Will Islamic Banking make the World Less Risky? An Empirical Analysis of Capital Structure, Risk Shifting and Financial Stability [1]

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by

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Abstract:

We use a classic Merton credit risk framework to argue that Islamic Banking Institutions (IBIs) face less incentive to take on risks than Conventional Banking Institutions (CBI). IBIs have less incentive for risk shifting both in and outside of distress situations. We test and confirm this prediction in an empirical analysis based on a dataset covering all CBIs, IBIs, and Islamic and conventional subsidiaries of mixed banking institutions in Pakistan. We find that full-fledged Islamic banks (IBs) are indeed more stable than conventional banking institutions (CBIs), and are better capitalized than their conventional counterparts. IBIs also have less volatile asset returns, less non-performing loans (NPLs) and lower loan loss provisioning. Similar results obtain for Islamic windows of mixed banks compared with conventional windows. The analysis suggests that the loss absorption capacity of Islamic banks leads to less risk taking and a more stable banking system.

Key words: Islamic Banking, risk shifting, asset quality, financial stability

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1. Introduction and Literature Review

With risk seeking behavior back to the center stage of world wide policy debates since the credit crisis unfolded, Islamic banking has received renewed attention. The proponents of Islamic finance argue that financial intermediation based on Islamic principles would bring in greater stability in the domestic economy, financial markets and even in the international economy (Chapra (2008); El-Gamal (2000); Nigel (1998); Siddiqi (2006); Zaher and Hassan (2001)). Generally Islamic banking institutions (IBIs) need to fulfill the same minimum capital requirements as conventional banking institutions (CBIs) do. However, IBIs have an extra line of protection in the form of *mudarabah* saving and investment (S&I) deposits based on profit and loss sharing (PLS) contracts.[2] IBIs share their profits or loss with these account holders. Because of this quasi equity structure of debt, the *loss absorption capacity* of IBIs can be expected to be higher than that of similarly capitalized CBIs. But a key question for their impact on systemic stability concerns the choices IBIs make on their asset side. Are risk shifting incentives actually less than the risks CBIs choose to be exposed to?

We use a classic Merton credit risk framework to show that IBIs can be expected to take lower risks in comparison to their CBI counterparts, IBIs have less incentive for risk shifting, both in and outside of distress situations. Therefore, such banks are expected to be more stable and have better quality. However, specific risks are attached to the structure of IBIs. On the liability side, if the Islamic banks pay lower return to the S&I account holders than the rate paid by other banks or pass some losses to these depositors, they may withdraw their deposits from the Islamic banks. Therefore some have argued that there may be a greater risk of deposit withdrawal for Islamic banks than for conventional banks in times of distress (Sundararajan and Errico (2002)). Especially, for small Islamic banks this risk is considered higher and thus more problematic.

To manage this risk Islamic banks forgo part of their profit share <u>as a *mudarib*</u> to pay competitive returns to the S&I *mudarabah* account holders. In case IBIs incur some loss, *all* that loss may be taken to the income accounts of IBIs, which otherwise has be shared with S&I account holders. This activity exposes the equity holders of Islamic bank to a peculiar risk, called <u>displaced commercial risk</u>. The Islamic Financial Services

[2] *Mudarabah* is a partnership in which one party invests its capital (*rab-ul-mal*) and the other party exerts its skills and services in the business. The profit is distributed between parties according to a pre-agreed ratio. All the financial loss is borne by the investors. The loss of mudarib is in kind of sacrifice of time and efforts.

Board[3] (2011) defines this risk as additional risk borne by shareholders of Islamic financial institutions due to volatility of returns over and above the normal risks when S&I account holders were to share the loss in accordance with *mudarabah* contract.

In other words, shareholders of an Islamic bank are exposed to additional losses which actually pertain to the S&I depositors. To mitigate this risk Islamic banks create reserve pools by paying *lower* return to S&I account holders than the actual profit when IBIs returns are higher than the market average return. One the other hand, when they incur losses (or generate lower return than CBIs), the Islamic banks try to smooth the returns through these reserves by paying *higher* than the actual returns. On the asset side, the risks of IBIs are generally similar to that of leasing or term loans in conventional finance. Apart from that Islamic banks also have *shariah* compliance risk which may also affect the goodwill of these banks.

Our empirical results are based on an extensive dataset covering all Conventional Banks (CBIs), Islamic Banks (IBIs), and Islamic and conventional subsidiaries of mixed banking institutions in Pakistan. The econometric analysis shows that full-fledged Islamic banks (IBs) are indeed more stable than conventional banking institutions (CBIs). These banks are also better capitalized than their conventional counterparts. Moreover, full-fledged IBs also have less volatility in return on their assets, have less non-performing loans (NPLs) and lower loan loss provisioning. Similarly, Islamic banking branches (IBBs) of mixed banks, with both conventional and Islamic windows, have better asset quality: they have lower NPLs and loan loss provisioning than that of conventional banking institutions (CBIs). The model with bank-time fixed effects show that Islamic windows of small mixed banks are also better capitalized and have higher asset returns. But they do have higher volatility in their asset returns, to such an extent that their stability index is lower than that of conventional banking branches (CBBs) of mixed banks. Conversely, NPLs and thus loan loss provisioning by IBBs of both small and large mixed banks is lower in comparison to conventional banking branches of mixed banks. So Islamic windows of mixed banks also have better asset quality than the conventional windows of those mixed banks.

[3]Islamic Financial Services Board is an international standard-setting organization that issues global prudential standards and guiding principles for the Islamic financial industry, broadly defined to include banking, capital markets and insurance sectors.

Review of Empirical Literature on Islamic Banking

An early study on the stability of Islamic banks is Bashir (1999), at a small scale using the data of only two Islamic banks in Sudan. The author evaluates the impact of size on various bank indicators and finds that size has a positive influence on profitability and riskiness,[4] but negative effect on capital-asset ratio of Islamic banks. Employing z-scores to test the relative strength of banks in 18 countries from 1993-2004, Ḷihák and Hesse (2010) find that small Islamic banks are financially stronger than small and large commercial banks, whereas, large Islamic banks are weaker than large commercial banks (See Figure 1 for summary of empirical studies on Islamic banking). They attribute their findings to the issues of credit risk management, in large Islamic banks, related to financing based on Profit and Loss Sharing (PLS) arrangements. However, Islamic banks prefer trade and leasing for financing instead of PLS products (Aggarwal and Yousef (2000); Beck, Demirgüç-Kunt and Merrouche (2013)) and the share of PLS in Islamic banksô total portfolio is relatively small (Baele, Farooq and Ongena (2012); Chong and Liu (2009); Zaheer, Ongena and Van Wijnbergen (2014)).

In a broader study covering 141 countries over the period 1995-2007, Beck, Demirgüç-Kunt and Merrouche (2013) compare the business model, efficiency, asset quality and stability of the Islamic banks and conventional banks employing a group of indicators from their balance sheets and income statements. They note that Islamic banks are better capitalized but they do not find significant differences between the business model,[5] efficiency, asset quality or stability of Islamic and conventional banks. Using loan level data of Pakistani banking sector from 2006 to 2008, Baele, Farooq and Ongena (2012) find that compared to conventional loans, on average Islamic loans are less likely to default. Using a sample of 553 banks from 24 countries between 1999 and 2009, Abedifar, Tarazi and Molyneux (2010) gauge the risk and stability characteristics of Islamic banking. Their study finds that small Islamic banks that are more leveraged and based in countries with predominantly Muslim population, have lower credit risk than conventional banks, and are more stable than similarly sized conventional banks. On the other hand, they did not find any significant difference between large Islamic and conventional banks. These papers suggest that the structure of banking sector, demographics of its location and the size and organization of Islamic banks may influence the health of Islamic banks. In another study, Hasan and Dridi (2010) evaluates the

[4] The author uses the *risk index* (so-called z-score) to measure the riskiness of the banks.
[5] See section 3.4 for capital structure of IBIs.

performance of IBs and CBs during the recent financial crisis by looking at the profitability of 120 Islamic and conventional banks across eight countries during the period 2007-09. Their finding show that during financial crisis profitability of IBs declines more than that of CBs, owing to week risk management practices

Using Bahrain Islamic Bank as a case study, Turen (1996) shows that during the period of analysis this bank offered a higher risk adjusted return compared to commercial banks operating in Bahrain at the time and argues that the profit sharing concept of Islamic banking can achieve a higher profitability and lower risk than conventional commercial banks. Al-Deehani, Karim, and Murinde (1999) argue that because of the profit sharing provisions with the depositors, Islamic bank can increase their market value and return on equity without taking on more risk. Using a sample of 12 Islamic banks they provide empirical evidence in support of their theoretical argument.

2. Theory: Islamic Deposits, Risk Shifting Incentives and Risk Sharing

Risk shifting incentives

Islamic deposits have two characteristics that make them different from regular deposits. First, their return is profit dependent, although with a limited upswing, so they are also different from equity claims in that respect. Their principal value is senior to equity however. A second difference is less rule based and more grounded in practice: Islamic banks have part of their assets in a reserve account that is used as collateral for the deposits only: equity holders have no access to that pool of assets, also not in ñgoing concernò distress situations[6]. We do not incorporate the collateral pool since that practice is not strictly required by Islamic law. Furthermore, to make the point of differences in risk shifting incentives under Islamic Finance (IF) and Conventional Finance (CF), we focus on the profit dependency of the rate of return only and ignore credit risk on the principal: since principal is treated the same under both modes of financing, credit risk on the principal (i.e. the Merton put embedded in the principal) has no impact on the *difference* in risk shifting incentives.

[6] This structure is similar to the limited recourse reserve accounts proposed by Acharya, Mehran and Thakor (2011). Such a reserve account can be looked at as a collateral pool supporting a rolling interest guarantee. See Claessens and van Wijnbergen (1993) for a valuation of a similar collateral arrangement in the case of sovereign debt.

Assume a simplified balance sheet with beginning of period assets A_t, stochastic return-inclusive end of period assets $A\hat{o}_t$, equity E_t and debt D_t issued with a profit sharing return capped at a gross rate r. The profit sharing is in proportion to the Debt/Asset ratio k (note that by construction k < 1). In what follows we will drop the time subscript where that does not generate confusion.

The contingent profit sharing rule can be represented as a portfolio of options, identical in each period over the remaining time to maturity of the deposit: calling the debt/asset ratio k, the portfolio consists of a fraction k of a long position in a call on return inclusive asset value $A\hat{o}$ with exercise price D and a short position also written on $A\hat{o}$ with exercise price rD. To see this equivalence, consider the pay- off structure of the sharing clause, which we call I_{IF} (omitting time indices):

(1) $$I_{IF} = \min[\max[kA', D], rD]$$

which we can rewrite as:

(2) $$\begin{aligned} I_{IF} &= D + k(\max[A' - \frac{D}{k}, 0] - \max[A' - \frac{rD}{k}, 0]) \\ &= D + k(C(A', \frac{D}{k}) - C(A', \frac{rD}{k})) \end{aligned}$$

This is k times the difference between two call options, one with strike price D/k and the other with strike price rD/k where we use C as shorthand for the value of a call option (plus the principal D).

The key issue now is how does that difference depend on the variance or standard deviation of the underlying profit stream? To that end consider first the derivative of C with respect to the volatility (in option pricing jargon, the Vega V):

(3) $$\begin{aligned} V &= \frac{\partial C(A_0, \frac{D}{k}; r_s, \sigma^2)}{\partial \sigma} \\ &= A_0 \sqrt{T} N'(d_1) \\ &= A_0 \sqrt{\frac{T}{2\pi}} e^{-\frac{d_1^2}{2}} \\ d_1 &= \frac{\ln(\frac{A_0}{D/k}) + (r_s + \sigma^2/2)T}{\sigma\sqrt{T}} \end{aligned}$$

where r_s equals the risk free interest rate (for which we use the rate on T-bills)[7]. If the derivative of V with respect to the strike price does not change sign over the range [D,rD], applying the Mean Value theorem (Apostol 1974) yields the following expression for the derivative of I_{IF} with respect to the volatility :

$$\begin{aligned}\frac{\partial I_{IF}}{\partial \sigma} &= k\left(\frac{\partial C(A_0, \frac{D}{k})}{\partial \sigma} - \frac{\partial C(A_0, \frac{rD}{k})}{\partial \sigma}\right) \\ &= -D\frac{\partial^2 C(A_0, r'\frac{D}{k})}{\partial \sigma \partial K}(r-1) \\ &= -DV_K\big|_{r'}(r-1)\end{aligned} \tag{4}$$

for an rô satisfying 1 < rô < r. Furthermore, it is straight forward to establish that the derivative of Vega with respect to the strike price K(=rôD/k) equals:

$$\begin{aligned}V_K &= \frac{\partial V}{\partial d_1}\frac{\partial d_1}{\partial K} \\ &= -\frac{d_1}{\sqrt{2\pi}}e^{-\frac{d_1^2}{2}}\frac{\partial d_1}{\partial K} \\ &= \frac{d_1}{\sqrt{2\pi T}\sigma}e^{-\frac{d_1^2}{2}}\frac{1}{K} \\ &> 0\end{aligned} \tag{5}$$

since $d_1 > 0$. So the Mean Value theorem (Apostol 1974) can be applied and by inserting (5) into (4), we unambiguously establish that the return on Islamic deposits depends negatively on the volatility of the asset portfolio being financed:

$$\frac{\partial I_{IF}}{\partial \sigma} < 0 \tag{6}$$

(6) shows that risk shifting incentives are not eliminated altogether, the value of equity E_{IF} still depends positively on volatility:

$$\begin{aligned}\frac{\partial V(E_{IF})}{\partial \sigma} &= +DV_K\big|_{r'}(r-1) \\ &= k\frac{d_1}{\sqrt{2\pi T}\sigma}e^{-\frac{d_1^2}{2}}\frac{(r-1)}{r'} \\ &> 0\end{aligned} \tag{7}$$

[7] The banks we are analyzing in the empirical section have their shares and bonds traded on the Karachi Stock Exchange, so we can use the risk neutral valuation approach used in what follows.

But are risk shifting incentives weaker under Islamic finance than under Conventional Finance (CF)? To compare risk shifting incentives with both types of deposits we first apply the same option pricing valuation to conventional deposits. The difference lies in the absence of profit sharing: interest payments to depositors have priority over equity returns in conventional finance. It is straightforward to show that we get a similar expression except for the sharing parameter k, which is absent from the valuation expression for Conventional Finance deposits I_{CF}:

$$\begin{aligned}\frac{\partial I_{CF}}{\partial \sigma} &= \left(\frac{\partial C(A_0, \frac{D}{k})}{\partial \sigma} - \frac{\partial C(A_0, \frac{rD}{k})}{\partial \sigma}\right) \\ &= -\frac{D}{k}\frac{\partial^2 C(A_0, r'\frac{D}{k})}{\partial \sigma \partial K}(r-1) \\ &= -\frac{D}{k} V_K\big|_{r'}(r-1)\end{aligned} \tag{8}$$

which is also negative. So under Conventional Finance, the dependence of the value of equity E_{CF} on volatility is:

$$\begin{aligned}\frac{\partial V(E_{CF})}{\partial \sigma} &= +\frac{D}{k} V_K\big|_{r'}(r-1) \\ &= \frac{d_1}{\sqrt{2\pi T}\sigma} e^{-\frac{d_1^2}{2}} \frac{(r-1)}{r'}\end{aligned} \tag{9}$$

Comparison of (7) and (9) allows us to answer the question on the relative sensitivity of Islamic and Conventional Finance:

$$\begin{aligned}\frac{\partial V(E_{IF})}{\partial \sigma} - \frac{\partial V(E_{CF})}{\partial \sigma} &= -(1-k)\frac{d_1}{\sqrt{2\pi T}\sigma} e^{-\frac{d_1^2}{2}} \frac{(r-1)}{r'} \\ &< 0\end{aligned} \tag{10}$$

which establishes our key result: under Islamic Finance, risk shifting incentives are weaker than under Conventional Finance. We should therefore expect Islamic banks to have less risky (lower volatility) asset portfolios. That is the theoretical prediction that we will test in the following empirical sections.

Risk sharing

Risk shifting incentives indicate the extent to which management will try to increase the volatility of the asset portfolio of the bank. But there is a second mechanism

through which Islamic deposits may influence bank stability: for given asset side composition, there is more risk sharing on the liability side. That should result in a lower equity price volatility given asset side volatility. If we split off the equity part of Islamic deposits and count it as equity, *effective* leverage k_I is lower with Islamic deposits than conventionally measured . This in turn should lead to lower equity price volatility given asset side volatility than is to be expected given the conventional measure of leverage counting Islamic deposits as debt (k_C):

$$\begin{aligned} \sigma_E^2 &= \frac{\sigma_A^2}{(1-k_I)^2} \\ &< \frac{\sigma_A^2}{(1-k_C)^2} \\ &\text{since } k_I < k_C \end{aligned} \tag{11}$$

Incorporating the standard Merton-put embedded in the principal would add further terms but is the same for both types of debt so that would not influence the comparison and is omitted.

3. Accounting treatment of S&I deposits and Capital of Islamic Banking Institutions

There are some issues about treatment of S&I deposits of Islamic banks for the calculation of equity capital of Islamic banks. Since Islamic banks issue S&I deposits on the PLS[8] basis, these are considered as quasi equity, a category between time deposits and pure equity. These accounts are not deposits in true spirit as the return on these deposits is conditional on the Islamic bankôs performance. On the other hand, S&I deposits may not be given the status of equity as unlike equity these accounts are redeemable in nature i.e. the investment account holders can withdraw them on maturity of these accounts. Even investment accounts can be withdrawn prematurely if an advance notice is given (Ļihák and Hesse (2010)) with or without some penalty, depending upon the Islamic bankôs policy. Whereas saving accounts are callable deposits and thus can be withdrawn anytime. Therefore, according to Financial Accounting Standard No.6 of Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) these accounts should

[8] PLS: Profit and Loss Sharing; S&I: Savings and Investment

be treated ñas an independent category between liabilities and ownersô equity.[9] The S&I accounts provide an extra line of protection for the Islamic banks besides equity when loss occurs to the Islamic bank.

Therefore, in principle these S&I accounts of IBIs should not be considered as liability of these banking institutions. However, in reality, Islamic banks treat these accounts as liabilities as competitive return are paid thereon regardless of the actual returns of the Islamic banks. This may even happen when the actual return of an Islamic bank is lower than the market return or, in extreme case, when the actual return is negative. This is done through the technique in which Islamic bank institutions forgo part of their share in profit as *mudarabah*, and give the same as a gift (*hibah*) to the S&I account holders.

According to the instructions of the central bank, Islamic banking institutions are not allowed to include S&I accounts in capital while calculating minimum capital requirement for Basel II and Basel III. For our estimation purpose first we treat these accounts as liabilities to make the indicators of stability comparable for IBIs and CBIs.[10] This approach obviously results in lower stability indicators of Islamic banks than would come out if we consider S&I deposits as part of equity. However, we also check the results by treating these accounts as equity of the IBIs to compute the capitalization and stability index of IBIs in that way.

Data and Descriptive Statistics

We use individual quarterly financial accounts of all commercial banks submitted to the SBP at the end of each quarter. The data contains very detailed information of all the balance sheet and income statement items of all commercial banks (both Islamic and conventional). We construct the indicators for asset quality and stability to evaluate the performance of Islamic and conventional banking institutions. The data covers 32 quarters starting from June 2002 to March 2010. There are 21 conventional banks (CBs), 6 full-fledged Islamic banks (IBs) and 13 mixed banks with both Islamic as well as conventional operations. Following the convention in Pakistan, we name the Islamic branches of mixed banks as Islamic banking branches (IBBs) and their conventional branches as conventional banking branches (CBBs). Both IBBs and full-fledged Islamic banks (IBs) form the Islamic banking institutions (IBIs).

[9]Accounting and Auditing Organization for Islamic Financial Institutions, 1998. Accounting and Auditing Standards for Islamic Financial Institutions, Bahrain.

[10]Thus the capital of both the banking institutions comprise share capital, reserves, un-appropriated profit and surplus or deficit on revaluation of assets.

Table 1 shows descriptive statistics of main indicators for IBIs and CBIs. We use z-score to compare the riskiness and insolvency of the Islamic and conventional banking institutions. The z-score has been increasingly used to check the bankôs soundness. Bank insolvency is defined as a state where (CAR + ROA) < 0 or CAR < -ROA, with CAR being the bankôs capital to asset ratio and ROA its return on assets, or equally when losses exceed the bank capital (Beck, Demirgüç-Kunt and Merrouche (2013); Boyd and Runkle (1993); Ţihák and Hesse (2010)). The Z-score is constructed as the sum of the mean rate of return on assets (μ) and the mean equity-to-assets ratio (k) divided by the standard deviation of the return on assets (ů):

(12) $$Z = \frac{\mu + k}{\sigma}$$

Z measures the risk of insolvency or distance to default. By combining accounting measures of profitability, leverage and volatility, it indicates the probability of a loss exceeding the equity capital. The sample data shows that average z-score of Islamic banks is significantly higher than that of conventional banks, portraying that IBIs are more stable than their conventional peers. Specifically, the average z-score for IBIs is 33.63, whereas for conventional banks it is 14.15. Similarly, IBIs are better capitalized than CBIs which leads to higher stability of IBIs than conventional banks. Specifically, the CAR of IBIs is 19.47 percent in comparison to CBIôs 5.85 percent.

Furthermore, we use NPLs to gross loans and provisioning to gross loans to compare the *asset quality* of both banking systems. Lower NPLs and provisioning indicates better quality of assets of a bank. NPLs and provisioning of IBIs are significantly lower than those of CBIs, representing superior asset quality of IBIs. Precisely, average NPLs and provisioning, both normalized by gross loans, for IBIs are 1.61 and 0.78 percent respectively. Whereas the same ratios for CBIs are 23.52 percent and 8.04 percent.

The industry average of these two indicators is 13.89 percent and 9.92 percent respectively. In sample B, we present the descriptive statistics of mixed banks used in our fixed effects specifications. While comparing the IBBs with CBBs the results are mostly similar to those of sample A. IBBs are less profitable than CBBs. The potential reason could be at initial stage for their operations, IBBs need to generate their own business and profits as all their activities have to be shariah compliant and for which IBBs have to market their products, which are distinct from those of their head offices.

Table 1. Descriptive Statistics

The table shows the descriptive statistics of all the indicators used for estimation in all specifications. We also report p-values for the test of difference in means between Islamic banking Institutions and conventional banking institutions. All the bank balance sheet data from State Bank of Pakistan is quarterly and cover the period from 2002-Q2 to 2010-Q1. There are 6 full-fledged Islamic banks (IBs) 21 Conventional banks (CBs) and 13 Conventional Banks which also host Islamic banking through their Islamic Banking Branches (IBBs). We call these banks as *dual banks*. For estimation purpose we treat these IBBs as separate entities. So there are 53 banks with 32 quarters for whole sample (Sample A). Sample B contains only dual banks with comparison of their conventional and Islamic business. Higher number of the z-score suggests greater stability. All ratios are in percentage. All variables are winsorized at the 1% and 99% level to remove outliers.

Sample A All Banks

Variable	Normalized by	Obs.	Mean	Median	Std. Dev.	Max	Min	Islamic Banking Institutions	Conventional Banking Institutions	p-value
Islamic Banking Institutions		1696	0.36		0.48	1	0			
Islamic Banks		1696	0.11		0.32	1	0			
Islamic Banking Branches		1696	0.25		0.43	1	0			
z-score		1423	15.55	12.39	18.94	88.87	-60.26	33.63	14.15	0.00
Return on Assets		1423	0.53	0.64	1.58	4.60	-6.33	0.32	0.32	0.96
Capital-Asset Ratio		1423	9.88	10.56	45.47	83.28	-321.30	19.47	5.85	0.00
Non-Performing Loans	Gross Loans	1367	13.89	4.77	22.24	96.90	0.00	1.61	23.52	0.00
Loan Loss Provisioning	Gross Loans	1369	9.92	3.31	18.34	93.21	0.00	0.78	8.04	0.00
Bank Level Controls										
Size		1423	10.00	10.01	1.91	13.49	4.53	7.99	10.61	0.00
Non-Loan Earning Assets	Total Earning Assets	1423	52.19	48.43	18.99	99.55	9.19	44.16	54.42	0.00
Fixed Assets	Total Assets	1423	2.98	1.70	3.93	22.90	0.00	3.43	2.75	0.00

Table 1. Sample B Dual Banks

Variable	Normalized by	Obs.	Mean	Median	Std. Dev.	Max	Min	Islamic Banking Institutions	Conventional Banking Institutions	p-value
Islamic Banking Branches		832	0.5	0.5	0.5	1	0			
Gross Loans	Total Assets	665	53.69	54.96	17.16	128.37	0.00	52.28	54.63	0.09
ZSCORE		665	13.98	13.08	8.59	72.19	3.67	25.24	15.05	0.00
Return on Assets		665	1.18	0.90	1.01	4.60	-1.23	0.49	0.92	0.00
Capital-Asset Ratio		665	12.09	8.10	13.84	92.08	3.36	18.42	8.30	0.00
Non-Performing Loans	Gross Loans	613	6.39	2.74	8.62	45.94	0.00	1.01	9.26	0.00
Loan Loss Provisioning	Gross Loans	612	4.37	2.14	5.15	27.70	0.00	0.57	3.78	0.00
Bank Level Controls										
Size		665	10.26	10.98	2.42	13.62	4.05	7.56	11.88	0.00
Non-Loan Earning Assets	Total Earning Assets	661	36.36	36.92	19.53	100.00	0.00	43.78	48.31	0.00
Fixed Assets	Total Assets	665	2.69	1.78	3.58	21.95	0.00	3.23	2.40	0.01

4. Econometric Specification

To evaluate difference in various banking indicators of riskiness and asset quality across both bank types in our data, we estimate the following regressions:

(13) $$M_{ijt} = \alpha_t + \beta ISL_j + \gamma_1 B_{ijt} + \varepsilon_{ijt}$$

where M_{ijt} is one of the measures corresponding to asset quality and stability of bank i, branches/operations type *j*, in quarter *t*. α_t is coefficient for time fixed effects. $ISLb_j$ is the dummy for Islamic banking institutions, which includes both IBBs and IBs. The dummy is one when the IBI is Islamic and zero otherwise. B_{ijt} are the time-variant banking characteristics as control variables. Specifically, we include log of assets, non-lending operations and fixed assets of the banks to control for size and asset structure of banks. We first estimate (13) with an intercept and a dummy for IBIs only (in order to compare CBIs and IBIs) without any covariates. Then we control the results for an array of bank/ segment-level time-changing features which might affect the differences across bank types.

We thus include log of assets as a proxy for size. There is, however, no definite relationship between bank size and stability (Beck, Demirgüç-Kunt and Merrouche (2013)). Most of the Islamic banks in Pakistan are in small to medium size bank categories, whereas to tap into the market a few big conventional banks also introduced Islamic banking operations through IBBs. We also include fixed assets to total assets ratio and non-loan earning assets to total assets ratio to control for the opportunity cost of having unproductive assets and non-lending business respectively.[11] Both the variables influence the stability of the banks as shown by some previous studies (Aggarwal and Yousef (2000); Beck, Demirgüç-Kunt and Merrouche (2013); Demirgüç-Kunt, Laeven and Levine (2004); Demirgüç-Kunt and Huizinga (2010)). To remove the outliers, the data is winsorized for all variables at the 1st and 99th percentiles. That is, we set all the observations greater/lower than 99th percentile/1st percentile value of a given series to 99th percentile/1st percentile value.

Further, to see the corresponding difference from CBIs, we also split the dummy for IBIs into dummy for Islamic banks (IBs) and Islamic banking branches (IBBs). We therefore estimate equation :

$$M_{ijt} = \alpha_t + \beta_1 ISLb_j + \beta_2 ISLbb_j + \gamma_1 B_{ijt} + \varepsilon_{ijt} \tag{14}$$

where $ISLb_j$ and $ISLbb_j$ are dummies for full-fledged Islamic banks and Islamic banking branches of mixed banks respectively.

Finally we apply bank-quarter fixed effects to specification (14). That is, we measure how conventional banking branches of a mixed bank are different from Islamic banking

[11] Fixed assets include operating fixed assets of the bank and non-loan earning assets comprise balances with other banks, lending to financial institutions and investment in securities and bonds.

branches of the same bank across different financial indicators of riskiness and asset quality. Thus we estimate following model:

$$M_{ijt} = \alpha_{it} + \beta ISL_i + \varepsilon_{ijt} \tag{15}$$

where M_{ijt} is one of the measures conforming to asset quality and financial stability of bank *i*, branches/operations type (Islamic or conventional) *j*, in quarter *t*. Crucially for our purposes we introduce α_{it} for bank-quarter fixed effects, to account for all observe and unobserved time variant bank heterogeneity. So in effect we compare Islamic and conventional operations within the *same* bank and in a specific quarter. Therefore, bank-quarter fixed effects specification disentangle the Islamic banking from conventional banking and the difference between the two systems is then due to Islamic banking *per se*. We also introduce a dummy for Islamic banking branches of large mixed banks to decipher how these entities differ from CBBs and small IBBs. Bank-quarter fixed effects take out all the banks which have either only Islamic operation or only conventional operations. So we are left only with mixed banks having both types of banking, Islamic and conventional.[12]

5. Results:

We first present the results by comparing IBIs and CBIs according to specification (13). Then we estimate specification (14) in which coefficients for IBs and IBBs are estimated separately. Finally, we use bank-time fixed effectsby estimating (15). Across all the specifications, standard errors are clustered at bank segment level to allow for correlation within clusters (branches type of each banking entity) across quarters. Z-score$_A$ is computed by treating PLS saving and investment accounts as liabilities of IBIs according to general practice of IBIs. Whereas in Z-score$_B$ we consider PLS accounts as equity of the IBIs in accordance with AAOIFI standards. Likewise, CAR$_A$ and CAR$_B$ are computed by treating PLS accounts as equity and liabilities respectively. Models 1,4, 7 and 10 in each Panel A and Panel B of table 4 and 5 reports the estimates of various specifications *without* using any control variables. In models 2, 5, 8 and 11 we control for size, and fixed assets and non-loan earning assets both normalized by total assets and total earning assets respectively. Lastly, in models 3, 6, 9 and 12 in both panels of tables 4 and

[12]It is apparent that for IBBs (i.e. Islamic segment of mixed banks) the size and asset structure of the parent company would matter. Thus, for example, IBBs of a big (mixed) bank probably have more access to capital market than IBBs of a small (mixed) bank. Therefore, we do not use any controls as the comparison is within bank and at each year quarter.

5, we interact size with dummy for IBIs to disentangle the stability and asset quality of small and large IBIs. In Table 5, model 1, 3, 5 and 7 report the results of specification (3) that uses bank-quarter fixed effects. In model 2, 4 ,6 and 8 we use dummies for Islamic windows of large and small mixed banks separately.

Conventional vs. Islamic Banking Institutions

Panel A and B of Table 3 below show the main results of specification (13) for various indicators of financial stability and asset quality of Islamic and conventional banking with and without control variables. In Table 3, ó*Islamic*ô is a dummy for IBIs which includes both full-fledged IBs and IBBs of mixed banks. The estimation without covariates indicates that IBIs fare better than CBIs in financial stability as their z-score is higher than that of CBIs.

In Panel A, both the z-scores, i.e. Z-score$_A$ and Z-score$_B$, of the IBIs are significantly higher than that of CBIs. Also, the magnitude of the coefficients is economically meaningful keeping in view the industry average. Specifically, Z-score$_A$ is 19 points higher than the same index of CBIs whereas Z-score$_B$ of IBIs is understandably much higher than that of CBIs (69 points). However, CAR$_A$ of IBIs is not significantly different from that of CBI. Whereas, CAR$_B$ 50 points higher than that of CBIs, which is expected because for this measure we treat PLS savings and investment of deposits of IBIs as equity of these institutions. Once we control for the bank/segment level characteristics of size, fixed assets and non-loan earning assets (models 2, 5, 8 and 11), Z-score$_B$ of IBIs still remain higher than the same indicator of CBIs showing sound financial stability. Also, IBIs are more capitalized than CBIs in terms of higher CAR$_B$. However, Z-score$_A$ and CAR$_A$ of IBIs are though positive but statistically insignificant.

Panel B of Table 3 show that there is a significant difference between asset quality of the IBIs and CBIs (Models 1, 4, 7, 10). IBIs have better asset quality than that of CBIs, i.e., NPLs and loan loss provisioning to gross loans of IBIs are lower in comparison to same indicators of CBIs. Findings about asset quality of the banks are consistent with the results of Baele, Farooq and Ongena (2012) who use individual loan level data of banking sector in Pakistan from 2006 to 2008. They find that, when compared to conventional loans, on average Islamic loans are less likely to default. Loan loss provisioning

Table 3 In this table we report the results of specification (13) for whole sample with and without bank level controls. The table reports the estimated coefficients with various stability/solvency (Panel A) and asset quality (Panel B) measures as dependent variable of bank i in year: quarter t. The independent variable *Islamic* is a dummy variable which takes the value of 1 if the institution is Islamic bank and zero otherwise and size is natural log of the assets. Fixed assets are normalized by the total assets and non-loan earning assets are normalized by the total earning assets of the each banking intuition. Z-score$_A$ and CAR$_A$ are computed by treating profit and loss saving and investment (PLS) accounts of IBIs as *liabilities*, whereas Z-score$_B$ and Capital-Asset Ratio$_B$ is calculated by treating these PLS accounts as *equity* of the IBIs. The estimations use various numbers of banking institutionï year: quarter observations. Standard errors (in parentheses) are clustered at the bank (segment) level. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table 3: Panel A					**Stability**							
Coefficients	Z-score$_A$			Z-score$_B$			CAR$_A$			CAR$_B$		
	1	2	3	4	5	6	7	8	9	10	11	12
Islamic	18.743**	15.863	109.243	69.272***	75.951***	1.176	13.44	7.273	57.397	49.925***	50.409***	29.373
	(8.884)	(11.042)	(80.173)	(10.664)	(12.975)	(40.672)	(9.915)	(13.717)	(56.230)	(10.065)	(14.249)	(54.992)
(2) Size		-2.385	0.851		1.79	-0.801		-1.87	-0.133		0.59	-0.139
		(1.770)	(2.890)		(2.446)	(2.289)		(2.988)	(4.315)		(2.997)	(4.323)
Fixed assets		-0.37	-0.38		-0.37	-0.362		0.841	0.836		0.708	0.71
		(0.700)	(0.766)		(0.869)	(0.806)		(0.741)	(0.750)		(0.802)	(0.788)
Non-loan Earning Assets		0.403	0.494		0.27	0.197		-0.162	-0.113		-0.11	-0.131
		(0.327)	(0.373)		(0.192)	(0.171)		(0.388)	(0.352)		(0.387)	(0.351)
(5) Islamic*size			-10.232			8.194*			-5.492			2.305
			(7.776)			(4.212)			(4.772)			(4.616)
P-value: (2)+(5=0			-9.381			7.393*			11.511			2.166
Constant	14.343***	19.032	-20.318	14.544***	-18.122	13.387	6.368	32.633	(39.772)	6.341	3.967	12.831
	(3.563)	(19.963)	(43.681)	(3.273)	(32.252)	(28.48)	(8.795)	(24.227)	-5.625***	(8.796)	(24.948)	(40.111)
R-squared	0.037	0.071	0.089	0.513	0.525	0.543	0.018	0.028	0.035	0.191	0.196	0.198
Observations	1423	1423	1423	1423	1423	1423	1423	1423	1423	1423	1423	1423

Table 3: Panel B	**Asset Quality**											
Coefficients	ROA			SD(ROA)			Loan Loss Provisioning			NPLs		
	1	2	3	4	5	6	7	8	9	10	11	12
Islamic	0.098	0.691**	2.107*	0.001	-0.00675**	-0.00063	-11.026***	-13.169***	-37.724**	-14.069***	-18.162***	-56.675**
	(0.237)	(0.296)	(1.125)	(0.003)	(0.003)	(0.01692)	(3.211)	(4.312)	(16.814)	(3.629)	(5.355)	(22.054)
(2) size		0.226***	0.275***		-0.00297***	-0.00276***		-2.356**	-3.075**		-3.115**	-4.243**
		(0.065)	(0.089)		(0.001)	(0.0008)		(1.198)	(1.568)		(1.517)	(2.014)
Fixed assets		-0.084***	-0.084***		0.00022	0.00021		0.187	0.185		0.736*	0.732*
		(0.021)	(0.021)		(0.000)	(0.0002)		(0.286)	(0.283)		(0.410)	(0.38)
Non-loan earning assets		0	0.002		0.00002	0.00002		0.296**	0.261**		0.270*	0.215
		(0.005)	(0.005)		(0.000)	(0.00005)		(0.134)	(0.123)		(0.143)	(0.132)
(5) Islamic*size			-0.155			-0.00067			2.638*			4.136**
			(0.104)			(0.00172)			(1.41)			(1.877)
Constant	0.292*	-1.881**	-2.479**	0.013***	0.04282***	0.04024***	12.489***	21.038**	30.594*	17.164***	33.615**	48.611**
	(0.166)	(0.809)	(1.057)	(0.002)	(0.010)	(0.00951)	(3.177)	(10.698)	(15.798)	(3.737)	(14.887)	(21.715)
c(2)+c(5)=0			0.12**			-0.00343**			-0.437			-0.107
R-squared	0.056	0.149	0.153	0.004	0.23919	0.24137	0.072	0.232	0.24	0.105	0.244	0.257
Observations	1423	1423	1423	1423	1423	1423	1367	1367	1367	1363	1363	1363

normalized by gross loans is significantly lower for IBIs owing to the lower level of NPLs. Although profitability, i.e., return on assets (ROA) of the IBBs show higher values, but are statistically insignificant.

After controlling for size and asset structure of the banking institutions, the outcome shows that IBIs are more profitable and have less volatility in ROAs in comparison to CBIs. This fact reveals that assets of IBIs are not only more profitable but also are less risky. In particular, ROA of IBIs is 69 basis points higher than the same indicator of CBIs. The coefficients are economically meaningful given the industry average of 0.53 percent. Similarly, the superior asset quality of IBI is also clear from the lower level of NPLs, and thus the loan loss provisioning, of IBIs in relation to CBIs. After addition of control variables the results show that NPLs and loan loss provisioning of IBIs are 18 and 13 percentage points lower than the same indicator of CBIs. Both these differences are large considering the industry means of both the indicators i.e. 14 percent and 10 percent respectively.

Some (statistically significant) stylized facts of the bank level control variables stand out. Larger banks carry less NPLs to gross loans and thus are required to make less provisioning as well. Thus, the asset quality of the banks improves as they become larger. In emerging economies where firms are mostly dependent on bank loans and loan demand is high the bigger banks are better placed to pick better quality firms to finance. However, as expected, large banks have higher profitability (ROA) due to the economies of scale. Though statistically insignificant, larger banks have lower z-score mainly due to lower capitalization. Regarding correlation of size and stability, theoretical and empirical literature is inconclusive (Beck, Demirgüç-Kunt and Merrouche (2013)).

Since size of an Islamic bank may affect the stability (Ţihák and Hesse (2010)) and asset quality (Beck, Demirgüç-Kunt and Merrouche (2013)) of IBIs, we also interact dummy for IBIs with size (see models 3, 6 ,9 and 12 of Panel A and Panel B). The results indicate that relative to the CBIs, small IBIs show lower level of NPLs and, therefore, loan loss provisioning, and are more profitable. As size of IBIs increases, the difference between IBIs and CBIs decreases for asset quality as NPLs of CBIs decrease with the size which is not the case for IBIs. Size affects profitability of both conventional and Islamic banks positively. Volatility of the returns of both IBIs and CBIs also decreases as their size increases. This shows that large IBIs and CBIs have stable returns on their assets in comparison with small IBIs and CBIs respectively. On the other hand, the z-score of IBIs

increases with their size, whereas size does not affect the same indicator for CBIs. Large IBIs, therefore, are significantly more stable than large CBIs.

Conventional Banking Institutions vs. full-fledged Islamic Banks and Islamic Banking Branches of Mixed Banks

As mentioned before, Islamic banking operations in Pakistan are carried out by two different kinds of entities, full-fledged Islamic banks and Islamic banking branches of mixed banks. So next we split the sample of IBIs into IBs and IBBs of mixed banks by using a dummy for each category separately to see whether they differ from CBIs. We thus estimate specification (14).

Panel A of Table 4 reports the results of specification (14) for financial stability of all the banking institutions. We first present the results of specification without any covariates shown in models 1, 4, 7 and 10. Z-score$_A$, a stability and solvency indicator, of full-fledged IBs is 16 points higher than that of CBIs showing that these institutions are more stable than conventional ones. Not surprisingly given the definition, Z-score$_B$ and CAR$_B$ also demonstrate better stability position of both IBs and IBBs. After controlling for size, fixed assets and non-loan earning assets, the results, in general, show improvements in terms of their statistical significance and economic relevance. The outcome suggests that the difference in stability indicator of IBIs and CBIs is not due to the size, fixed assets and non-loan earning assets. Specifically, Z-score$_A$ shows that for IBs this index is significantly higher than the same indicator of CBIs. Similarly, Z-score$_B$ and CAR$_B$ of IBs and CBIs are greater than the counterpart indicators of CBIs.

Table 4, Panel B (without covariates) shows that volatility of ROA given by standard deviation of ROA is significantly lower for Islamic banks than for CBIs. However, we do not find any significant difference in volatility of ROAs of CBIs and IBBs which is a surprise. The results also suggest that IBs have better asset quality because they have lower NPLs and loan loss provisioning on their balances sheets.

To check whether or not the difference between IBIs and CBIs is derived from some other banking characteristics, we control for the size and asset structure of the banking institutions (model 2, 5, 8 and 11). The specification improves the results and the difference in terms of asset quality between IBs and IBBs from CBIs goes up. Specifically, loan loss provisioning and NPLs, of full-fledged IBs are 12 percentage points and 17 percentage points lower than those of CBIs.

IBs also have lower volatility in returns than CBIs. On the other hand, ROA of IBBs is 1.2 percentage points higher than that of CBIs. Islamic operations of mixed banks are slightly more profitable than conventional business of CBIs. Also IBBs depict better asset quality as their provisioning and NPLs are 15 percentage points and 20 percentage points respectively lower than the same measures of CBIs.

We interact dummies for IBs and IBBs with size separately to check how size affects the coefficients of these institutions for different variables. The results, shown in Table 4 Panel A and B (models 3, 6, 9 and 12), signify that in comparison to conventional peers, small IBs are more stable as they have higher z-scores and better capitalization. IBIs also have superior

asset quality because of the lower NPLs. Specifically, the coefficient of z-score and capital asset ratio of small full-fledged IBs is 2.6 times and 1.6 times greater than that of CBIs respectively. This suggests that IBs are less risky than CBIs. The results also indicate that standard deviation of ROA of IBs is significantly lower than that of CBIs, though for larger IBs this difference declines. Similarly, NPLs and loan loss provisioning is 92 percentage points and 57 percentage points lower than the same measures of CBIs respectively. However as the size of Islamic banks becomes larger the asset quality of the IBIs becomes relatively weaker.

This is obvious from the fact that if we calculate coefficient of size of IBs for loan loss provisioning and NPLs by separately adding coefficient (4) and (7) for the relevant indicators, these turns out to be 1.6 and 3.5 respectively. The fact that size impacts Islamic banksô asset quality negatively is also revealed by Ļihák and Hesse (2010). However, this is not the case for IBBs of the mixed banks as their NPLs and provisioning go down with increase in their size. Volatility of returns of small and large IBIs is less than that of CBIs, showing that their assets are less risky as size of IBIs does not impact the riskiness of their returns. Due to increase in size, the differences between IBBs and CBIs decrease for the asset quality.

Table 4 In this table we show the results of specification (14). The table reports the estimated coefficients with various stability (Panel A) and asset quality (Panel B) measures as dependent variables of bank i in year: quarter t. The independent variables *Islamic Banks* and *Islamic Branches* are dummies which takes value of 1 if the institution is full-fledged Islamic bank or Islamic branches of the mixed banks respectively and zero otherwise. Size is natural log of the assets. Fixed assets are normalized by the total assets and non-loan earning assets are normalized by the total earning assets of the each banking intuition. Z-score$_A$ and CAR$_A$ is treating profit and loss saving and investment (PLS) accounts of IBIs as liabilities, whereas Z-score$_B$ and CAR$_B$ is calculated by treating these PLS accounts as equity of the IBIs. The estimations use numbers banking institutionï year: quarter observations. Standard errors (in parentheses) are clustered at the bank (segment) level. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Panel A **Stability**

Coefficients	Z-score A			Z-score B			Capital-Asset Ratio A			Capital-Asset Ratio B		
	1	2	3	4	5	6	7	8	9	10	11	12
Islamic Banks	16.257*	15.845*	254.727***	79.69***	82.179***	163.287***	17.049	12.486	163.506**	65.332***	62.621***	109.949***
	(8.584)	(8.129)	(80.572)	(12.099)	(12.559)	(55.781)	(10.512)	(11.178)	(63.628)	(9.516)	(10.605)	(41.499)
Islamic Banking Branches	19.988	15.882	119.32	64.054***	69.022***	-19.396	11.632	1.475	77.631	42.209***	36.825**	55.876
	(12.346)	(17.816)	(85.743)	(14.371)	(19.906)	(44.52)	(10.303)	(17.116)	(59.361)	(10.196)	(17.705)	(57.155)
(4) Size		-2.382	0.395		0.906	-0.953		-2.609	-0.61		-1.143	-0.626
		(1.950)	(2.908)		(2.758)	(2.293)		(3.403)	(4.307)		(3.394)	(4.316)
Fixed Assets		-0.37	-0.618		-0.44	-0.54		0.782	0.626		0.57	0.52
		(0.680)	(0.692)		(0.825)	(0.784)		(0.756)	(0.73)		(0.775)	(0.756)
Non-Loan Earning Assets		0.403	0.447		0.229	0.185		-0.197	-0.164		-0.192	-0.184
		(0.359)	(0.375)		(0.18)	(0.168)		(0.368)	(0.35)		(0.366)	(0.35)
(7) Islamic Banks*Size			-24.327***			-8.542*			-15.355***			-4.823
			(7.798)			(4.653)			(5.744)			(3.15)
(8) Islamic Banking Branches*Size			-12.473			10.804*			-9.195*			-2.296
			(8.611)			(5.673)			(5.322)			(5.039)
Constant	14.338***	18.998	-12.084	14.567***	-6.213	16.253***	6.376	42.6	20.073	6.375	27.316	21.543
	(3.562)	(28.942)	(44.17)	(3.273)	(35.263)	(0.521)	(8.796)	(29.179)	(39.446)	(8.796)	(29.415)	(39.782)
(4) + (7)=0			-23.932			-9.495			-15.965			-5.449
(4) + (8)=0			-12.078***			9.851***			-9.805***			-2.922***
R-squared	0.037	0.071	0.099	0.52	0.53	0.553	0.019	0.03	0.048	0.203	0.209	0.210
Observations	1423	1423	1423	1423	1423	1423	1423	1423	1423	1423	1423	1423

Panel B												
						Asset Quality						
Coefficients	ROA			SD(ROA)			Loan Loss Provisioning			NPLs		
	1	2	3	4	5	6	7	8	9	10	11	12
Islamic Banks	-0.142	0.266	1.527	-0.004**	-0.00738***	-0.03285***	-10.567***	-12.021***	-57.227**	-13.656***	-16.645***	-92.084***
	(0.357)	(0.262)	(1.892)	(0.002)	(0.002)	(0.01136)	(3.145)	(3.812)	(23.066)	(3.624)	(4.663)	(25.972)
Islamic Banking Branches	0.218	1.164***	1.117	0.003	-0.00605	0.00296	-11.316***	-14.65***	-36.469**	-14.33***	-20.123***	-55.093**
	(0.254)	(0.387)	(1.187)	(0.004)	(0.004)	(0.01949)	(3.257)	(5.310)	(16.85)	(3.651)	(6.703)	(22.099)
(4) Size		0.286***	0.287***		-0.00288***	-0.00272***		-2.517*	-3.028*		-3.328**	-4.153**
		(0.074)	(0.089)		(0.001)	(0.0008)		(1.310)	(1.566)		(1.666)	(2.01)
Fixed Assets		-0.079***	-0.08***		0.00022	0.00025		0.165	0.216		0.707*	0.79**
		(0.019)	(0.019)		(0.000)	(0.0002)		(0.298)	(0.29)		(0.422)	(0.385)
Non-Loan Earning Assets		0.003	0.003		0.00002	0.00003		0.286**	0.266**		0.257*	0.225*
		(0.005)	(0.004)		(0.000)	(0.00005)		(0.130)	(0.124)		(0.139)	(0.133)
(7) Islamic Banks*Size			-0.13			0.00264**			4.59**			7.663***
			(0.18)			(0.00103)			(2.081)			(2.313)
(8) Islamic Banking Branches*Size			0.006			-0.00111			2.558*			4.098**
			(0.124)			(0.00215)			(1.423)			(1.895)
Constant	0.292*	-2.694***	-2.7***	0.013***	0.04161***	0.03957***	12.491***	23.351*	29.711*	17.165***	36.671**	46.929**
	(0.166)	(0.899)	(1.043)	(0.002)	(0.010)	(0.00957)	(3.178)	(12.404)	(15.84)	(3.737)	(17.14)	(21.765)
(4) + (7)=0			0.157			0.000			1.562**			3.51**
(4) + (8)=0			0.293***			-0.00383			-0.47***			-0.055***
R-squared	0.059	0.164	0.165	0.033	0.240	0.249	0.072	0.233	0.241	0.105	0.245	0.259
Observations	1423	1423	1423	1423	1423	1423	1367	1367	1367	1363	1363	1363

Bank-quarter Fixed Effects: Conventional vs. Islamic Windows of Mixed Banks

The data also provide us with the opportunity to use bank-quarter fixed effects, since we have some banks that host both Islamic and conventional banking separately through Islamic and conventional banking branches. Bank-quarter fixed effects permit us to control for any time variant observed and unobserved heterogeneity. This specification thus shows how Islamic banking operations of mixed banks are different from their conventional operations within the *same* bank and quarter in terms of financial stability and asset quality. Since specification with fixed effects takes into account only those banks which have both types of banking windows, the sample observations decrease by about half.

Table 5, Panel A and B reports the estimation results of the specification (15). The estimation outcome indicates that IBBs have 10 percentage points higher capitalization than CBBs while we consider CAR_A. However, there is no difference between z-$score_A$ of IBBs and CBBs. On the other hand, if we consider Z-$score_B$ and CAR_B for comparison, IBBs are more stable and better capitalized than CBBs. Models 1, 3, 5 and 7 in Panel B indicate that IBBs have higher ROA than that of CBBs. Specifically, IBBs ROA is 0.7 percentage point higher than return on assets of CBBs. This suggests that offering Islamic banking by a conventional bank yields higher returns to the conventional bank. However, there is higher level of volatility in the returns on their assets than those of CBBs. In contrast, NPLs of IBBs are 7 percentage points lower than the same ratio of CBBs. Loan loss provisioning of IBBs, therefore, is also lower than that of CBBs. This shows a better asset quality of IBBs as the coefficients are highly significant and economically meaningful. In model 2, 4, 6 and 8 of both panels, we use separate dummy variables for IBBs of small and large mixed banks to see if they behave differently from CBBs. The results show that IBBs of small mixed banks are less stable than CBBs as these have lower z-$score_A$. The main reason for this outcome is that Islamic windows of small mixed banks have greater volatility in returns of their assets than that of CBBs. However, the z-score of IBBs of both small and large mixed banks is greater than the same indicator of CBBs, which suggests that treatment of risk sharing S&Ideposits of IBBs lead to less risk shifting in these institutes. On the other hand, though Islamic windows of large banks also have higher volatility in returns they have also much better capitalization. Therefore, their z-$score_A$ is 2 points greater than that of CBBs, albeit insignificant statistically. We also check if IBBs large mixed banks behave differently from those of small IBBs. For that we test if the coefficients of Islamic windows of large banks are equal to the coefficients of Islamic windows of small ones. The results show that IBBs of large mixed banks are

significantly more stable than that of small mixed banks. However if we consider z-score$_B$ and CAR$_B$, we note that IBBs of small mixed banks are more stable and better capitalized than those of large mixed banks.

Table 5 In this table we report the results of specification (15) for Sample B (only dual banks) using *bank-time fixed effects*. The table reports the estimated coefficients for specifications with the various stability (Panel A) and asset quality (Panel B) measures as dependent variable of bank i in year: quarter t. The independent variables *Islamic* is a dummy variable which takes the value of 1 if the branches of a mixed bank are Islamic and zero otherwise. Similarly, large Islamic is a dummy variable for the mixed banks with assets more the around USD2 billion. Size is natural log of the assets. Fixed assets are normalized by the total assets and non-loan earning assets are normalized by the total earning assets of the each banking intuition. Z-score$_A$ and CAR$_A$ is computed by treating profit and loss saving and investment (PLS) accounts of IBIs as liabilities, whereas Z-score$_B$ and Capital-Asset Ratio$_B$ is calculated by treating these PLS accounts as equity of the IBIs. Each model use various banking institutionï year: quarter observations. Standard errors (in parentheses) are clustered at the bank-segment level. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Panel A **Stability**

Coefficients	Z-score A		Z-score B		Capital-Asset Ratio A		Capital-Asset Ratio B	
	1	2	3	4	5	6	7	8
Islamic@	-0.796	-2.555**	64.994***	68.501***	9.536***	5.201***	39.967***	43.036***
	(1.265)	(1.22)	(10.227)	(12.8)	(2.712)	(1.453)	(2.549)	(2.138)
Large Islamic		1.801		59.821***		15.93***		35.439***
		(2.116)		(16.883)		(5.844)		(5.115)
C	13.588***	12.29**	-7.456	-4.869	8.386***	5.189	5.48	7.744***
	(4.969)	(5.942)	(20.719)	(20.107)	(1.934)	(4.668)	(3.663)	(3.146)
p value (1)=(2)		0.076		0.682		0.076		0.172
R-squared	0.542	0.55	0.730	0.732	0.575	0.60	0.849	0.854
Observations	665	665	665	665	665	665	665	665

Panel B **Asset Quality**

Coefficients	ROA		SD(ROA)		Loan Loss Provisioning		Non-Performing Loans	
	1	2	3	4	5	6	7	8
Islamic@	0.725***	0.699***	0.01***	0.008***	-5.291***	-5.818***	-7.231***	-8.111***
	(0.251)	(0.201)	(0.002)	(0.001)	(1.046)	(1.509)	(2.033)	(3.029)
Large Islamic		0.763		0.013**		-4.333***		-5.647***
		(0.547)		(0.006)		(0.767)		(1.014)
C	1.512**	1.493*	0.014**	0.013**	8.421***	8.421***	11.497***	11.497***
	(0.77)	(0.795)	(0.007)	(0.006)	(0.000003)	(0.000)	(0.000006)	(0.000)
p value (1)-(2)=0		0.912		0.387		0.381		0.441
R-squared	0.622	0.622	0.657	0.672	0.835	0.838	0.822	0.825
Observations	665	665	666	666	611	611	612	612

@ For column 2, 4, 6, 8 and 10, ôIslamicô is a dummy for small IBBs, which otherwise represent all Islamic windows of mixed banks

Panel B of Table 5 (model 2, 4, 6 and 8) show that IBBs of small mixed banks are more profitable but have more volatility in returns on their assets than CBBs. ROA of these entities is 0.7 percentage points higher than ROA of CBIs. Moreover, these Islamic windows have

better asset quality as NPLs, and thus loan loss provisioning is 8 percentage points and 6 percentage points lower than that of CBBs. By the same token, IBBs of large mixed banks have NPLs and provisioning 4 percentage points and 5 percentage points lower than same indicators of CBBs respectively. In this respect, there is no difference between IBBs of small and large mixed banks.

Robustness

We check the robustness of our estimations by using the original un-winsorized data. The unreported results are not different from the baseline results which indicate insignificance of outliers in the estimation process. Next, using contemporaneous control variables of size and asset structure, i.e. fixed assets and non-lending, of the banks may create endogeneity problem in the estimation due to reverse causality. We therefore replace contemporaneous control variables with lag values of the control variables in a robust estimation. The robust specification results support our findings of baseline estimation. Similarly, following Beck, Demirgüç- Kunt and Merrouche (2013) we also estimate the specifications using an alternative method of median least squares which minimizes the median squares of residual and is, therefore, robust to outliers (Clarke and Fuchs (2007)). However, we cannot cluster standard errors at bank level in this method. The findings do not change using to this method either.

Age and experience of a bank may influence the differences between Islamic and conventional banking across all indicators of stability and asset quality. Thus it may be the case that asset quality of the IBIs turns out to be better than that of CBIs because age differences between IBIs and CBIs. Therefore, the difference in behavior of IBIs from CBIs may not be because of Islamic characteristics *per se*. To disentangle this effect, we re-estimate the specifications with an additional control for age and experience of a bank that we proxy by the number of years a bank has been in the business. The results confirm that the differences between Islamic and conventional banking for baseline specifications are not due to age and experience. Thus, our baseline results still stay valid. Finally, we also use number of bank branches (outlets) as a proxy for a bankôs experience as it is generally expected that older banks will have larger numbers of branches. Our results are also robust to this alternative specification.

6. Conclusion

Using data from Pakistan, where conventional and Islamic banks co-exist, we investigate how Islamic banking institutions are different from conventional banking institutions in terms of asset quality and stability. We find that Islamic banking institutions (IBIs) performed better than conventional banks in profitability and asset quality during the sample period. Specifically, NPLs and provisioning to gross loans ratios of IBIs are lower than the same indicators of conventional banks. Thorough analysis shows that IBs have not only better asset quality but also are more stable than CBIs whereas IBBs though have higher z-score, do not differ significantly from conventional banking institutions. However, IBBs are more profitable, have less volatility in ROAs and have lower NPLs and resulting loan loss provisioning than CBIs. If we treat S&I accounts of IBIs issued on the basis of PLS risk sharing as part of (equity) capital,we find that IBIs are more stable, and have better a asset quality than CBIs.

Estimation with bank-quarter fixed effects suggest on the contrary that Islamic operations of small mixed banks have higher capital to asset ratio and are more profitable, but have higher volatility of returns on their assets. As a consequence, stability index of these IBBs is lower than that of conventional part of mixed banks. This is if we treat risk sharing S&I deposits of IBBs as their liabilities. IBBs, of both small and large mixed banks, also exhibit superior asset quality due to lower NPLs and thus provisioning than CBBs. Also IBBs of small mixed banks are more profitable than CBBs and, IBBs of large mixed banks are not significantly different from that of small ones in this regard.

The results have important implications for the co-existence of conventional and Islamic banking systems. Our results imply that there is an inherent difference in the stability (z-score) and asset quality of IBIs and CBIs. Therefore, our evidence suggests that the presence of Islamic banks improves financial stability. Due to profit and loss sharing deposits, Islamic banking institutions have less incentive for risk shifting. As a consequence, these institutions have better asset quality and are more stable than their conventional counterparts.

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