa Bank, 96 ≡ Commercial Bank of Qatar, 97 ≡ Doha Bank, 98 ≡ International Bank of Qatar Q.S.C., 99 ≡ Qatar National Bank, 100 ≡ Qatar International Islamic Bank, 101 ≡ Qatar Islamic Bank SAQ, 102 ≡ Arab Bank Group outlet.

Table 1: Definition of variables and expected signs.[16]

Ratios	Definitions	Expected sign for Zscore
Profitability		
ROA	Return on assets = Net income/Total assets	+
ROE	Return on equity = Net income/Stockholders' equity	+
Liquidity		
CTA	Cash to assets = Cash/Total assets	
CTD	Cash to deposits = Cash/Total customer deposits	
Credit risk		
LLR	Loans loss reserves to gross loans	-
NPL	Non-performing loans to gross loans	-
LTA	Loans to assets = Loans/Total assets	-
LTD	Loans to deposits = Loans/Total customer deposits	-
Reglementary risk		
CAP	Capital adequaty ratio	
Insolvency risk		
DTA	Deposits to assets = Deposits/Total assets	
Asset structure		
FAA	Fixed assets to assets = Fixed assets/Total assets	
OBSIA	Off-balance sheet items to assets = Off-balance sheet items/Total assets	
Dummies and Interactions		
IB	Dummy variable equal to 1 if the bank is Islamic, 0 otherwise (i.e. Conventional banks (CB))	-
Large	Dummy variable equal to 1 if bank is large (size>median), 0 otherwise	
Large_CB	Inetraction term between large bank and conventional bank.[17]	
Large_IB	Inetraction term between large bank and islamic bank.[18]	
D2008	Dummy variable equal to 1 if year > 2008	
Bank caracteristics		
Size	Log(Total asset)	
Age	Number of years since the bank was incorporated	
Growth	Log(Total assets/Total assets$_{-1}$)	
Market share	percentage of comparison between Islamic banks total asset and banks.[19]	

[16] (Ben Khediri, Charfeddined, & Ben Youssef, 2015).
[17] Give a dummy variable equal to 1 if conventional bank is big, 0 otherwise (small bank).
[18] Give a dummy variable equal to 1 if islamic bank is big, 0 otherwise (small bank).
[19] Market share=Islamic bank total assets /Country banks total assets x 100%
(see (Purboastuti, Anwar, & Suryahani, 2015) and (Aminah, Soewito, & Khairudin, 2019)).

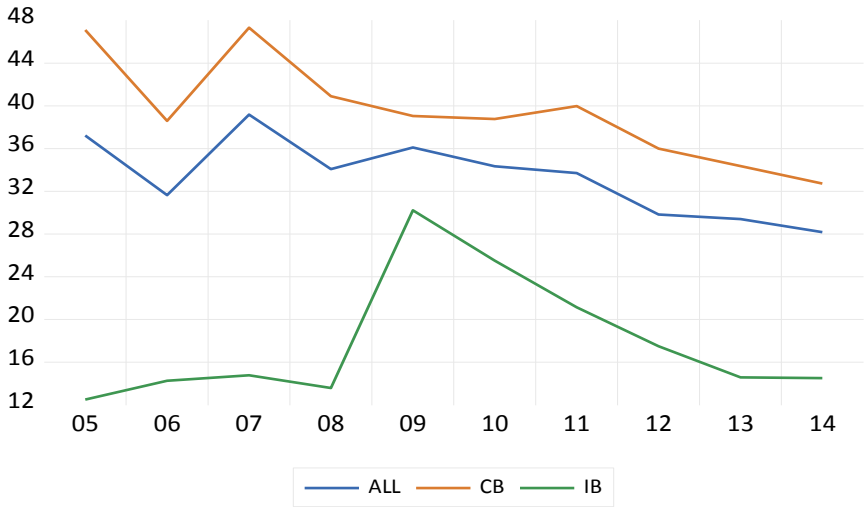

Figure 1: Quatar Zscore average evolution 2005-2014.

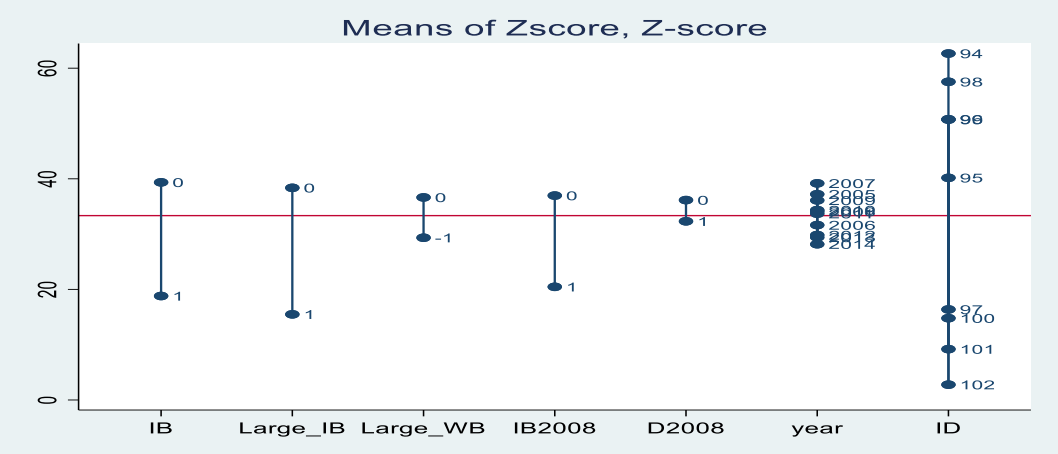

Figure 2 : **Mean of Zscore comparisons** : IB vs CB, Large_IB vs Small_IB , Large_CB vs Small_CB, Pre vs Post GFC 2008 for IB banks, Pre vs Post GFC 2008 for all Banks, between year, and between Quatarian banks (ID).

IV. Regression based Comparisons analysis between IBs and CBs

While univariate comparisons show significant differences between IBs and CBs, these differences could be driven by other bank characteristics. This is to be done within **regression estimation**. Different regression models are considered in this section. First, we Compare interest-free and CB controlling for *bank characteristics*. Second, we Compare IB and CB cross different *Size groups*. Third, we do analyse *cross IB* difference. Forth, we take account of *Market share* side for each type of banks. Fiveth, we take account of post GFC effect on IBs caracteristcs.

All the variables under the study must be **stationary otherwise spurious regression** may be found. Henceforth, Levin, Lin & Chu, ADF - Fisher Chi-square, and PP - Fisher Chi-square Unit Root Tests for PANEL data have been implemented to ensure that all the bank specific variables in the regression equation are **stationary.** The result is shown in **Table A 3**. All considered bank caracteristic variables are stationary.

Focusing on a sample of banks with both types allows us to control for unobserved time-variant bank-specific effects by introducing **bank and year** dummies, thus a clearer identification of such differences than when comparing banks from different types.

A. Controlling for bank caracteristics

To assess differences in Profitability, Liquidity, Credit risk, Insolvency, and stability across different bank types, we therefore run the following regression:

$$Y_{i,t} = \mu + \boldsymbol{\gamma IB_i} + \mu_t Y_t + \mu_i B_i + \boldsymbol{\delta}\, X_{i,t} + \pi D2008 + u_{it} \quad (1)$$

where $X_{i,t}$ is vector of Bank **caracteristics**,

$$X_{i,t} = (\mathrm{AGE}_{i,t}\ , \mathrm{Size}_{i,t}, \mathrm{Growth}_{i,t}, FAA_{i,t}, \mathrm{OBSIA}_{i,t})',$$

where

Age = Number of years since the bank was incorporated,

Size = Log(Total asset),

Growth = Log(Total assets) - Log(Total assets$_{-1}$),

$Y_{i,t}$ is one of our measures of Profitability, Liquidity, Credit risk, Insolvency, and stability of bank i, in year t, B_i are **Bank-fixed effects,** Y_t are **year-fixed effects,** IB_i is a **dummy** taking the value one for interest-free **banks**, $D2008$ is a dummy variable for GFC (taking the value one from year > 2008), and u_{it} is an error term. We thus compare IB and CB.

The results in **Table 9** show that IBs have lower Cash to deposits (CTD) and lower Cash to assets (CTA), higher Loans to deposits (LTD), higher Capital adequaty ratio (CAP), and higher Debt to assets (DTA). **IBs are then more capitalized and show lower liquidity,** higher **credit risk, and lower solvency.** The magnitude of these differences is also meaningful, with IB having a **6.559**% point lower Cash to assets and a 123.296% point lower Cash to deposits, 96.3959%

point higher Loans to deposits (LTD), 25.8155% points higher CAP, and 129.206% points higher Debt to assets (DTA).

B. Cross different Size groups

Now, we split the sample of all banks according to their asset **Size**. Specifically, we split the sample into banks above the 50th percentile (**Large** banks) and banks below the 50th percentile (**Small** banks). We therefore run the following regressions:

$$Y_{i,t} = \mu + \boldsymbol{\alpha}\ \textbf{Small\_IB}_{\boldsymbol{i}} + \boldsymbol{\delta}\ \textbf{Small\_CB}_{\boldsymbol{i}} + \mu_t Y_t + \mu_{\mathrm{i}} \mathrm{B}_i + \boldsymbol{\delta}\, X_{i,t} + \pi\, D2008 + u_{\mathrm{i}t} \quad (2)$$

where Small_IB is an Inetraction term between **small** bank and IB (a dummy variable equal to 1 if IB is Small, 0 otherwise), and Small_CB is an Inetraction term between **small** bank and CB (a dummy variable equal to 1 if CB is Small, 0 otherwise), $Y_{i,t}$ is one of our measures of Profitability, Liquidity, Credit risk, Insolvency, and stability of bank i, in year t, B_i are **Bank-fixed effects,** Y_t are **year-fixed effects,** $D2008$ is a dummy variable for GFC (taking the value one from year > 2008), and u_{it} is an error term.

The results in **Table 10** show that **small** IBs have higher Cash to deposits (**124.00884 %** CTD) while **small** CBs have lower Debt to assets (-13.22705 % DTA) and higher Z-score (1722.2707%). **Small IBs are then more liquid while small CB are more solvent and more stable**.

C. Cross-IBs variation

To controll for individual **IB** caracteristic in assessing the differences across different bank types, we therefore run the following regression:

$$Y_{i,t} = \mu + \boldsymbol{\gamma_i} \boldsymbol{IB_i} + \mu_t Y_t + \mu_{\mathrm{i}} \mathbf{B_i} + \delta\, X_{i,t} + \pi D2008 + u_{\mathrm{i}t} \quad (3)$$

where

IB is an Islamic Bank indicator,

$Y_{i,t}$ is one of our measures of Profitability, Liquidity, Credit risk, Insolvency, and stability of bank i, in year t, $\boldsymbol{B_i}$ are **Bank-fixed effects,** Y_t are **year-fixed effects,** $D2008$ is a dummy variable for GFC (taking the value one from year > 2008), and u_{it} is an error term.

OLS results of regression (3) for each group of considered measures are given at **Table 11.** Having three islamic banks, we can say that :

95 ≡ Barwa Bank has more Loans to deposits (158.305% in LTD) and higher stability (1849.09% in Z-score). **Barwa Bank is then riskier and more stable**.

100 ≡ Qatar International Islamic Bank is less profitable, it has less Return on assets (- 5.284 % ROA) and less Return on equity (- 32.71 % ROE). It has less liquidity (- 8. 887 % CTA and -154. 23486% CTD) and more Loans to deposits (80.695 % LTD). It is more solvent and more stable; it has lower Debt to assets (-20.734% DTA) and higher stability (80.695% in Z-score). **Qatar International Islamic Bank is then less profitable, less liquid, riskier, more solvent, and more stable.**

101 ≡ Qatar Islamic Bank SAQ has **less liquidity** (- 6.5599% in CTA and -123.296% in CTD), more Loans to deposits (80.695% in LTD), and **higher stability** (96.3959% in Z-score). **Qatar Islamic Bank SAQ is then less liquid, and riskier.**

We continue to find that IBs are riskier. But also, we find that these three Islamic banks have more **stability in common.**

D. High share Market for IBs

Taking into account differences in **Market share**, we use additional specifications, including **interacting** the IB dummy with High Market share variable (Hshare). To do so, we split the sample all banks according to their Market share. Specifically, we split the sample into banks above the 50th percentile (**high** Market share banks) and banks below the 50th percentile (**Low** Market share banks). We use additional specifications, including **interacting** the IB dummy with high Market share dummy. We therefore run the following regression :

$$Y_{i,t} = \mu + \beta\, IB_i + \boldsymbol{\gamma}\, \mathbf{HShareIB}_i + \mu_t Y_t + \mu_{\mathrm{i}} \mathrm{B_i} + \delta\, X_{i,t} + \pi\, D2008 + u_{\mathrm{i}t} \quad (4)$$

where

$$HShareIB = \text{HShare} * \text{IB},$$

HShare = 1 if Market Share ≥ Median market share,

Market share = Bank total assets /Country banks total assets * 100%,

$Y_{i,t}$ is one of our measures of Profitability, Liquidity, Credit risk, Insolvency, and stability of bank i, in year t, B_i are **Bank-fixed effects,** Y_t are **year-fixed effects,** IB_i is a **dummy** taking the value one for interest-free **banks**, $D2008$ is a dummy variable for GFC (taking the value one from year > 2008), and u_{it} is an error term.

OLS results of regressions (4) for each group of considered measures are given at **Table 12**. Rgressions results of **Table 12** show that IB with **higher market** share have relatively **higher profitability** ratios (**101.41 %** in ROA and **752.01 %** in ROE), have relatively **lower liquidity** ratios (77.66.7956% CTD) and **higher credit risk** (**1166.88** % in LTD, **1.543** in LLR, and **85.077** in NPL) than conventional banks and other IB. While IB have **highe**r capitalization (16.2%) and credit risk (4.7% in LTA and 18.6% in LTD) than CB.

We find that IBs have higher credit risk, higher profitability, lower liquidity, and higher capitalization than CBs in banks with higher market share of IB.

E. Post 2008 Global Financial Crisis (GFC) for IBs

Taking into account GFC effect and time trend (long run effect) on IBs, We run the following regression:

$$Y_{i,t} = \mu + \beta\, IB_i + \boldsymbol{\gamma}\, \boldsymbol{IB2008_i} + \mu_t Y_t + \mu_i B_i + \mu_{\,IBTrend_i} + \delta\, X_{i,t} + u_{it} \quad (5)$$

where

$$\boldsymbol{IB2008_i} = \mathrm{IB_i} * \boldsymbol{D2008},$$

$$\mathrm{IBTrend_i} = \mathrm{IB_i} * \mathrm{Trend},$$

Trend = t, $Y_{i,t}$ is one of our measures of Profitability, Liquidity, Credit risk, Insolvency, and stability of bank i, in year t, B_i are **Bank-fixed effects,** Y_t are **year-fixed effects,** IB_i is a **dummy** taking the value one for interest-free **banks**, $D2008$ is a dummy variable for GFC (taking the value one from year > 2008), and u_{it} is an error term.

OLS results of regressions (5) for each group of considered measures are given at

Table 13**.** From **Table** 13, We conclude that Post GFC, IB have **lower rentability** (- 3.6.0% in ROA and - 24.6% in ROE) but **higher capitalization** (5.33% in CAP) than Pre GFC **with higher (lower) risk** [14.4% in LTA (-5.7 in LLR and - 5.4% in NPL)]. We find also that IB have **less liquidity** ratios (- 6.45% in CTA) Post 2008 GFC (Global Financial Crisis). In long term all these effects take the opposite results.

In Quatar, with univariate analysis, compaired to conventional banks, interest-free banks are riskier and less stable, but have a higher liquidity, and are more solvent in average.

Regression based comparision show that

- ✓ In controlling for **bank caracteristics**, IBs are then **more capitalized** and show **less liquidity**, **higher credit risk**, and **lower solvency than CBs**,
- ✓ in controlling for **Size**, **Small IBs** are then **more liquid** while small CB are more **solvent** and more **stable**,
- ✓ a **cross IBs**, Barwa Bank is **riskier** and **more stable**, Qatar International Islamic Bank is **less profitable**, **less liquid**, **riskier**, **more solvent**, and **more stable**, and Qatar Islamic Bank SAQ is **less liquid**, **riskier**, but **more stable than CBs**,
- ✓ in banks with **higher market share** of IB, we find that IBs have **higher credit risk, higher profitability, lower liquidity, and higher capitalization than CBs**,
- ✓ Post GFC, IBs have **lower rentability, higher capitalization, higher risk, and less liquidity.**

All these results can be summed up as given in **Table 5** (given below).

V. Quantitative Analysis and Findings

A. Analysis

The analysis concerns here the vector of K=4 endogenous variables :[20]

$$\boldsymbol{Y_{it}} = [\mathbf{LZscore}_{it}, \boldsymbol{DTA_{it}}, \boldsymbol{ROA_{it}}, \boldsymbol{CAP_{it}}]',$$

[20] This choice is based on signifcant correlations between Z-score and the other variables, see Annexe Table A 2.

where $\text{LZscore}_{it} = \log(\text{Zscore}_{it})$, DTA_{it} is the debt to assets ratio, ROA_{it} is the Return on assets, CAP_{it} is the Capital adequaty ratio, and the subscripts 'i' and 't' represent individual banks and time period, respectively.

1. Unit-root test

Among various unit root tests, author has applied Fisher-type unit-root test (See **Table 2**). Fisher-type unit-root test based on augmented Dickey-Fuller tests has been implemented to ensure that considered variables are stationary. The result is shown below at **Table 2**. As all the series are stationary at level, then first differences is not needed for VAR specification.

Table 2: Unit root test results : Fisher-type unit-root test Based on augmented Dickey-Fuller tests.[21]

		CAP*		ROA**		DTA*		LZ-score*	
		Statistic	**p-value**	**Statistic**	**p-value**	**Statistic**	**p-value**	**Statistic**	**p-value**
Inverse chi-squared(18)	**P**	63.9781	0.0000	32.5528	0.0189	106.7087	0.0000	44.7538	0.0004
Inverse normal	**Z**	-2.9104	0.0018	-1.7180	0.0429	-3.7858	0.0001	-1.8166	0.0346
Inverse logit t(49)	**L***	-4.4051	0.0000	-1.6940	0.0483	-8.2477	0.0000	-2.4077	0.0099
Modified inv. chi-squared	**Pm**	7.6630	0.0000	2.4255	0.0076	14.7848	0.0000	4.4590	0.0000
Conclusion			SL2		SL2		SL2		SL2

Note : * Cross-sectional means removed lags(1), ** Panel means: Included.
SL2 ≡ Stationary variable.

2. Pearson Correlation Analysis

The Pearson correlation test reveals the correlation among the variables. It indicates how the variables are related with each other and also to what extent. The result is shown below at **Table 3** for all banks (Panel A), for Islamic banks (Panel B), and for Conventional banks (Panel C).

In Panel **A** (and Panel **C**), for all banks (for conventional banks), results of the Correlation analysis between **LZ-score=log(Z-score)** and DTA depict a positive significant coefficient of **0.2892 (0.2490)**. It denotes that if DTA increases it will have a positive impact on the Stability. The same relationship is found between the Capital adequaty ratio (CAP) and **LZ-score.** The test result shows a negative relationship between Return on assets (ROA) and **LZ-score**. It indicates that if the ROA increases it will have a negative impact on the Stability. In Panel **B**, for

[21] Ho: All panels contain unit roots, Ha: At least one panel is stationary.

Islamic banks, results of the Correlation analysis between **LZ-score=log(Z-score)** and Capital adequaty ratio (CAP) a positive significant coefficient of **0.8011.** It denotes that if CAP increases it will have a positive impact on the Stability of Islamic banks.

Table 3: Correlation matrix.

All banks				
Panel A :	**LZ-score**	**DTA**	**ROA**	**CAP**
LZ-score	1.0000			
DTA	**0.2892**	1.0000		
	0.0084			
ROA	**-0.2016**	-0.1066	1.0000	
	0.0694	0.3405		
CAP	**0.2647**	0.0268	-0.0435	1.0000
	0.0163	0.8111	0.6980	
Islamic Banks				
Panel B :	**LZ-score**	**DTA**	**ROA**	**CAP**
LZ-score	1.0000			
DTA	0.2363	1.0000		
	0.2663			
ROA	-0.0651	-0.1326	1.0000	
	0.7624	0.5369		
CAP	**0.8011**	0.3322	0.0002	1.0000
	0.0000	0.1127	0.9991	
Conventional Banks				
Panel C :	**LZ-score**	**DTA**	**ROA**	**CAP**
LZ-score	1.0000			
DTA	**0.2490**	1.0000		
	0.0594			
ROA	**-0.2190**	-0.0938	1.0000	
	0.0987	0.4838		
CAP	**0.2186**	0.0294	-0.0634	1.0000
	0.0993	0.8268	0.6364	

3. Granger Causality Test

The simple correlation does not imply anything regarding the causality amongst the variables. To find out the causal relationship between two variables (Granger, 1969) causality test is implemented between each pairewise considered variables. Granger causality test has been performed with default lag selection. There are

four data series i.e., $\text{LZscore} = \log(\text{Zscore})$, DTA_{it} the **debt** to assets ratio, ROA_{it} the Return on assets, and CAP_{it} the Capital adequaty ratio. Each series has been analyzed for causality with the others. Results of the Granger causality test are presented in **Table 4**.

Table 4 shows that there is no bilateral directional relationship between LZ-score and DTA, ROA and CAP, at 5% significance level. The test results are tabulated below. It can be observed from the results that three equations are showing significant unilateral causal relationship that is from **LZ-score to ROA,** from **CAP to LZ-score**, and from **CAP to DTA**.

Table 4: Pairwise Granger causality tests results (all banks).

Null Hypothesis:	Obs	F-Statistic	Prob.
DTA does not Granger Cause LZ-score	73	0.00545	0.9414
LZ-score does not Granger Cause DTA		1.42880	0.2360
ROA does not Granger Cause LZ-score	**73**	0.01922	0.8901
LZ-score does not Granger Cause ROA		**3.84783**	**0.0538**
CAP does not Granger Cause LZ-score	**73**	**2.89431**	**0.0933**
LZ-score does not Granger Cause CAP		1.11960	0.2936
ROA does not Granger Cause DTA	73	0.11331	0.7374
DTA does not Granger Cause ROA		0.36097	0.5499
CAP does not Granger Cause DTA	**73**	**7.17195**	**0.0092**
DTA does not Granger Cause CAP		0.04776	0.8277
CAP does not Granger Cause ROA	73	0.08915	0.7661
ROA does not Granger Cause CAP		1.74513	0.1908

B. Methodology: PANEL VAR-X model

The analysis applies here a panel VAR-X model, which serves as a useful tool to evaluate the magnitude and duration of the effects. Like simultaneous equations models, PVAR model is a system of regression equations, it contains several endogenous variables. Each variable is regressed with its own lag and the lags of other endogenous variables. In addition, the advantage of this model is that it does not require any a priori assumptions on the direction of the feedback between variables in the model. Thus, PVAR is a generalization of pairwise Granger

Causality regression.[22] The panel VAR-X will be based on the following specification:[23]

$$Y_{it} = \boldsymbol{\Gamma_0} + \sum_{j=1}^{p} \Gamma_j \, Y_{i,t-j} + \beta X_{it} + u_{it} \quad (6)$$

$$\boldsymbol{Y_{it}} = [\mathbf{LZscore}_{it}, \boldsymbol{DTA_{it}}, \boldsymbol{ROA_{it}}, \boldsymbol{CAP_{it}}]',$$

$$X_{i,t} = (\text{Share}_{i,t}\ , \text{Size}_{i,t}, D2008, IB_i)',$$

where X_{it} are exogenous explicative variables, p is the optimal lag parameter to be determined, $\boldsymbol{\Gamma_0}$ is Kx1 real parameter vector, Γ_j are KxK real parameter matrix, j=1, …, p, the subscripts 'i' and 't' represent individual banks and time period, respectively, and u_{it} are the idiosyncratic errors independent and identically distributed (i.i.d.).

In this specification, we follow the presumption that the **debt** to assets ratio, DTA, the Return on assets, ROA, and the Capital adequaty ratio, CAP, affect **Zscore**s only with a lag, while **Zscore**s have a contemporaneous effect on bank activity mainly through debt to assets ratio, DTA. Therefore, LZscore_{it} appears first in the ordering, and $DTA_{it}, ROA_{it}, CAP_{it}$ appear later (in this order).[24]

With time series data, it was shown by (Zellner, 1962) that estimating the *K* equations separately by least square (**LS)** in system of equations (6) is identical to generalized LS (**GLS)** estimation if no restrictions are imposed on the parameter matrix (see (Belsley & Kontoghiorghes, 2009) p 309)). If the process is normally distributed (Gaussian), this estimator is also identical to the ML estimator and consequently there is no loss in asymptotic estimation efficiency.[25]

This technique may combine the traditional **VAR approach**, which treat all the variables in the system as endogenous, with a **panel data approach**, which allows for **unobserved individual heterogeneity** (the *error components SUR model*) as given in the following model:

---

[22] According to (Engle & Granger, 1987) argument that if the time series are cointegrated, then causality should be tested with VECM instead of unrestricted VAR model if considered series are integrated.

[23] For good introductions to VARs, see (L¨utkepohl, 2005), (Hamilton, 1994), (Stock & Watson, 2001), and (Becketti, 2013).

[24] Qualitatively and quantitatively, the results remain broadly unchanged for alternative ordering.

[25] If the process is stable (I (0)), LS estimator has an asymptotic normal distribution under general conditions. In addition, however, that an asymptotically correct inference is obtained by pretending that the result is precise and using it in the usual way to set up *t*, $\chi 2$ and *F* statistics.

$$Y_{it} = \boldsymbol{\mu_i} + \sum_{j=1}^{P} \Gamma_j \, Y_{i,t-j} + \beta X_{it} + u_{it} \quad (7)$$

$$\boldsymbol{Y_{it}} = [\mathbf{LZscore}_{it}, \boldsymbol{DTA_{it}}, \boldsymbol{ROA_{it}}, \boldsymbol{CAP_{it}}]',$$

$$X_{i,t} = (\text{Share}_{i,t}\ , \text{Size}_{i,t}, D2008, IB_i)',$$

where Y_{it} is a **vector** of four endogenous variables : $\text{LZscore}_{it} = \log(\text{Zscore}_{it})$, DTA_{it} is the debt to assets ratio, ROA_{it} is the Return on assets, and CAP_{it} is the Capital adequaty ratio, X_{it} are exogenous explicative variables, and where the **Banks'** specifics are captured in this framework in the fixed effect parameter, denoted in model (7) by vector $\boldsymbol{\mu_i}$**,** and the subscripts 'i' and 't' represent individual banks and time period, respectively**.**

When Y_{it} is a scalar, linear dynamic panel-data models include p lags of the dependent variable Y_{it} as covariates and contain unobserved panel-level effects, fixed or random $\boldsymbol{\mu_i}$. By construction, the unobserved panel-level effects $\boldsymbol{\mu_i}$ are correlated with the lagged dependent variables Y_{it-1}, making standard estimators (FE and RE estimators) inconsistent. (Arellano & Bond, 1991) derived a **consistent** generalized method of moments (GMM) estimator for the parameters of this model. [26] They build upon the idea of (Anderson & Hsiao, 1981) by noting that they identify **how many lags** of the dependent variable Y_{it}, the predetermined variables Y_{it-j}, and the endogenous variables are valid instruments and how to combine these lagged levels with first differences of the strictly exogenous variables X_{it} into a potentially large instrument matrix. (Arellano & Bond, 1991) derive then the corresponding one-step and two-step GMM estimators,[27] as well as the **robust VCE estimator for the one-step GMM** estimator. Application of the **Sargan/Hansen** test for joint validity of the instruments as standard practice after GMM Estimation will be done.[28] In the subsequent section, the **robust VCE for the one-step GMM** estimator will be applied.

If there are *r* instruments and only *K* parameters to estimate, then panel GMM estimations leaves $(r - K)$ overidentifying restrictions. **Sargan/Hansen** test statistic **of overidentifying restrictions** is distributed as $\chi 2(r - K)$ under the null

[26] With many panels and few periods, estimators are constructed by first-differencing to remove the panel-level effects and using instruments to form moment conditions.
[27] They also found that the robust two-step VCE was seriously biased.
[28] For detailed surveys of the literature on GMM estimation and dynamic panel estimators, see (Wooldridge, 2002) and (Baltagi, 2005).

hypothesis that the overidentifying restrictions are valid. If observed test statistic is large then the overidentifying moment conditions are rejected and we conclude that some of the instruments are correlated with the error and hence are endogenous. Then, if test statistic has p-value higher than 0.05, so the restrictions are not rejected and we conclude that the overidentifying instruments are valid instruments (See (Cameron & Trivedi, 2005)).

When the idiosyncratic errors u_{it} are i.i.d., the first-differenced errors Δu_{it} are first-order serially correlated. Serial correlation in the first-differenced errors at an order higher than 1 implies that the moment conditions used are not valid. To test for autocorrelation aside from the fixed effects, the **Arellano–Bond test** will be applied to the residuals in differences.

C. Findings

Before estimation, lag order for VAR model should be chosen through minimizing the value of usual information criteria. Akaike information criterion (AIC), Schwarz information criterion (SC), and Hannan-Quinn information criterion (H-Q) have been employed for lag selection (See Table 13 in Annexe). From Table 13 all information criterion AIC, SC and H-Q are recommending p = 1 as optimal lag.[29]

From **Table 15** in Annexe (LS results for **model** (6)),[30] the regression coefficient of **LZ-score$_{-1}$** is **0.929386,** 0.002756, -**0.007721, and -0.007814** which affects repectively the LZ-score and DTA positively and affects negatively the ROA and CAP though the result is not statistically significant at 5% significance level for DTA**. The** regression coefficient of **DTA$_{-1}$** is 0.810133 and **0.034465** which affects significantly and positively the DTA and CAP repectively. **The** regression coefficient of **ROA$_{-1}$** is **0.783497** which affects Significantly the ROA. **The** regression coefficient of **CAP$_{-1}$** is **-0.491344, 0.234915,** 0.013763, and **0.386420** which affects the LZ-score negatively and affects positively the DTA, ROA, and

[29] The AIC always suggests the largest order, SC chooses the smallest order, and H-Q is in between (see (Belsley & Kontoghiorghes, 2009) p 316).
[30] Statistical inference are based on panel-robust standard errors.

CAP repectively though the result is not statistically significant at 5% level for DTA. Diagnostic tests (in **Table 16**, see Annexe) suggest adequate specifications as the models show free autocorrelation errors.

This result implies that **stability** is significantly sensitive to the increase of previous Z-score and to decrease in previous CAP. **Islamic Banks are Less stable**. **Profitability** is significantly sensitive to the decrease of previous Z-score and to increase in previous ROA. **Islamic Banks are less profitable**. **Insolvency** and capitalization are sensitive to the increase in previous DTA and CAP. While **CAP** is sensitive in addition to decrease of previous Z-score. **CAP is lower for Large bank, and higher for high share bank and post GFC.**

The dynamic behavior of model (6) will be assessed using impulse response functions, which describe the reaction of one variable in the system to innovations in an other variable in the system while holding all other shocks at zero.[31] From **Figure 3**, we deduce :

- ✓ Response of Z-scores to shocks in CAP ratio: An increase of one percentage point in CAP ratio leads to a cumulative **decline** of 5 percentage point in Z-scores, (in the 7 subsequent year, **Figure 3**).
- ✓ Response of DTA ratio to shocks in CAP ratio: an increase of one percentage point in CAP ratio leads to a cumulative **increase** of 0.4 percentage point in DTAs (in the subsequent year).
- ✓ Response of ROA ratio to shocks in Z-score ratio: An increase of one percentage point in Z-scores ratio leads to a cumulative **decline** of 1 percentage point in ROAs (in the 5 subsequent year).
- ✓ Response of CAP ratio to shocks in Z-score ratio (DTA ratio): An increase of one percentage point in Z-scores ratio (DTA ratio) leads to a cumulative **decline** of 2 (0.5) percentage point in ROAs (in the 5 subsequent year).

For equation (7), since the fixed effects are correlated with the regressors due to lags of the dependent variable, the Finding uses **Arellano-Bond : one-step system GMM** for **each variable** (See Table 16 in Annexe) and **seemingly**

[31] The shocks in the VAR were orthogonized using Cholesky decomposition, which implies that variables appearing earlier in the ordering are considered more exogenous, while those appearing later in the ordering are considered more endogenous.

unrelated regression estimator (SURE) for **the system of equation** (See **Table 18** in Annexe), the PVAR-X.[32]

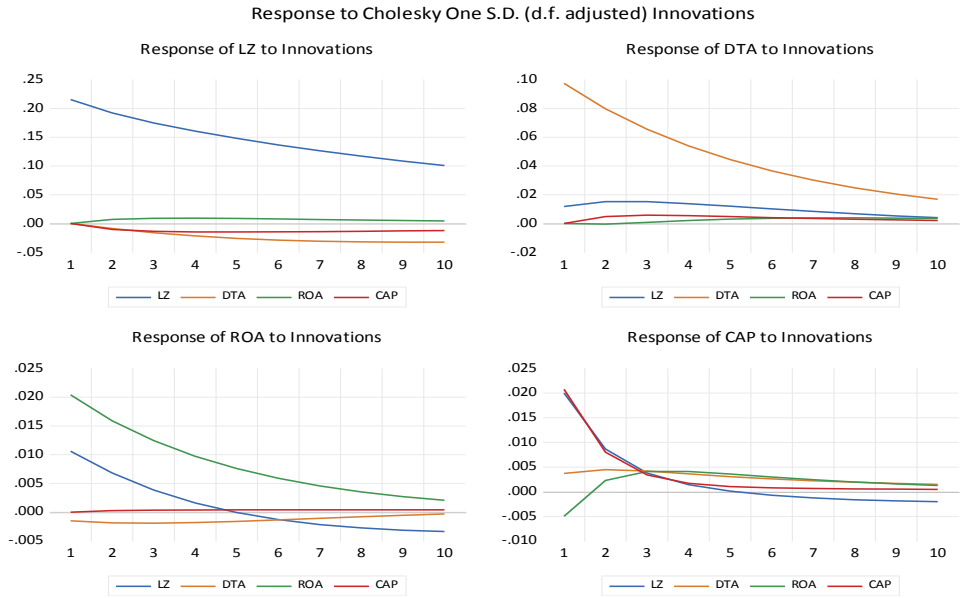

Figure 3: Impulse response function from Equation (6) results (LZ ≡ log(Z-score)).

Taking account of individual fixed effect, from Table 16 (*Arellano-Bond : One-step system GMM results for model* (7)),[33] the regression coefficient of **LZ-score**$_{-1}$ is 0**.931,** 0.01052, -**0.029, and** - **0.0099** which affects repectively the LZ-score and DTA positively and affects negatively the ROA and CAP though the result is not statistically significant at 5% significance level for DTA**. The** regression coefficient of **DTA**$_{-1}$ is **0.9252** and **0.0276** which affects significantly and positively the DTA and CAP repectively. **The** regression coefficient of **ROA**$_{-1}$ is 0.**4551 and 0.578** which affects significantly the DTA and ROA respectively. **The** regression coefficient of **CAP**$_{-1}$ is - **0.57, 0.2457, 0.**0187, and 0**.3727** which affects the LZ-score negatively and affects positively the DTA, ROA, and CAP repectively though the result is not statistically significant at 5% level for ROA.

[32] This transformation preserves the orthogonality between the transformed variables and lagged regressors. The estimation uses lagged regressors as instruments and estimate the coefficient by GMM methodology.For **PVAR model**, and with **balanced** panel data, we have to use a forward mean-differencing (**Helmert procedure**), which removes the mean of all forward future observations available for each bank-year (Arellano & Bover, 1995)**, see** (Klein, 2013)**, and** (Love & Zicchino, 2006). This will be done in subsequent version since available data are unbalanced panel data.

[33] The Arellano–Bond estimator is designed for datasets with many panels and few periods, and it requires that there be no autocorrelation in the idiosyncratic errors.

Arellano-Bond test for zero autocorrelation in first-differenced errors are given at **Table 16.** The value of the test for first order and second-order autocorrelation present no evidence of model misspecification.

This resul is in line with the previous finding. It implies again that **stability** is significantly sensitive to the increase of previous Z-score and to decrease in previous CAP. **Islamic Banks are Less stable**. **Profitability** is significantly sensitive to the decrease of previous Z-score and to increase in previous ROA. **Higher share bank are less profitable**. **Insolvency** and **capitalization** are sensitive to the increase in previous DTA and CAP. While **CAP** is sensitive in addition to decrease of previous Z-score. **Insolvency** is sensitive in addition to the increase in previous ROA. **Solvency is lower for small bank and is higher for high share bank. Capitalization is higher for small banks**.

From **Table 18 (***SURE results for model* (7))**,** with SURE technic (OLS on the system of equations), the regression coefficient of **LZ-score$_{-1}$** is **0.369,** - 0.0264073, - **0.0275, and 0.04057** which affects repectively the LZ-score and CAP positively and affects negatively the DTA and ROA though the result is not statistically significant at 5% significance level for DTA**. The** regression coefficient of **DTA$_{-1}$** is **0.63887** and - **0.0487** which affects significantly and positively the DTA and negatively the CAP repectively. **The** regression coefficient of **ROA$_{-1}$** is **0.5944 and** - **0.3518** which affects Significantly the ROA and CAP respectively. The regression coefficient of **CAP$_{-1}$** is **0.1639** which has significant affect only on the CAP. Diagnostic tests (in

Table 19 given in Annexe) suggest **unadequate** specification as we reject the hypothesis that correlation between residuals is zero for considered model.[34] However, estimation results are presented **for reference** since for correlated residuals case, we have better to use the feasible GLS estimator or Two-stage least-squares regression (2LS) estimation methods. 2LS estimation results will be reported here after (see **Table 7**).

Table 7 (2LS for model (7)) results differ from the previous findings. It implies that **stability** is significantly sensitive only to the increase of previous Z-score. **Islamic Banks, high share banks and large banks are less stable, but Bank are more stable Post GFC**. **Profitability** is again significantly sensitive to the decrease of previous Z-score and to increase in previous ROA. Also **Higher share**

[34] The models show global significance at 1% level for each equation.

bank are less profitable and **profitability is lower Post GFC**. In line with regression base comparison analysis, 100 ≡ Qatar International Islamic Bank is found to be the less profitable Islamic bank. **Insolvency** is sensitive only to the increase in previous DTA. But, again **Solvency is lower for small bank and post GFC and is higher for high share bank.** While **CAP** is sensitive to the increase of previous Z-score and CAP, and significantly sensitive to the decrease in DTA and ROA. **Capitalization is higher Post GFC and is smaller for large banks**. **All islamic banks are more capitalized**.[35]

These results can be summed up as follow :

- IBs are less stable, less profitable, and more capitalized,
- Small banks are more stable, less solvent, and more capitalized,
- High share banks are less stable, more solvent, and less profitable,
- Post GFC, banks are more stable, less solvent, and less profitable.

All given results are summed up as given in the following Tables (Table 5 and Table 6).

Table 5: Comparison analysis IB vs CB; a sum up.

	Univariate analysis	**Regression analysis**						
		Bank caracteristic	**Size**	**Hshare**	**Across IB** 95	100	101	**GFC**
Credit risk	+	+		+	+	+	+	+
Liquidity	+	-	+	-		-	-	-
Capitalization		+		+				+
Solvency	+	-	+			+		
Stability	-		+		+	+	+	
Profitability				+		-		-

Note : 95 ≡ Barwa Bank, 100 ≡ Qatar International Islamic Bank, 101≡ Qatar Islamic Bank SAQ. Empty cells suggest that the determinant was not significant.

[35] These Results are similar to ones given by OLS.

Table 6: Sum up comparison results from model (7).

LS (PVAR)	**Stability**	**Solvency**	**Profitability**	**Captalization**
IBs	-		-	
Small Banks				+
High share Bs				+
Post GFC				+
Arellano-Bond	**Stability**	**Solvency**	**Profitability**	**Capitalization**
IBs	-			+
Small Banks		-		+
High share Bs		+	-	
Post GFC				+
2LS (or SURE)	**Stability**	**Solvency**	**Profitability**	**Captalization**
IBs	-			
Small Banks	+	-		+
High share Bs	-	+	-	
Post GFC	+	-	-	

Note: Empty cells suggest that the determinant was not significant.

Table 7: 2LS estimation results.

	LZ-score			DTA			ROA			CAP		
	Coef.	**Std. Err.**	**P>z**	**Coef.**	**Std. Err.**	**P>z**	**Coef.**	**Std. Err.**	**P>z**	**Coef.**	**Std. Err.**	**P>z**
LZ-score												
-1	.3692254	.1227157	**0.003**	-.0264073	.0730633	0.718	-.0275236	.0146336	**0.060**	.0405712	.0187131	**0.030**
DTA -1	-.1278848	.1759113	0.467	.6388679	**.1047353**	**0.000**	.0004246	.020977	0.984	-.0487095	.026825	**0.069**
ROA -1	-.466796	.9439515	0.621	.0754288	.5620164	0.893	.5944323	.112564	**0.000**	-.3517977	.1439449	**0.015**
CAP -1	.0664699	.3324969	0.842	.1235902	.1979643	0.532	.0196748	.0396495	0.620	.1639397	.0507031	**0.001**
Share	-3.611944	1.229614	**0.003**	1.62638	.7320959	**0.026**	-.7765118	**.1466285**	**0.000**	.1386593	.1875061	0.460
Size	-.6709672	.1622183	**0.000**	-.3580094	.0965826	**0.000**	.0109892	.0193441	0.570	-.1293768	.024737	**0.000**
D2008	.1419235	.0840597	**0.091**	.1073058	.050048	**0.032**	-.0167553	.0100239	**0.095**	.0421658	.0128184	**0.001**
Bank												
95	-.3391593	.0990478	**0.001**	-.0377772	.0589718	0.522	-.0156137	.0118112	0.186	.0260699	.015104	**0.084**
96	.5461704	.1153966	**0.000**	.1651475	.0687056	**0.016**	.0302864	.0137608	**0.028**	.0660678	.017597	**0.000**
97	-.3675879	.1436467	**0.010**	.0233747	.0855254	0.785	-.0139402	.0171295	0.416	.0420983	.021905	**0.055**
98	.0753755	.0914325	0.410	-.0073273	.0544377	0.893	.0002634	.0109031	0.981	-.0450248	.0139427	**0.001**
99	1.15725	.1596595	**0.000**	.1120595	.0950592	0.238	.0919118	.019039	**0.000**	.0525515	.0243468	**0.031**
100	-.8422886	.1898013	**0.000**	-.127756	.1130052	0.258	-.0374913	.0226333	**0.098**	.0518547	.0289431	**0.073**
101	-.7745585	.2160101	**0.000**	.0199775	.1286096	0.877	-.0173519	.0257587	0.501	.1170045	.0329398	**0.000**
102	-.6542894	.3383677	**0.053**	.0135315	.2014597	0.946	.0304245	.0403495	0.451	.2138182	.0515983	**0.000**
_cons	5.142001	.802443	0.000	1.285774	.477764	0.007	.1453505	.0956894	0.129	.4572792	.122366	0.000

VI. Conclusion

This paper contributes to the empirical literature on interest-free finance by investigating the feature of interest-free (IB) and conventional banks (CBs) in Quatar over the period 2005–2014.[36] Our sample contains 9 banks (6 conventional and 3 Islamic). We have 90 observations, or bank-years of data, for banks operating in Quatar for the calendar years 2005–2014.

To distinguish between interest-free and conventional banks [in terms of Profitability, Liquidity, Credit and Insolvency risk, and Stability], 12 financial ratios are used in this study. All are defined in **Table 1**. We classify these ratios into six general categories: **profitability** ratios (ROA, and ROE), **liquidity** ratios (CTA, and CTD), **credit** risk (LLR, NPL, LTA, LTD), **insolvency risk** (DTA), **Reglementary risk** (CAP), and asset **structure** ratios (FAA, OBSIA). We use also the Z-score as measure of bank **stability.**

Three technics are used to do a comparisons study. In first stage, a univariate analysis based on t-test is conducted. In second stage, a multivariate regression based comparisons is done. And in third stage, a PVAR-X model is considered. Results differ from one technic to an other [see sum up in Table 5 for univariate analysis (descriptive) and multivariate regression based comparisons and in Table 6 for Panel VAR-X model investigations]: [37]

i) **With univariate** (t-test based) analysis, compaired to conventional banks, **IBs** are **riskier** and **less stable**, but have a **higher liquidity**, and are **more solvent**.

ii) **With multivariate regression based comparision**, first we compare interest-free and CB controlling for **bank characteristics**. Second, we Compare IB and CB cross different **Size groups**. Third, we do analyse cross IB difference. Forth, we take account of **Market share** side for each type of banks. And then, we take account of post 2008 GFC effect on IBs caracteristics. **Regression based comparision** results say that:

[36] List of Quatarian banks is given at Annexe, see Table A 1.

[37] From Table 5, it is the Small IBs wich are **more liquid** while small CBs are more solvent and more stable. IBs with higher market share have higher credit risk, higher capitalization, and higher profitability. Post the 2008 GFC, IBs are less liquid, have higher capitalization, higher risk, and lower rentability.

- IBs show **higher** credit risk, **lower liquidity**, **lower solvency, and are more capitalized**.
- **Small** IBs are more liquid while small CB are more solvent and more stable.
- **A cross IBs,** Barwa Bank is the riskier while Qatar International Islamic Bank is the less profitable, the less liquid, the more solvent, and the more stable (the three IB are more stable than CBs).
- In banks **with higher market share** of IB, we find that IBs have higher credit risk, higher capitalization, lower liquidity, and higher profitability.

iii) Panel VAR-X(1) model results say that:[38]

- IBs are less stable, less profitable, and have higher capitalization,
- Small banks are more stable, less solvent, and have higher capitalization,
- Higher share banks are less stable, more solvent, and less profitable,
- Post GFC, banks are more stable, less solvent, and less profitable.

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[38] From Table 6, **IBs** are found to be less stable, less profitable, and have higher capitalization. **Post GFC**, all Quatarian banks are found to be more stable, less solvent, and less profitable. **Small banks** are found to be more stable, less solvent, and have higher capitalization. While banks with **Higher market share** are found to be less stable, more solvent, and less profitable.

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ANNEXE

Bank List

Table A 1: List of Quatarian banks covered in this study.[39]

Conventional Banks
• 94 Al Khalij Commercial Bank, • 96 Commercial Bank of Qatar, • 97 Doha Bank, • 98 International Bank of Qatar Q.S.C., • 99 Qatar National Bank, • 102 Arab Bank Group outlet[40]
Islamic Banks
• 95 Barwa Bank, • 100 Qatar International Islamic Bank, • 101 Qatar Islamic Bank SAQ,
Islamic window or Branch
• Al Khalij Commercial Bank • Doha Bank, • Qatar National Bank, • Arab Bank Group[41]

Tables for comparison analysis.

Table 8: Descriptive statistics and Student t-test

Variable	ALL			CB			IB			Difference t-test p-value
	N	Mean	std	N	Mean	std	N	Mean	std	
ROA	82	.0280371	.0302731	58	.0270764	.0334038	24	.0303588	.0213143	0.6579
ROE	82	.1710475	.1880095	58	.1773095	.2125643	24	.1559143	.1103193	0.6421
CTA	82	.0689492	.0995492	58	.0809797	.1158331	24	.0398755	.0200496	0.0890
CTD	**71**	**.3346594**	**1.334922**	**51**	**.0964944**	**.0696646**	**20**	**.9419801**	**2.451947**	**0.0153**
LTA	**67**	**.4948697**	**.2033684**	**43**	**.4554107**	**.2057516**	**24**	**.5655671**	**.1823461**	**0.0324**
LTD	**67**	**.7594499**	**.4226365**	**43**	**.6706522**	**.3801973**	**24**	**.9185458**	**.455469**	**0.0201**
LLR	66	.0187141	.0235819	42	.0195319	.0198481	24	.0172829	.0294277	0.7124
NPL	66	.0219742	.0291444	42	.026669	.0350288	24	.0137583	.0101238	0.0834
CAP	82	.1837919	.1004844	58	.1728717	.106104	24	.2101823	.081434	0.1268
DTA	**82**	**.1582212**	**.1880161**	**58**	**.186064**	**.207909**	**24**	**.0909344**	**.1033865**	**0.0363**
Zscore	**82**	**33.34309**	**24.67625**	**58**	**39.35873**	**25.49786**	**24**	**18.80527**	**14.88073**	**0.0004**

Table 9 : Comparing **IB** and **CB**, Controlling for bank caracteristics (Equation (1)).

[39] Source : Islamic financial instituitions, Global investment and Business Center , USA 2009.

[40] (Combined) has four branches in Qatar, along with an Islamic banking.

[41] Merged with Abu Dhabi Commercial Bank in 2019.

Variable	Profitability			Liquidity		Credit risk
	Return on assets ROA	Return on equity ROE	Cash to assets CTA	Cash to deposits CTD	Loans to assets LTA	Loans to deposits LTD
IB	**-.02305872***	**-.17917362***	**-.06559928*** **	**-1.2329612** **	**.12126295***	**.963959*** **
Size	-.15026045***	-.84800812***	-.17192829***	-3.2301069*	-.06986214	.55917917
AGE	.00356023***	.02048295***	.00493062***	.08435535**	.00207893	-.01646901
Growth	-.00994461	.00722158	-.01008688	4.7985985**	-.12394764	-1.6530088**
FAA	-1.7655009*	-10.823657*	.26455596	2.3703382	12.168547***	46.551446***
OBSIA	-.04281989	-.31417727	-.06092887	.47539101	.21113323*	-.63659225
_cons	.57726423***	3.2681832***	.62403374***	10.09007*	.60796782	-1.1780225
N	63	63	63	55	47	47
R^2	.75175475	.67877737	.68521349	.80077899	.68094845	.75912886
F	7.0856278	2.3973505	3.5201562	1.2970402	.	.

(suite)

Variable	Credit risk		Reglementary risk	Insolvency	Stability
	Loans loss reserves to gross loans LLR	Non-performing loans to gross loans NPL	Capital adequaty ratio CAP	Debt to assets DTA	Zscore
IB	.11796981	.05026301	**.25815529** **	**1.2920647*** **	**25.455072**
Size	.05084024	-.03063245	-.15629385***	-.03573678	-19.701974***
AGE	.00381641	.00477594	.01661861**	.06722557***	1.8432311**
Growth	-.09578532	.01198083	.01144815	.03055816	11.02221
FAA	-1.3662996	-2.8324136	.88007638	.88452569	-198.06652
OBSIA	-.03732337	-.08784498	.02451734	-.08013262	-6.1195284
Trend	-.0036911	-.00360204	-.00842333**	-.04327521***	-1.400849***
_cons	3.3600574	3.6201916	8.5675511**	40.742122***	1423.6011***
N	47	47	63	63	63
R^2	.42049036	.44504626	.78094768	.95228089	.96364439
F	.	.	8.8404741	56.55891	95.376571

Table 10: Comparing Small IB, Small CB (Equation (2)).

Variable	Profitability		Liquidity			Credit risk
	Return on assets ROA	Return on equity ROE	Cash to assets CTA	Cash to deposits CTD	Loans to assets LTA	Loans to deposits LTD
Small_IB	-.01112609	-.05357403	.00319064	**1.2400884** **	-.0498457	-.06907365
Small_CB	-.01121755	-.06442157	-.04675863	-.425979	-.14336008***	.01149361
Size	-.15381283***	-.86641482***	-.17715893***	-2.8392094**	-.08416828	.56830519
AGE	.00360977***	.02073727***	.00499225***	.07537316***	.0021545	-.01676388
Growth	-.0050102	.03157889	-.00863376	4.0263122***	-.11838227	-1.6702145**
FAA	-1.7922412*	-10.896588	.54031035	15.579876	12.350342***	45.952883***
OBSIA	-.04380322	-.31957601	-.06383474	.42837261	.20017808	-.64289418
Trend						
_cons	.61571367***	3.4694978***	.69067591***	7.7685275*	.88508332*	-1.1306587
N	63	63	63	55	47	47
R^2	.75569902	.68150466	.69327291	.87406919	.71621302	.7598803
F	.	.	.	.	.	.

(suite)

Variable	Credit risk		Reglementary risk	Insolvency	Stability
	LLR	NPL	CAP	DTA	Zscore
Small_IB	-.00936043	.00024581	.01905494	.01362837	4.3121803
Small_CB	.00583419	-.01293345	.00802773	-.13227054***	17.222707***
Size	.05266609	-.03244099	-.15160845***	-.04964389	-16.715158***
AGE	-.00201466	.00211606	.00165585	-.00238857	.19853836
Growth	-.09862401	.01357073	.00363916	.03289379	8.3708409
FAA	-1.4647206	-2.7781081	.98586682	1.7005336	-256.76912
OBSIA	-.03799668	-.08836727	.02548801	-.08824197	-4.917134

Trend	-.00007674	-.00192363	.00088598	.00033419	-.39712656***
_cons	-.014742	2.0737153	-.17208773	.20821133	451.61423***
N	47	47	63	63	63
R^2	.42413999	.44738966	.78454699	.9579639	.97191985
F	.	.	.	.	.

legend: * p<.1; ** p<.05; *** p<.01.

Table 11: Comparing Islamic and conventional banks, testing for **cross-IB** variation ; Equation (3).

	Profitability			Liquidity		Credit risk
Variable	**Return on assets ROA**	**Return on equity ROE**	**Cash to assets CTA**	**Cash to deposits CTD**	**Loans to assets LTA**	**Loans to deposits LTD**
IB						
95	-.02890601	-.19313592	-.01954553	.54504521	.07054471	**1.5830549****
100	**-.05284145*****	**-.32719311*****	**-.08887202*****	**-1.5423486****	.04602729	**.80695048****
101	-.02305872*	-.17917362*	**-.06559928*****	**-1.2329612****	.12126295*	**.963959*****
Size	-.15026045***	-.84800812***	-.17192829***	-3.2301069*	-.06986214	.55917917
AGE	.00356023***	.02048295***	.00493062***	.08435535**	.00207893	-.01646901
Growth	-.00994461	.00722158	-.01008688	4.7985985**	-.12394764	-1.6530088**
FAA	-1.7655009*	-10.823657*	.26455596	2.3703382	12.168547***	46.551446***
OBSIA	-.04281989	-.31417727	-.06092887	.47539101	.21113323*	-.63659225
_cons	.57726423***	3.2681832***	.62403374***	10.09007*	.60796782	-1.1780225
N	63	63	63	55	47	47
R^2	.75175475	.67877737	.68521349	.80077899	.68094845	.75912886
F	7.0856278	2.3973505	3.5201562	1.2970402	.	.

(suite)

	Credit risk		Reglementary risk	Insolvency	Stability
Variable	**Loans loss reserves to gross loans LLR**	**Non-performing loans to gross loans NPL**	**Capital adequaty ratio CAP**	**Debt to assets DTA**	**Zscore**
IB					
95	.07185545	-.03027027	.04192241	-.0125017	**18.490943*****
100	.02574046	-.0160118	-.09207035*	**-.20733633*****	**58.990453*****
101	.03753724	-.00753479	-.04727405	-.01555247	**54.701044*****
Size	.05084024	-.03063245	-.15629385***	-.03573678	-19.701974***
AGE	-.00047333	.00169339	.00032904	-.00251402	3.4030163***
Growth	-.09578532	.01198083	.01144815	.03055816	11.02221
FAA	-1.3662996	-2.8324136	.88007638	.88452569	-198.06652
OBSIA	-.03732337	-.08784498	.02451734	-.08013262	-6.1195284
Trend	-.00101001	-.00167545	.00175765	.00031203	-2.3757148***
_cons	.85699557	1.8215241	-.93740983	.04907459	2333.7357***
N	47	47	63	63	63
R^2	.42049036	.44504626	.78094768	.95228089	.96364439
F	.	.	8.8404767	56.558918	95.376564

Note : 95 ≡ Barwa Bank, 100 ≡ Qatar International Islamic Bank, 101 ≡ Qatar Islamic Bank SAQ.

Table 12 : Comparing Islamic and conventional banks, testing of High share Market for IBs ; (Equation (4)).

	Profitability			Liquidity		Credit risk
Variable	**Return on assets ROA**	**Return on equity ROE**	**Cash to assets CTA**	**Cash to deposits CTD**	**Loans to assets LTA**	**Loans to deposits LTD**
IB	**-.152288*****	**-1.1374939*****	**-.22497316*****	**8.1525415*****	**.33735046***	-.53258652
HShareIB	**1.0140779*****	**7.5200559*****	**1.2506263*****	**-77.667956*****	-1.6848658	**11.668783****
Size	-.21719511***	-1.3443727***	-.25447643***	.49034092	.02186735	-.07610679
AGE	.00483068***	.02990415***	.00649742***	-.01223815	.00070395	-.00694636
Growth	-.01048616	.00320566	-.01075475	-.1943245	-.07166969	-2.0150673***
FAA	-1.0689817	-5.6585085	1.1235483	.92982129	11.202695**	53.240595***
OBSIA	-.02188739	-.158949	-.03511356	-.27257335	.18243025	-.43780558
_cons	.79722325***	4.8993242***	.89530138***	-1.385729	.28374218	1.0674493

N	63	63	63	55	47	47
R^2	.8297576	.7930864	.72517398	.97233966	.70324089	.83210442
F	9.7584261	4.1429468	8.089291	39.757879	.	.

(suite)

	Credit risk		Reglementary risk	Insolvency	Stability
Variable	**Loans loss reserves to gross loans LLR**	**Non-performing loans to gross loans NPL**	**Capital adequaty ratio CAP**	**Debt to assets DTA**	**Zscore**
IB	**-.31278348****	-.18723577	**.78137234*****	**1.3718939*****	**43.271648****
HShareIB	**1.5430441*****	**.85076791*****	**-1.8572201*****	-.28336298	-63.242021
Size	-.03316803	-.07695098**	-.03370722	-.01703328	-15.527656**
AGE	-.00734326	-.00137702	.02957409***	.06920223***	2.2843909**
Growth	-.14366283**	-.01441676	.01243996	.03070948	11.055983
FAA	-.48174708	-2.3447095	-.3955548	.6898979	-241.50428
OBSIA	-.01103643	-.07335149	-.01381922	-.08598177	-7.4249641
Trend	.00407073	.00067749	-.01797472***	-.0447325***	-1.7260928***
_cons	-3.5894467	-.21146508	17.081888***	42.041186***	1713.5311***
N	47	47	63	63	63
R^2	.67715963	.49549609	.88369926	.95245713	.96440178
F	.	.	56.089029	70.495014	113.94502

Table 13: Comparing Islamic and conventional banks, testing of post GFC effect on IBs.

	Profitability			Liquidity		Credit risk
Variable	**Return on assets ROA**	**Return on equity ROE**	**Cash to assets CTA**	**Cash to deposits CTD**	**Loans to assets LTA**	**Loans to deposits LTD**
IB	**-.63662123****	**-5.8973499*****	-.88267619*	-1.295371	**2.5882376***	**-9.702787***
IB2008	**-.03628862****	**-.24601581****	**-.0645153****	-.10274519	**.14438215****	-.27707386
IBTrend	**.0083944****	**.07717749*****	**.01136408***	**.00204971**	**-.03391502***	**.14323985***
Size	-.17242483***	-1.0554627***	-.201288***	-3.218315*	.02247879	.16956817
AGE	.00390394***	.02374047***	.00537881***	.0841004**	.00067434	-.00987217
Growth	-.00773542	.0075547	-.00358733	4.8344744**	-.11663213	-1.8139362**
FAA	-1.8784156*	-13.303449*	.36489901	3.8659063	11.285472**	47.337082***
OBSIA	-.0411352	-.26362205	-.06480697	.43886251	.19934664	-.41574572
_cons	.6585811***	4.0613311***	.72612218***	10.010556*	.28599275	.23903576
N	63	63	63	55	47	47
R^2	.77311574	.72224652	.70362724	.80119039	.72204158	.79946662
F	8.3210733	2.3866412	3.5833647	1.1306848	.	.

(suite)

	Credit risk		Reglementary risk	Insolvency	Stability
Variable	**Loans loss reserves to gross loans LLR**	**Non-performing loans to gross loans NPL**	**Capital adequaty ratio CAP**	**Debt to assets DTA**	**Zscore**
IB	**-3.5603729*****	**-2.4554768*****	**3.4580423*****	1.1723134	114.62764
IB2008	**-.05698077*****	-.05437109*	.05331007*	-.00861984	3.7313854
IBTrend	.02623535***	.01796789***	-.02273569***	.00089626	-.64897688
Size	-.02052698	-.07952795*	-.09437571**	-.03790411	-18.027282**
AGE	-.08721668***	-.05749187**	.09555782***	.06414129*	4.0871603
Growth	-.12282445**	-.00054003	.01571952	.03187602	10.640304
FAA	-1.1672554	-2.5603034	1.9259106*	.95054873	-204.57125
OBSIA	-.00007835	-.07022709	.00195478	-.0818519	-5.8792235
Trend	.05395197***	.03580805**	-.05837343***	-.0413279*	-2.819269
_cons	-50.197034***	-32.998681**	54.957355***	38.930331*	2742.0324
N	47	47	63	63	63
R^2	.68315338	.52358142	.84069045	.95231112	.96409901
F	5.7232493	6.8826909	12.9072	55.637812	94.76259

Tables for PVAR model Results. [42]

Table 14: VAR Lag Order Selection Criteria for Equation (6).[43]

Lag	LogL	LR	FPE	AIC	SC	HQ
0	202.4476	NA	3.93e-08	-5.701488	-5.026837	-5.435709
1	445.1565	417.1559*	3.31e-11*	-12.78614*	-11.57177*	-12.30774*
2	456.3991	17.91801	3.91e-11	-12.63747	-10.88338	-11.94645

Note : Endogenous variables: LZ-score DTA ROA CAP.

Table 15: PVAR-X(1) estimation results for Equation (6).

Bank-level variables	**LZ-score**	**DTA**	**ROA**	**CAP**
LZ-score -1	**0.929386**	0.002756	**-0.007721**	**-0.007814**
	(0.02974)	(0.01355)	**(0.00318)**	**(0.00407)**
	[31.2468]	[0.20344]	**[-2.43009]**	**[-1.91939]**
DTA-1	-0.066021	0.810133	-0.007455	**0.034465**
	(0.14430)	**(0.06572)**	(0.01542)	**(0.01975)**
	[-0.45751]	**[12.3275]**	[-0.48361]	**[1.74496]**
ROA-1	0.229807	0.037518	**0.783497**	0.206246
	(1.09130)	(0.49699)	**(0.11658)**	(0.14937)
	[0.21058]	[0.07549]	**[6.72078]**	[1.38079]
CAP-1	**-0.491344**	**0.234915**	0.013763	**0.386420**
	(0.27518)	**(0.12532)**	(0.02940)	**(0.03766)**
	[-1.78557]	**[1.87456]**	[0.46820]	**[10.2598]**
Bank-level caracteristic				
SIZE	-0.257815	-0.067637	0.019070	**-0.106520**
	(0.18167)	(0.08274)	(0.01941)	**(0.02487)**
	[-1.41911]	[-0.81750]	[0.98260]	**[-4.28377]**
SHARE	0.634083	0.393953	-0.222760	**0.576478**
	(1.39738)	(0.63638)	(0.14927)	**(0.19126)**
	[0.45377]	[0.61905]	[-1.49228]	**[3.01409]**
IB	**-0.180840**	-0.018285	**-0.012800**	0.011377
	(0.06782)	(0.03089)	**(0.00724)**	(0.00928)
	[-2.66643]	[-0.59201]	**[-1.76668]**	[1.22558]
D2008	0.089414	-0.046808	-0.004217	**0.039731**
	(0.09298)	(0.04235)	(0.00993)	**(0.01273)**
	[0.96161]	[-1.10538]	[-0.42457]	**[3.12188]**
C	1.238600	0.237212	-0.016600	0.451775
	(0.59025)	(0.26881)	(0.06305)	(0.08079)
	[2.09842]	[0.88246]	[-0.26327]	[5.59206]
R^2	**0.964466**	0.751031	0.512468	0.766098
Adj. R^2	0.960024	0.719909	0.451527	0.736860
F-statistic	217.1359	24.13246	8.409196	26.20236
Log likelihood	13.23315	70.65189	**176.5024**	158.4094

[42] Results for model (6) are done by EVIEWS version 10. Estimation of the standard VAR model in EViews is performed using simple OLS applied to each equation.

[43] * indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

Note : Exogenous variables: C SIZE SHARE IB @YEAR>2008

Note : Standard errors in ( ) & t-statistics in [ ]

Table 16: Dignostic tests : VAR Residual Serial Correlation LM Tests from model (6).

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	21.97962	16	0.1439	1.403998	(16, 174.8)	**0.1444**
2	22.19866	16	0.1369	1.418862	(16, 174.8)	**0.1374**

Table 17: Dynamic panel-data estimation for Equation (7). Arellano-Bond : One-step system GMM.[44]

Variable	**LZ-score**	**DTA**	**ROA**[45]	**CAP**
LZ-score-1	**.930191*** **	.01051618	**-.02907032***	**-.00986975****
CAP -1	**-.57323813****	**.24567182*****	.01871067	**.37271114*****
DTA -1	-.0676625	**.9252001*****	.00056115	**.02756849***
ROA -1	.18310809	**.45508935****	**.57754615*****	.14446119
Share	.67254164	**.95975343****	**-.74688113*****	.34744981
Size	-.26702479	**-.12622446****	.00557239	**-.08422566***
IB	**-.17631403***	-.00197859		
D2008	.10670368	.01592556	-.01522316	.02641336
C	1.2617339	.31268905*		.40855042**
Fisher	71769.69	789.24	11.55	18.34
Sargan/Hansen test	0.175	0.356	0.129	0.977
AB(1) test for AR(1)	0.048	0.041	0.000	0.108
AB(2) test for AR(2)	0.561	0.133	0.768	0.652

Legend: * p < 0.1; ** p < 0.05; *** p < 0.01. Note : p-values are reported for Sargan/Hansen test, Hausman test, and AB(1) and AB(2) tests. Fisher global significant test statistic. AB(1) statistic is the Arellano-Bond tests for first ordrer autocorrelation and AB(2) statistic is for second order autocorrelation. The Hansen /Sargan-test suggests that the instruments used are uncorrelated with the residuals, and the Arellano-Bond tests rejects the hypothesis that the errors are not autocorrelated in the first order (AR(1)), but cannot reject this hypothesis for the second order (AR(2)).

[44] All results of model (7) are done by STATA version 15.

[45] One-step **difference** GMM is used.

Table 18: SURE estimation results for Equation (7).

	LZ-score			DTA			ROA			CAP		
	Coef.	Std. Err.	P>|z|	Coef.	Std. Err.	P>|z|	Coef.	Std. Err.	P>|z|	Coef.	Std. Err.	P>|z|
LZ-score -1	**.369225**	**.1227157**	**0.003**	-.0264073	.0730633	0.718	**-.027523**	**.0146336**	**0.060**	**.0405712**	**.0187131**	**0.030**
DTA -1	-.127884	.1759113	0.467	**.6388679**	**.1047353**	**0.000**	.0004246	.020977	0.984	**-.0487095**	**.026825**	**0.069**
ROA -1	-.466796	.9439515	0.621	.0754288	.5620164	0.893	**.5944323**	**.112564**	**0.000**	**-.3517977**	**.1439449**	**0.015**
CAP -1	.0664699	.3324969	0.842	.1235902	.1979643	0.532	.0196748	.0396495	0.620	**.1639397**	**.0507031**	**0.001**
Share	**-3.61194**	**1.229614**	**0.003**	**1.62638**	**.7320959**	**0.026**	**-.776511**	**.1466285**	**0.000**	.1386593	.1875061	0.460
Size	**-.670967**	**.1622183**	**0.000**	**-.358009**	**.0965826**	**0.000**	.0109892	.0193441	0.570	**-.1293768**	**.024737**	**0.000**
D2008	**.1419235**	**.0840597**	**0.091**	**.1073058**	**.050048**	**0.032**	**-.016755**	**.0100239**	**0.095**	**.0421658**	**.0128184**	**0.001**
Bank												
95	**-.339159**	**.0990478**	**0.001**	-.0377772	.0589718	0.522	-.0156137	.0118112	0.186	**.0260699**	**.015104**	**0.084**
96	**.546170**	**.1153966**	**0.000**	**.1651475**	**.0687056**	**0.016**	**.0302864**	**.0137608**	**0.028**	**.0660678**	**.017597**	**0.000**
97	**-.367587**	**.1436467**	**0.010**	.0233747	.0855254	0.785	-.0139402	.0171295	0.416	**.0420983**	**.021905**	**0.055**
98	.0753755	.0914325	0.410	-.0073273	.0544377	0.893	.0002634	.0109031	0.981	**-.0450248**	**.0139427**	**0.001**
99	**1.15725**	**.1596595**	**0.000**	.1120595	.0950592	0.238	**.0919118**	**.019039**	**0.000**	**.0525515**	**.0243468**	**0.031**
100	**-.842288**	**.1898013**	**0.000**	-.127756	.1130052	0.258	**-.037491**	**.0226333**	**0.098**	**.0518547**	**.0289431**	**0.073**
101	**-.774558**	**.2160101**	**0.000**	.0199775	.1286096	0.877	-.0173519	.0257587	0.501	**.1170045**	**.0329398**	**0.000**
102	**-.654289**	**.3383677**	**0.053**	.0135315	.2014597	0.946	.0304245	.0403495	0.451	**.2138182**	**.0515983**	**0.000**
C	5.142001	.802443	0.000	1.285774	.477764	0.007	.1453505	.0956894	0.129	.4572792	.122366	0.000

Note : Islamic banks are 95 ≡ Barwa Bank, 100 ≡ Qatar International Islamic Bank, 101≡ Qatar Islamic Bank SAQ.

Table 19: Dignostic tests from Seemingly unrelated regression of model (7).

Equation	Obs	Parms	RMSE	R-sq	chi2	P	Breusch-Pagan test of residual independence :[46]
LZ-score	73	15	.1458595	0.9814	3861.41	0.0000	chi2(6) = 54.313, Pr = 0.000
DTA	73	15	.0868428	0.7778	255.54	0.0000	
ROA	73	15	.0173934	0.6828	157.13	0.0000	
CAP	73	15	.0222424	0.8484	408.53	0.0000	

[46] Correlation matrix of residuals:

	lz	DTA	ROA	CAP
lz	1.0000			
DTA	-0.0029	1.0000		
ROA	**0.2300**	-0.0350	1.0000	
CAP	**0.8170**	0.0470	**-0.1423**	1.0000

Other Tables

Table A 2: Correlation matrix.

	ROA	ROE	CTA	CTD	LTA	LTD	LLR	NPL	CAP	DTA	Zscore
ROA	1.0000										
ROE	0.9688*	1.0000									
CTA	0.2375*	0.2220*	1.0000								
CTD	-0.3029*	-0.3265*	0.0624	1.0000							
LTA	0.0853	0.0669	0.1227	0.1838	1.0000						
LTD	0.0396	0.0322	0.0203	0.1462	0.6381*	1.0000					
LLR	-0.0219	0.0608	0.0325	0.1704	0.1271	0.4044*	1.0000				
NPL	0.0906	0.1567	0.1452	0.0645	0.0938	-0.0935	0.6393*	1.0000			
CAP	-0.0435	-0.1822	0.6348*	0.6155*	0.0996	0.0030	-0.2712*	-0.1801	1.0000		
DTA	-0.1066	-0.1417	-0.1752	-0.0539	-0.1378	0.0360	-0.0570	-0.0394	0.0268	1.0000	
Zscore	-0.2578*	-0.2678*	0.1976	0.1780	-0.0834	-0.0813	-0.0070	-0.0458	0.4401*	0.2756*	1.0000

(SUITE)

	Zscore	NPL	CAP	ROA	CTD	CTA	GDPG	INF	size	OBSIA	FAA	Share	AGE
Zscore	1.0000												
NPL	-0.0458	1.0000											
CAP	0.4401*	-0.1801	1.0000										
ROA	-0.2578*	0.0906	-0.0435	1.0000									
CTD	0.1780	0.0645	0.6155*	-0.3029*	1.0000								
CTA	0.1976	0.1452	0.6348*	0.2375*	0.0624	1.0000							
GDPG	0.0633	-0.0317	0.1988	-0.0508	0.0166	0.0240	1.0000						
INF	0.0286	0.0938	0.0731	0.1443	-0.2296	0.0285	0.3702*	1.0000					
size	-0.3392*	0.1102	-0.5141*	-0.0148	-0.3597*	-0.0070	-0.2580*	-0.1634	1.0000				
OBSIA	0.1137	-0.1332	-0.0537	0.0808	0.2084	-0.1587	0.2267*	0.2086	-0.2292	1.0000			

FAA	0.3950*	0.0745	0.3355*	-0.1110	0.0446	0.4182*	0.3019*	0.3171*	-0.1578	0.2975*	1.0000		
Share	-0.2781*	0.0291	-0.3669*	-0.0305	-0.2403*	0.0002	0.0332	0.1320	0.8168*	-0.0767	0.0479	1.0000	
AGE	-0.1109	0.0903	-0.4847*	0.1549	-0.3462*	0.0254	-0.0949	-0.0822	0.5497*	-0.0971	-0.0670	0.5571*	1.0000

Table A 3: Unit root test results.

Series:	Z_SCORE		CAP		CTA		CTD		ROA	
Null Hypothesis: Unit root (individual unit root process)	Statistic	p-value	Statistic	p-value	Statistic	p-value	Statistic	p-value		
ADF - Choi Z-stat	-0.53638	0.2958	-0.90258	0.1834	-1.40285	0.0803	-2.14888	0.0158	-1.17400	0.1202
PP - Choi Z-stat	-2.55873	0.0053	-4.18702	0.0000	-3.44233	0.0003	-3.21669	0.0006	-1.90825	0.0282
Ho: All panels contain unit roots										
Ha: At least one panel is stationary										
Inverse chi-squared(42) P	65.1675	0.0000	83.7577	0.0000	89.8397	0.0000	63.6175	0.0000	58.0707	0.0000
Inverse normal Z	-5.3093	0.0000	-6.5394	0.0000	-6.2448	0.0000	-5.0681	0.0000	-4.6105	0.0000
Inverse logit t(109) L*	-5.8457	0.0000	-7.6539	0.0000	-8.0413	0.0000	-5.5826	0.0000	-5.1098	0.0000
Modified inv. chi-squared Pm	7.8612	0.0000	10.9596	0.0000	11.9733	0.0000	7.6029	0.0000	6.6785	0.0000

Series:	DTA		Size		ROE	
Null Hypothesis: Unit root (individual unit root process)	Statistic	p-value	Statistic	p-value		
ADF - Choi Z-stat	1.64874	0.9504	0.58078	0.7193	-0.59133	0.2772
PP - Choi Z-stat	1.40688	0.9203	-4.83301	0.0000	-2.25110	0.0122
Ho: All panels contain unit roots						
Ha: At least one panel is stationary						
Inverse chi-squared(42) P	31.5645	0.0247	71.7548	0.0000	63.7450	0.0000
Inverse normal Z	-2.6714	0.0038	-5.6994	0.0000	-4.8430	0.0000
Inverse logit t(109) L*	-2.5154	0.0076	-6.4444	0.0000	-5.6274	0.0000

Modified inv. chi-squared Pm	2.2608	0.0119	8.9591	0.0000	7.6242	0.0000

Table A 4 : Granger causality test results.

Null Hypothesis:	F-Statistic	Prob.	Null Hypothesis:	F-Statistic	Prob.
ROA does not Granger Cause CAP	3.33570	0.0424	FAA does not Granger Cause CTD	3.57855	0.0367
CTA does not Granger Cause ROA	**3.11184**	0.0519	GROWTH does not Granger Cause CTD	4.81367	0.0134
CTD does not Granger Cause ROA	**1.45009**	0.2446	INF does not Granger Cause CTD	4.43694	0.0171
ROA does not Granger Cause CTD	4.57549	0.0152	SHARE does not Granger Cause CTD	3.61549	0.0345
OBSIA does not Granger Cause ROA	3.11905	0.0539	SIZE does not Granger Cause CTD	4.48513	0.0164
CTA does not Granger Cause CTD	4.46888	0.0166	CAP does not Granger Cause Z_SCORE	12.7930	2.E-05
FAA does not Granger Cause CTA	3.08896	0.0545	DTA does not Granger Cause Z_SCORE	2.66127	0.0782
CTA does not Granger Cause FAA	3.63495	0.0337	CTA does not Granger Cause ROE	2.67166	0.0775
GROWTH does not Granger Cause CTA	2.94351	0.0619	SHARE does not Granger Cause CTA	4.67071	0.0131
INF does not Granger Cause CTA	4.67651	0.0130	SIZE does not Granger Cause CTA	4.63254	0.0135
CTA does not Granger Cause INF	3.07580	0.0536	CTA does not Granger Cause Z_SCORE	6.77787	0.0022
CAP does not Granger Cause CTA	3.14681	0.0503			