Macroeconomic Challenges Facing Low-Income Countries
New Perspectives

January 30–31, 2014

Liquidity Crisis: Are Islamic Banking Institutions More Resilient?

Sajjad Zaheer
University of Amsterdam

Moazzam Farooq
Central Bank of Oman

Paper presented at the joint RES-SPR Conference on "Macroeconomic Challenges Facing Low-Income Countries"
Hosted by the International Monetary Fund
With support from the UK Department of International Development (DFID)
Washington, DC—January 30–31, 2014

Liquidity Crisis: Are Islamic Banking Institutions More Resilient?

Sajjad Zaheer
University of Amsterdam
Amsterdam School of Economics, University of Amsterdam
Valckenierstraat 65-67, 1018 XE Amsterdam, The Netherlands

Phone: +31 20 5254236, Fax: +31 20 5254254
E-mail: s.zaheer@uva.nl

Moazzam Farooq
Central Bank of Oman
Financial Stability Unit
P.O. Box 1161, Post Code 112Ruwi-Muscat
Sultunate of, Oman

Phone +968 99 0146 99

Email: m.farooq@uvt.nl

This draft: January 2013

We are thankful to Mario Catalan, Cameila Minoiu, Chris Papageorgiou, and participants at IMF-DFID pre-conference on "Macroeconomic Challenges Facing Low Income Countries". We are utmost grateful to the State Bank of Pakistan for providing the data used in this paper. This paper is part of an IMF research project on macroeconomic policy in low-income countries supported by the U.K.'s Department for International Development (DFID). The views expressed in this paper are those of the author(s) and do not necessarily reflect those of DFID, the IMF, IMF policies, State Bank of Pakistan and its subsidiaries or Central Bank of Oman.

Liquidity Crisis: Are Islamic Banking Institutions More Resilient?

Abstract

The importance of liquidity risk and the threat of ensuing bank-run cannot be overemphasized. The peculiar structure of Islamic banks and their call to the faith of the customers pose interesting questions regarding their behavior during a liquidity crisis and calls for detailed empirical study. Using a natural experiment from Pakistan we attempt to fill this gap and decipher the differential behavior of Islamic and conventional banking institutions during the episodes of liquidity crunch. Our results show that, Islamic banking branches are less prone to the risk of withdrawal during the bouts of liquidity stress and this effect remains there after introducing an array of controls. Moreover, the Islamic operations of same bank tend to attract more deposits than their conventional operations implying that religious branding might have a role in this phenomenon. The results further highlight that the Islamic banking institutions are more likely to grant new loans during episodes of liquidity crisis and that at occasions their lending decisions might be less sensitive to changes in deposits. The results suggest that, greater financial inclusion of faith based groups through Islamic banking, for example, may not only increase their economic well being but may also bring in stability in the financial system.

Keywords: Liquidity Crisis; Islamic Banking; Bank Run

Liquidity Crisis: Are Islamic Banking Institutions More Resilient?

Maturity transformation, that is, conversion of short term liabilities into longer term financing, is the core business of banks, therefore, by the very nature of their business, the banks hold a mix of illiquid assets with liquid liabilities which exposes them to liquidity mismatch risk which, in turn, may lead to the bank runs and insolvency (Diamond and Dybvig (1983)). To meet the unexpected withdrawals from depositors, banks have to keep sufficient cash or liquid assets which can be readily converted into cash and also give some return with minimum risk. Banks need to fulfill minimum liquidity requirements stipulated by the central banks. Due to higher opportunity cost of cash reserves, banks prefer to invest in short term government securities because they (i) can easily be converted into cash through sale in the secondary markets, (ii) offer risk-free return due to government backing, and (iii) are accepted as collateral for borrowing from the money market.

In the event of a bank run, deposit insurance can play a useful role in weathering the crisis (Bryant (1980). However, in the absence of deposit insurance, liquidity shock may occur more erratically just because of rumor mongering about the health of the financial sector, irrespective of the actual performance of the banks. This situation becomes more challenging for newly established banking system because of the smaller deposit base and size of banks. This kind of a situation thus can test the resilience of the nascent financial industry, for example the relatively new Islamic banking, against a liquidity shock. For Islamic banks, financial crisis might be particularly more disastrous due to less developed Islamic money market, lack of money market instruments and, in various jurisdictions, absence of the lender of last resort facility by the

central bank. Islamic banks are exposed to additional pressure of deposit withdrawal risk because they share profit and loss on investment deposits (Khan and Ahmed (2001)). This may happen when investment depositors of Islamic banks are paid less competitive risk-adjusted returns than the market. On the other hand, religion oriented depositors might be relatively insensitive to the rate of return as Gerrard and Cunningham (1997) document that over 60% of the Muslim customers of Islamic banks declared that they will not withdraw deposit even if the bank does not pay any return. This makes it interesting to explore the resilience of this segment of the financial sector in panic and contrast it to the conventional banking. Moreover, it is also imperative to find that in response to a liquidity shock whether Islamic banking institutions are less likely to cut their lending less than their conventional counterparts. This very important to explore because if the answer is yes then greater financial inclusion through Islamic banking may reduce financial fragility or the transmission of financial shocks to the real economy in regions where Islamic banking is in use.

The purpose of this paper is to gauge the impact of liquidity crisis on the deposit behavior in the Islamic and conventional banks in Pakistan, where there is no explicit deposit insurance in the banking sector. During the last week of September 2008 the banking sector of Pakistan was hit by severe liquidity shock due to rumor mongering about the credibility and performance of a number of banks, freezing of foreign currency accounts and lockers opened in banks. The 2008 liquidity crisis in Pakistan provides a natural experiment to investigate whether or not Islamic banks are more resilient to a liquidity shock and whether they act any different from conventional banks. Although the panic was avoided within a couple of months by the intervention of the central bank, State Bank of Pakistan (SBP), through a variety of actions to

promote the liquidity and solvency of banking sector, however it did hit various banks individually. The timeline of the events provide us an opportunity to identify the bank lending channel as first the banks were hit by the liquidity shock through deposit withdrawals, which then might have affected the bank's lending behavior. Therefore, the causation is from liquidity to the lending, and not the other way around.

Our results show that, against all odds, the evidence of withdrawal of deposits from Islamic Banking Branches/Subsidiaries (ISs) during liquidity crisis is less than their conventional counterparts and this result hold for a variety of specifications involving various control variables. Moreover, during a liquidity crisis Islamic banking institutions continue to provide more credit than their conventional counterparts.

Rest of the paper is organized as follows, Section 1 presents the proposition about resilience of Islamic banks against financial panic, Section 2 describes the background of the financial panic and liquidity crunch in banking sector of Pakistan. In Section 3, we provide the data and econometric specification to distill the impact of crisis on Islamic and conventional banking institutions. Section 4 presents the results and finally Section 5 concludes the study.

1. Islamic Banks and Financial Crisis

1.1. Organization of Islamic Banking in Pakistan

In Pakistan, the need for Islamic banking emerged more as a result of constitutional and legal obligations than an economic and financial phenomenon. Early efforts were made to Islamize the entire financial system during early 1980s. However, after going through lengthy

courts' proceedings regarding *Shariah*[1] compliance of banking products, in 1999 Shariat Appellate Bench (SAB) of the Supreme Court of Pakistan declared the banking system as *unIslamic* due to some contracts which were repugnant to Islamic jurisprudence. Subsequently, to reintroduce Islamic banking, SBP issued detailed criteria for the establishment of Islamic banks in the private sector in 2001. This time, a three-pronged strategy was introduced. This approach permitted financial industry to establish either full-fledged Islamic banks (IBs) in the private sector; or Islamic banking subsidiaries or standalone Islamic banking subisidiries or branches (ISs) of the existing commercial banks. The new strategy was considerably different from initial one in which banks were directed to Islamize their *all* operations invariably within certain timeframe[2]. The approach to allow the co-existence of both banking systems has been proved successful, and Islamic banking so far has been growing in double digits. Currently, there are 5 full-fledged Islamic banks and 13 conventional banks having Islamic branches with a market share of about 7 percent. In this paper, we call Islamic banks plus Islamic branches (subsidiaries) of conventional banks as Islamic banking institutions (IBIs).

1.2. Liquidity Management in Islamic Banking Institutions

Liquidity management is the core challenge for Islamic banking industry, because of the scarcity of appropriate *shariah*-compliant liquidity management instrument relative to their demand, underdeveloped Islamic money market, fewer market players and lack of lender of last

[1]*Shariah*, also known as Islamic law, is a set of certain laws based on Quran and the traditions of Prophet Muhammad, *peace be upon him*, called *sunnah.*

[2]State Bank of Pakistan, BCD Circular No. 13 dated October 12, 1984.

resort facility for IBIs (Errico and Farahbaksh (1998; International Islamic Financial Market (2010)). Consequently, dearth of liquidity management tools induce IBIs to keep higher reserves buffers.

The first Islamic liquidity management instrument was issued in 1983 by Bank Negara Malaysia on the basis of interest free-loan to the government on which it might pay some return as a gift but without any contractual obligation (Sundararajan and D. Marston (1998)). In 2001, the same instrument was issued on the basis of sell and buy back technique Siddiqi (2006).[3] After a considerable time, in 1994, first Islamic money market was developed in Malaysia. Also, in some jurisdictions, central bank's role as the lender of last resort is not established for Islamic banks due to the absence of an alternative to discount rate. Only partial achievement has been made to resolve liquidity management problems due to scarcity of basic infrastructure needed for robust Islamic money markets (IFSB (2008)). As a result, to mitigate liquidity risk, Islamic banks have to rely on higher excess cash liquidity, which is cost inefficient. Eventually, Islamic banks incorporate this cost in their asset pricing that may lead to disintermediation. Moreover, higher excess reserves affect performance and profitability of Islamic banks in competitive market (Hasan and Dridi (2010)), especially during crisis.

[INSERT TABLE 1 ABOUT HERE]

[3]According to this contract, Malaysian government sells its specific asset as pre-agreed cash price to the financial institutions and then buys back the same assets at a higher price to be paid in future. The purchase price securitized in the form of instrument, called Government Investment Certificate (GIC) and issued to financial institutions. At maturity government pays the purchase price to GIC holders in exchange for securities. Scholars from other regions consider buy-back contract as prohibited in Islam because it is two contracts in one contract.

The progress that so far has been made in this regard mainly involves issuance of interest free money market instruments, called *sukuk*,[4] to facilitate IBIs. In Islamic finance *sukuk* refer to interest-free asset-backed securities. Generally, *Sukuk* are issued employing various Islamic finance modes namely *murbahah, ijarah and musharakah* or *mudarabah*. *Sukuk* issuance based on these modes, shows ownership of the *sukuk* holders in debt, underlying asset and projects and businesses respectively.

Since discounted sale of the debt is not allowed in Islam, *murabahah sukuk*, a debt instrument, cannot be traded in secondary market.[5] In current practice, fixed return instruments *ijarah sukuk* are mostly used by the central bank in different Muslim countries with leading role of Malaysia and Bahrain (S&P (2010)), International Islamic Financial Market (2009) because of their eligibility for the secondary market.[6] Moreover, in inter-bank Islamic money market, Islamic banks took several initiatives for liquidity management which include placement or acceptance of fund in Islamic banks on *mudarabah* and commodity *murabahah* basis and compensating mutual interbank balances. There are, though, some hazards which impede the development of efficient Islamic money market. For instance, return on overnight transactions among Islamic banks is difficult to be established on *mudarabah* basis in a transparent way. Also transactions based on *mudarabah* or commodity *murabahah* are not well appropriate for active money market trading (IFSB (2008)). Securitization of *ijarah* sukuk may be proved a good alternative in this

[4]*Sukuk* is a plural which is originated from *sakk that* means a legal instrument or certificate. The terminology is now widely used for interest-free securities/bonds. Total volume of global sukuk at the end of 2010 was USD million 198 (International Islamic Financial Market, 2010).

[5] Malaysia is an exception, where sale of debt with discounting is considered permissible in Islam. Many of the activities in Islamic money market in Malaysia are based on sale of debt at discounted value.

[6]Till June 30th 2009, *Ijarah sukuk* were 52% of the total *sukuk* issued in the international market.

regard. Difference of opinions regarding Islamic repos also hinders the way to resolve liquidity management problem for Islamic banks.

Currently, many Islamic countries are issuing sovereign *sukuk* which help IBIs in investment and liquidity management activities. The important tasks yet to be performed are sufficient issuance of *sukuk* according to the market appetite, development of efficient Islamic money market Sundararajan and D. Marston (1998) across all jurisdictions, precise and complete legal structure for Islamic instruments (Hasan and Dridi (2010)) especially in cases of defaults,[7] and alternative Islamic arrangements for lender of last resort facility.

1.3. Structure of the Islamic Banking and Bank Run

Diamond and Dybvig (1983) present a model which describes the typical situation of a bank run. In this model banks play the role of financial intermediary between the savers and the borrowers. While playing this intermediary role, banks transform short term deposits into long term loans. In this process banks also extract information from the borrowers' financial health, which otherwise is not available to the capital market investors. Banks, therefore, resolve asymmetric information problem on part of the borrowers which leads to agency cost and moral hazard problem. Consequently, financial intermediation results in greater economic development and welfare gain. While decreasing the transaction cost, these institutions get the return from the difference between loan rates charged to the borrowers and deposit rates paid to the depositors.

[7]There were some defaults of *sukuk* in near past which indicated the legal risk attached to the Islamic instruments because of the uncertainty prevailed about the claims of *sukuk* holders on underlying assets. The major defaults are of Gulden Built *Sukuk* USD 650 million of Saad Group and Kuwait Investment Dar *Sukuk* of USD 100 million, while *Nakheel Sukuk* was saved from default by Abu Dhabi state. There is one private *sukuk* default case in US of USD 167 million.

In normal circumstances, this is required equilibrium, leading to efficient allocation of resources. However, the process of maturity transformation of short term liabilities into long duration financing and investment exposes banks to maturity mismatch, liquidity risk and a potential bank run. Although banks keep some fraction of demand deposits as liquid assets, the same may not be sufficient in unusual circumstances. Thus, for example, in the wake of mere gossips or misreporting in media about the financial health of the banks, depositor may start withdrawing deposits from the banks. This small panic may be transformed into a bank run if some banks are unable to meet the short term liabilities by selling their assets or borrowing from the market against these illiquid assets. The situation may lead to technical default in the banking sector. The probability of financial losses may be enormous due to the incomplete investment projects, insolvency of borrowers, and one or more creditors snatching the competition (Radelet and Sachs (2000)). The world has experienced this sort of crisis in 1930s when in a bank run US banks were unable to meet their short term liabilities and refused deposit withdrawals. According to Diamond and Dybvig (1983) model, deposit insurance and central banks' lender of last resort facility can mitigate the risks of a bank run.

The peculiar structure of IBIs may expose them to a financial panic differently. It is, therefore, useful to analyze the asset and liability structure of Islamic banks in perspective of financial crisis.

The liability side of an Islamic bank mainly consists of current accounts (transaction deposits), profit and loss sharing saving and investment accounts (PSIAs), and equity.[8] Current

[8] PSIA generally refer to Profit Sharing Investment Account, which does not include saving accounts. But, since saving accounts are also mobilized on *mudarabah* basis, we refer PSIA to profit and loss sharing saving and

accounts of the IBIs are similar to those of conventional banks that can be withdrawn on demand at any time by the deposit holders. These accounts are mainly held for transaction demand for money. IBIs raise these deposits on the basis of interest-free debt contract (*Qard*) and invest the amount in short term assets. Some Islamic economists, like Chicago School of thought, argue for 100 percent reserve requirement on all types of deposits of the IBIs because this, they think, would create stability in overall economy due to the money multiplier effect (Al-Jarhi (1983)). This stance, however, is not supported by the majority of Islamic economists because in that case commercial banking only reduces to safe keeping (Uzair (1955)). Islamic banks, in practice, are required to maintain certain fraction of demand deposits as reserves either in cash or in form of interest-free government bonds (*sukuk*). Therefore, as far as these deposits are concerned, IBIs are exposed to financial panic same as conventional banks.

The main difference between Islamic and conventional banking institutions on the liability side is the unique PSIAs. Since IBIs cannot mobilize funds on the basis of interest, they primarily use *mudarabah* to raise funds in the form of PSIAs. *Mudarabah* is a contract between *mudarabah* account holders (MAHs)[9] and an IBI in which MAHs act as fund providers (*rabb-ul-mal*) and share in either profit or loss, as the case may be, of the bank. There is no financial loss to bank as *mudarib*. However, if negligence, misconduct, fraud or breach of contract can be proven, the IBI is responsible for the entire loss (IFSB (2008)). MAHs, like shareholders, are

---

investment. In our view, since the saving deposits are demand deposits they are more sensitive to any change in rate of return, especially when it becomes negative (i.e. loss). Funding of Islamic banks through issuing *sukuk* (Islamic bonds) is limited.

[9] IFSB names it as IAH (investment account holder), but due to change in our definition of PSIA we introduce this terminology.

contractually bound to share profit or loss subject to the actual outcome of the banking operations and in proportion to their investments. Therefore, neither return nor principal amount of PSIAs is guaranteed.

Since PSIAs are not mobilized through a debt contract, the same cannot be treated as a liability of the bank and, hence, MAHs are not considered creditors and therefore, first claimants on the banks' assets. On the contrary, these accounts are not customary equity either, as unlike equity which is irredeemable, MAHs' funds are invested for a fixed period of time and even premature withdrawals can be made from these accounts, with or without some penalty according to the individual *mudarabah* contracts. In this sense, these PSIAs are limited-duration equity investments.[10] Nonetheless, MAHs, like shareholders are residual claimants on bank's assets and ranked *paripassu* with shareholders as regards their interests (claims) in assets of an Islamic bank. However, they don't enjoy the same rights as shareholders do for selecting the board members and having access to the important information through board. To discipline bank management, MAHs have to rely on monitoring of the board on behalf of the shareholders or in their ability to divest out of the bank. MAHs can gain some benefit out of the monitoring only if interests of the shareholders and MAHs coincide. These issues may give rise to complex agency problems (Archer, Abdel Karim et al. (1998; El-Gamal (2003)) as well as it may lead to moral hazard on part of the bank management (Mudawi (1985; Khan (1986; Sadr and Iqbal (2001). Management of an IBI may protect their own interests or interests of the shareholders instead of those of MAHs. There are, however, two things which may protect MAHs from moral

[10]PSIA can be regarded as puttable equity instrument that gives MAH the right to put (sell) it back to the bank. IAS 32 classifies any puttable instrument as a financial instrument. In Pakistan a portion of demand deposits (saving deposits) are also mobilized on *mudarabah* basis, and can be withdrawn at any time.

hazard problem despite asymmetric information and lack of voting rights. The first, and foremost, is that PSIAs are of limited duration nature. Due to the redeemable nature of PSIAs an IBI faces commercial pressure to pay competitive returns to retain the existing funds (AAOIFI (1999a). MAHs can withdraw funds and invest elsewhere if they feel that the return on their investment is lower than the market rate. This pressure may discipline IBs and make them more efficient and prudent. In addition, Al-Deehani, Abdel Karim and Murinde (1999) show that '*an increase in investment accounts financing enables the IB to increase both its market value and its shareholders' rates of return at no extra financial risk to the bank*'. Similarly, Archer, Abdel Karim and Al-Deehani (1998) demonstrates that both shareholders and MAH are subject to same portfolio investment risk to the extent that the funds of both parties are commingled as done in almost all IBIs. As the interests of MAHs and shareholders are aligned agency cost, moral hazard problem and corporate governance issues may be of less concern in IBIs. Thus PSIAs provide an extra line of protection for the Islamic banks besides equity when loss occurs to the Islamic bank.

According to the instructions of Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) and Islamic Financial Services Board (IFSB), PSIAs should not be treated as liabilities of the banks due to their equity-like nature.[11] In practice, however, Islamic banks treat them as a liability of the bank in Pakistan and in other jurisdictions like Iran, Malaysia, Sudan, Turkey, UAE and Yemen, taking into account the economic substance of the transaction rather than the legal form of the *mudarabah* contract (Karim (2001)). Contrary to the

[11]In Financial Accounting Standard No.6, it is described that '*equity of unrestricted investment account holders shall be presented as an independent category in the statement of financial position of the Islamic bank between liabilities and owners' equity* as on balance sheet item. Restricted PSIA should be treated as off balance sheet item (AAOIFI 1998).

contractual obligations of PSIAs, Islamic banks manage to give competitive returns to MAHs to retain PSIAs, regardless of their actual financial position of the bank i.e. profit or loss. If Islamic bank pays lower return to the MAHs or passes some losses to these depositors, they may withdraw their deposits from Islamic banks. Thus there is greater risk of deposit withdrawal for Islamic banks than conventional banks (Sundararajan and Errico (2002)) that could be problematic, especially for small Islamic banks. To manage this risk Islamic banks forgo part of their profit share as a *mudarib* to pay competitive returns to the MAHs. In Islamic banking since PSIA depositors share in profit and loss of the Islamic banks, they are exposed to risk of capital loss.

On the asset side, IBIs are considered more stable as generally they don't have several features of conventional banks which led the world to recent financial crisis. Main causes of financial crisis 2007-2009 are described as heavy reliance on interest based debt financing, high leverage, lack of adequate market discipline, excessive and imprudent credit growth, investments in toxic assets and speculative short selling (Bernanke (2008; BIS (2008)). Most of the causes are either absent or fewer in IBIs than in conventional banks. Islamic banking, therefore, is less susceptible to financial crises at least in the first round of the financial crisis when it does not hit the real sector of the economy. Chapra (2008) proposes that financial instability can be avoided through "*Risk-sharing along with the availability of credit for primarily the purchase of real goods and services and restrictions on the sale of debt, short sales, excessive uncertainty (gharar), and gambling (qimar).*'' These are the very features of Islamic banking contracts which put greater market discipline and thus financial stability. For instance, asset-backed financing of IBIs ensures the direct link between financial transaction and real sector activities

(Mohieldin (2012)). Therefore, depositors of Islamic banks may have strong incentives to monitor their banks (Beck, Demirgüç-Kunt et al. (2013)). Thus liability structure of Islamic banks may impose the required market discipline.[12]

Conventional banks mainly see the credibility of the borrower which depends on the net-worth and collateral of the borrower. Generally, conventional banks do no project appraisal and extend financing even for speculation, especially when the risk of default can be transferred to other persons by selling the debt (Chapra (2008)). Moreover, these banks, especially big, remain less prudent in lending because of the bailout assurance by the central banks and governments according to ‘’too big to fail’’ axiom (Boyd and Gertler (1993; Mishkin (2000)). Currently, this problem does not exist in Islamic banking because of their small market share. However, moral hazard problem can also exist in IBIs if the management of the banks believes that losses can easily be passed on to PSIAs holders. This problem may be less potent as Islamic banks face deposit withdrawal risk if they pass any loss to their depositors.

Loans of Islamic banking institutions are less likely to default due to religious motivations of the borrowers, if they are predominately Muslims. Consequently, asset quality of IBIs may show, if not superior, as good position as that of conventional banks especially in Muslim majority jurisdictions. The basic hypothesis is that delay in repayment of the loans by the rich Muslims, is considered as unjust and, therefore, a major sin.[13] Thus, devout Muslims who only do business

[12]On the other hand, Islamic banks may not exploit the equity-like nature of saving and investment accounts as they face displaced commercial risk.

[13]It is reported that Allah's Messenger (may peace be upon him) said, "*Delay (in the payment of debt) on the part of a rich man is injustice.*"Sahih Muslim, The Book of Transactions, Hadith 3796, http://sunnah.com/urn/237960

with IBIs are less likely to defaults on their obligations. Even if the Muslims who take loans both from IBIs and Conventional Banking Institutions (CBIs) have to default on their loans would prefer to do that on loans from CBIs considering it as choosing the lesser evil. Consequently, if business cycles affect both the borrowers of IBIs and CBIs homogeneously, the hazard rate of IBIs would be unlikely to be more than that of CBIs. However, if IBIs operate in Muslim minority country and its borrowers are mainly non-Muslims, a priori, there would not be significant difference between assets quality of both the banking institutions.

A requisite for bank run to occur is that bank experience a liquidity mismatch, i.e., short term of banks liabilities surmount the it's short term assets. Assets of Islamic are as illiquid as those of conventional banks. However, due to less developed money market, lack of interbank repos, and in various jurisdictions absence of lender of last resort facility Islamic banks keep excess reserves as a precautionary measure to meet unforeseen liquidity demand. Moreover, in the sub-optimum level of their operations there is lower level of financial intermediation in Islamic banks than conventional banks.

In summary, IBIs do not entail much different degree of risks toward a bank run so far as demand deposits are concerned. However, there may be more withdrawal risk of PSIA deposits which may fluctuate depending upon the volatility in the return on these accounts. On the other hand, bank weak asset quality, over-leveraging and lower capitalization may trigger a bank run sooner once the depositors realize the situation. In this respect IBIs are less likely to face a bank run than conventional banks due to strong liquidity position, better asset quality, and ban on excessive speculation, derivatives, short selling and sale of debt in Islamic finance.

Islamic deposits are *functionally* similar to conventional deposits.[14] Does this mean that we should also expect their default rates to be similar? As mentioned above Islamic banks are structured differently in that they hold relatively more liquidity and are relatively better capitalized, these features may affect how they fare during panics. Additionally, there can be motivations to prefer one form of banking over the other. For example borrowers may choose conventional over Islamic banks because of easy accessibility or specific product needs. If proximity of the closest bank branch or suitability of product is the overriding reason to choose one type of loan over the other, we do not necessarily expect that in the event of financial panic either type of banks will systemically differ in losing deposits.

Interesting testable hypotheses can be formed regarding the motivation for preferring one form of banking over the other and the expected 'run' associated with that choice. The very existence of Islamic banking is based on religion and for depositors choosing Islamic bank(deposit) is plainly is a real economic decision. Those who choose to go Islamic despite potentially poorer accessibility to the branch, and theoretically participation in risks rather than surety of fixed return, might also have a higher propensity to not ditch their bank in the times of crisis.

On the basis of this we may form four testable hypotheses. To test these hypotheses our analysis will rely on a variety of bank and borrower controls and fixed effects to account for both observed and unobserved heterogeneity.

Hypothesis 1. In the event of financial crisis, ceteris paribus, IBIs are expected to experience same level of deposit withdrawal as conventional banks.

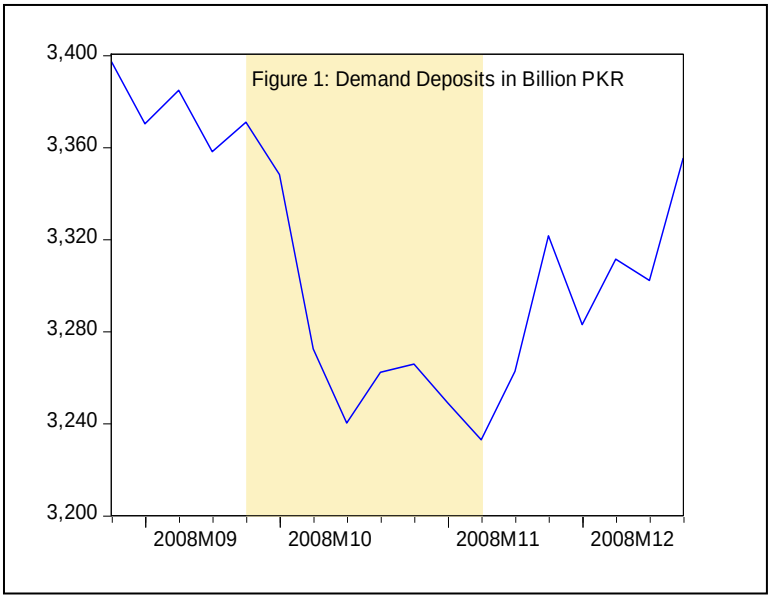
[14] Apart from functional similarity, returns on Islamic and conventional deposits are also subject to a similar tax treatment in Pakistan.

Hypothesis 2. For the same bank having Islamic and conventional operations, the deposit withdrawal is equally likely for both its Islamic branches and conventional branches in the event of a liquidity crisis.

Hypothesis 3. Once hit by general liquidity crunch, both IBIs and conventional banks are equally likely to curtail their lending.

2. 2008 Liquidity Crisis in Pakistan:

During the last week of September 2008 the banking sector in Pakistan faced liquidity crunch owing to the deposit withdrawals induced by widespread rumors in the public about financial sector failure. In the first week of October 2008, there were strong predictions about the bankruptcy of few banks. The fall in deposits continued for seven weeks, from September 27, 2008 to November 14 2008. In just three weeks from September 27, 2008 through October 18, 2008, demand deposits of the banking industry declined **4 percent** to 131 billion PKR (Pakistani Rupee) (see figure 1). Across all banks, small to medium size banks were hit by the shock more severely than others. Some banks failed to fulfill the weekly cash reserve requirements of the central bank, State Bank of Pakistan (SBP), which was then 9 percent of all demand liabilities and time



deposits with maturity of less than one year (Financial Stability Review, SBP, 2008-09). Because of the liquidity crunch, overnight interbank lending rate went up as high as 48 percent per annum (Khan (2008)). The situation needed prompt action by the central bank. Accordingly, SBP publicized that the banking sector of the country is 'stable, safe and sound'.[15] Moreover, SBP specifically communicated about the two most effected banks that they had strong balance sheet position with robust financial ratios. Besides, to ease liquidity situation, the central bank drastically decreased the reserve requirement from 9 percent to 5 percent in gradual phases within a month (i.e., from Oct 11- Nov 1, 2008),. It also exempted short term time liabilities from cash reserve requirement. Using these monetary policy tools, SBP released PKR 270 billion (Financial Stability Review, SBP, 2008-09). While for the whole banking industry generally these actions eased the liquidity situation, yet some banks had to use discount window facility of SBP to meet their liquidity requirements. It took deposits more than two months for deposits to reach the pre-crisis level of demand deposits and to restore the confidence of depositors in the banking industry. We exploit this natural experiment to test our hypothesis mentioned earlier.

3. Data Analysis and Econometric Specifications

Our data set comprise 25-week deposit data of all banks operating in Pakistan, the data period runs from 11-Jul-2008 till 02-Jan-2009. We define the crisis period as the period of heavy withdrawal of deposits from the banking system, as such the crisis period comprises seven

[15] http://www.sbp.org.pk/press/2008/BankingSysStandsSoundFootings-10-Oct-08.pdf

weeks, from 27-Sep-2008 to 14-Nov-2008. Other than the deposit information, we have information on a number of bank level variables that are discussed later.

To evaluate the impact of liquidity shock on the deposits of Islamic and conventional banks, we estimate the following regressions:

$$\Delta \ln D_{ij} = \alpha + \beta_1 ISLb_j + \beta_2 ISLis_j + \gamma_1 B_{ij} + \varepsilon_{ij} (1)$$

Where $\Delta \ln D_{ij}$ is the change in log of deposits over seven-week liquidity crisis period for bank *i*, branch type *j*, $ISLb_j$ is the dummy for Islamic Banks (IBs), $ISLis_j$ is dummy for Islamic Banking Subsidiries/Branches) (ISs) of mixed conventional banks, these dummies take the value of one for IB or IS and zero otherwise. B_{ij} is a battery of bank characteristics, used as control variables, which change across banks and branches type. Specifically, these controls include standard CAMEL[16] type bank fundamentals, log of total assets(to control bank size), log of number of branches (to account for bank reach), age and business structure non-deposit funding to total funding(as a proxy for differences in business structure Further, in some specifications, to control for unobserved heterogeneity among banks, we use bank fixed effects as well.

The summary statistics of variables are presented in Tables 2

[INSERT TABLE 2 ABOUT HERE]

[16] CAMEL stands for Capital Adequacy(proxied by capital to asset ratio), Asset Quality (assessed using NPL ratio), Management (using credit rating), Earnings (we use ROA as a proxy), Liquidity (we proxy by Liquid assets to Total assets ratio)

We first estimate (1) with only an intercept and a dummy for IBs and ISs (in order to compare these with CBIs) *without* any covariates. In next set of regressions, we control the results for an array of bank/ segment-level time-changing features which might affect the differences in shocks across bank types.

Next, once the banking sector was hit by a liquidity shock, we check whether the shock experienced is absorbed equally by the two types of banks or if it gets transmitted to the borrowers in the form of lending cuts. Therefore, we augment our data by credit data obtained from the credit information bureau (CIB) of the SBP. Since it is not usual for banks to withdraw existing credit facilities or demand the repayment of credit during the temporary liquidity crunch, therefore, we use only new loans granted by banks during the liquidity crisis identified above. During the crisis period banks granted a total of 2825 new loans and the credit data that we have include the history of each loan with information on various characteristics of borrower and loan. Using this augmented set of data we run the following regression:

$$\ln L_{ijk} = \alpha + \vartheta_1 \Delta \ln D_{ij} + \beta_1 ISL_j + + \gamma_1 B_{ij} + \delta_1 F_k + \theta_1 L_n + \varepsilon_{ij} \quad (2)$$

Where $\ln L_{ijk}$ is natural log of new loans granted by bank *i*, branch type *j* to borrowing firm *k* during the crisis period. $\Delta \ln D_{ij}$ is the change in log of deposits over seven-week liquidity crisis period for bank *I*,, branch type *j*, $ISL_j$is the dummy for Islamic Banks Institutions (IBIs), that is either IBs or ISs. As before, for some regressions we split this into two separate dummy variables $ISLb_j$ - the dummy for Islamic Banks (IBs) and $ISLis_j$ - dummy for Islamic Banking Branches/Subsidiaries (ISs) of conventional banks.$B_{ij,}, F_k, and\ L_n$ are a battery of bank, borrower and loan characteristics used as control variables.

A key challenge here is to disentangle the effect of liquidity shocks on credit provision (lending channel) from the effects of credit demand shocks. Isolating these two effects is difficult because the events that trigger liquidity crunch might also affect credit demand (Khawaja and Mian (2008)). We overcome this identification challenge by employing the approach used by Khwaja and Mian (2008), that is we use firm fixed effects to test how the credit supply to the same firm borrowing from different (Islamic/conventional, more/less affected) banks gets affected following the liquidity shock. Specifically, we run the following regression:

$$\Delta \ln L_{ijk} = \alpha_k + \vartheta_1 \Delta \ln D_{ij} + \beta_1 ISL_j + + \gamma_1 B_{ij} + \theta_1 L_n + \varepsilon_{ij} (3)$$

Where $\Delta \ln L_{ijk}$ is change in natural log of loan granted by bank *i*, branch type *j* to borrowing firm *k* during the crisis period and α_k is borrower/firm fixed effects.

4. Results:

4.1. Conventional banking institutions vs. full-fledged Islamic Banks and Islamic Banking Branches of Dual Banks

As mentioned earlier, Islamic banking operations in Pakistan are carried out by two different kinds of entities, full-fledged Islamic banks (IBs) and Islamic banking branches or subsidiaries (ISs) of dual banks. Conventional banks in Pakistan have a considerably longer history and broader base in comparison to newly established full-fledged Islamic banks, that prompted us to separate Islamic banking institutions (IBIs = ISs+IBs) into separate dummies. Table 3, shows the main results of specification (1). Across all the specifications, White heteroskedasticity consistent standard errors are used.

As a starting point, we first report estimates from a parsimonious specification (Models I), where we regress 'change in logged deposits during the crisis period' against the dummies for IBs and ISs. The results show that CBBs, IBs and ISs behave differently during the period of liquidity stress. The coefficient of constant term is negative and significant suggesting that CBBs experienced massive withdrawal of demand deposits during the crisis period. The coefficient for IBs is not significant at customary significance level of 10 percent; this implies that withdrawal of demand deposits from IBs is not dissimilar from that of CBBs. In contrast, the coefficient on ISs is positive and significant, indicating increase in demand deposits during the crisis period. This result is remarkable as, during a period of liquidity stress, when one would expect a withdrawal of deposits, the ISs experience an increase in demand deposits. More specifically, the ISs would on average experience increase in demand deposits by 19.8 percent during the crisis period. With the mean demand deposits at PKR 64 million, 19.8 percent increase in demand deposits for ISs is economically significant as well. The significant coefficient of ISs and insignificant coefficient of IBs suggests that Islamic nature of banks/deposits *per se* is not the only determinant of isolation from liquidity crunch and other bank level factors might be important as well. We further explore this in subsequent analysis.

4.2. Does banks history, information provisioning by banks and strong fundamentals matter?

The specification used in Model I does not include controls for important factors that may affect the depositors' behavior during a liquidity crisis or bank-run situation. For example, during a crisis rather than looking at the orientation (Islamic or otherwise) of bank, depositors might actually be considering the relative strength of the banks as depicted by capital

adequacy(solvency), asset quality, earnings history and (prior) liquidity conditions of the bank. As Zaheer and Farooq (2013) and Beck, Demirgüç-Kunt et al. (2013) show that Islamic banks/ branches are better capitalized than their conventional counterparts, therefore, the more withdrawal from conventional banks and increase in demand deposits of ISs might only be an outcome of the better capitalization of ISs. To control for this, in Model- II, we extend our baseline specification with 'Capital to Asset' ratio. The coefficient of this variable is negative and significant, indicating that higher 'Capital to Asset' ratio leads to more withdrawal of fund. One possible explanation for this result is that better capitalized banks might be paying lower returns, prompting depositors to withdraw risky investments without losing much on account of expected returns.[17] Nevertheless, the economic significance of this variable remains small and it loses statistical significance as well when we further augment our model.

He and Manela (2013), postulate that during crisis period, depositors try to seek more information about their banks and the availability of information may affect their decision to run on a bank. One credible and sought out channel of information during the liquidity crisis period could be the bank branches themselves. Therefore, banks with more branches might be in a better position to provide information to information-hungry desperate depositors and might be able to avert a bank-run through better provision of information. To account for this effect, in Model III, we augment the model by adding log of number of branches of banks (or their Islamic operations). The results show that, the size of branch network does not affect the decision to withdraw demand deposits during periods of liquidity crunch. A plausible reason for this could

[17] Demand (Checking) Deposits in Pakistan comprise Saving Accounts and Current Accounts. While banks don't pay any return on later, they pay a positive return on the former one, presently the floor for such return is fixed at 6 percent by SBP.

be that, during crisis times, depositors do not take information available through branches as a credible source of information. The insignificant coefficient of the log of branch network also shows that having a larger branch network does not accelerate deposit withdrawal either, if it does not avert it. The coefficient for the variable of our prime interest, that is, IS remains statistically and economically significant. However, like before, the coefficient for IB remains statistically insignificant.

Rather than relying on the information available from branch network or using Capital to Asset ratio as a criterion, demand depositors might potentially evaluate the relative strength of their respective banks from their history of past successful operations. On this front, conventional banks have a clear advantage over IBIs as, on average, IBIs are relatively new entrants as compared to their conventional counterparts. To control for this potential effect, in Model III, we add 'Age' of banks in the specification. The results show that like the previous two factors, age of a bank or their clean history of the past also appears to be irrelevant for the deposit withdrawal during stressed periods. This result is quite intuitive and straightforward to interpret, as it is a common observation, during recent financial crisis as well, that past history is not a guarantee of treading well through the crisis as things can go awry real fast for banks during bouts of stress. The depositors, therefore, may not give too much credence to the past. The coefficient of ISs retains its sign and size, suggesting that even after controlling for an array of factors described above, during liquidity stress, the CBBs are more prone to the threat of withdrawal as compared to their Islamic counterparts, which in effect experienced increase in their deposits.

In our next estimation, in Model V, we further control for other bank level fundamentals using CAMEL[18] like indicators to control for capital adequacy (capital to total assets), asset quality (NPL ratio), earnings (ROA), liquidity (liquid assets to total assets). These additional controls also do not change the results obtained previously, and the coefficient on ISs remains significant, large and positive.

4.3. Can independent information on banks help them?

The results so far show that the ISs are less likely to experience a bank-run in the times of liquidity stress, and that the solvency condition of banks (Capital to Asset Ratio), their history of successful operations (Age), and the ability to better satisfy informational needs of depositors (through larger branch network) are largely irrelevant in the depositors' bank-run decisions. However, it remains to see if credible third-party information regarding the solvency and strength of banks may affect the depositors' behavior. To evaluate this, we add another variable 'Credit Rating' as an additional control variable to the existing array of control variable. To use credit ratings in the regression, we assign a numerical rating to each notch of the ratings given by credit rating agencies, the numerical ratings that we assign range from 1 to 10, with the 1 being the lowest (BBB-) or equivalent and 10 being the highest (AAA or equivalent). The results show that, credit rating does affect the relative withdrawal of banks during the crisis time. This give credence to the idea that, if depositors are convinced that the solvency of a bank is expected to remain intact, as evident from a higher independent credit rating then brief bouts of liquidity stress may not necessarily lead to bank runs. The results (Model V) show that a one-notch

[18] In CAMEL(S) framework, M stands for management, that we proxy by 'credit rating' assigned by a rating agency. We do not use credit rating in this model, because of the potential multicollinearity concerns.

improvement in credit rating results in 2.1 percent less withdrawal of demand deposits. One notable result that can be observed here is that, the coefficient of ISs remain not only statistically significant, but also economically relevant as for ISs *ceteris paribus* the seven-week increase in demand deposits during the liquidity crunch period was about 29 percent, considering average demand deposits of Rs. 64 billion (PKR 80 ~ 1 USD) this is an economically relevant percentage.

4.4. Is it Islamic Effect or the Bank Structure Matters More?

Up to now we have seen that the coefficient of IS remains statistically and economically significant, its sign remains consistent and size remains relevant throughout. We are now set to explore more to evaluate if this effect is coming out of the way ISs are structured and organized. Zaheer and Farooq (2013) and Beck, Demirgüç-Kunt et al. (2013)show that Islamic and conventional banks differ significantly in their business model besides other factors. So is it a different business model that results in less deposit withdrawal from ISs during times of liquidity stress? To evaluate this proposition, we add an additional battery of control variables to the existing specification. Specifically, we add 'non-deposit funding to total funding' ratio (Model and Size (proxied by log of total assets) as additional control variables[19]. The results, reported in Model VII (Table 3), show that of these additional control variables, 'operating cost to total cost' has a positive coefficient and is statistically significant, whereas the other two variables do not return statistically significant coefficients. The coefficients of ISs remain large, positive and statistically significant signifying better performance of ISs as compared to CBBs on deposit

[19] Despite multicollinearity concerns, in this model 'credit rating' is included along with other CAMEL indicators, dropping this variable does not meaningfully alters the results.

retention during stressed liquidity conditions. Additionally, this also shows that the too-big-to-fail axiom (as evident from statistically insignificant coefficient of Size) may not necessarily hold true in the liquidity crises episodes.

4.5. Bank or her (religious)Depositor?

Although we do control for a set of bank level variables that may potentially affect the decision of bank run, we are still far from conclusively inferring if the relative shielding of ISs is due to unobserved heterogeneity in the banks or because of the (more religious) depositors' decision to stick with the ISs (that signals religious orientation) during liquidity crunch. To disentangle this effect, we introduce bank fixed effects in our estimation. The results of the estimation (Model VII, Table 3) show that in the fixed effects model as well the coefficient of ISs (Islamic branches) is positive and significant suggesting that during periods of liquidity crunch, conventional operations of a 'mixed' bank tend to lose more deposits as compared to the Islamic operations. Given that the bank is same and in the event of a failure, the Islamic and conventional depositors are going to have the same fate, significantly less withdrawals (in fact additional deposits) from Islamic operations is remarkable and suggests that the religious orientation of the depositor (who might feel more affiliated with IS as compared to a secular depositor) might contribute to the decision of not running on the bank.

4.6. Does Cost of Withdrawal Matters?

So far the results show the relative better accomplishment of ISs as compared to their conventional counterparts during episodes of liquidity crunch, we further notice that this result remains robust to addition of an array of control variables. However, so far our focus was primarily on demand deposits that are relatively cheap to withdraw. Time deposits, on the other

hand, might be more expensive to withdraw as these deposits generally attract a penalty (in the form of lost interest or a penalty over and above that) making it more costly to withdraw time deposits. To evaluate this, we replace the demand deposits with time deposits and re-estimate the specifications mentioned above, the unreported results show that like demand deposits, the results remain similar for time deposits as well signifying that the superior performance of ISs in deposit retention during periods of liquidity crisis.

4.7. Do Liquidity Shocks Impact the availability of Credit?

The discussion so far illustrates that ISs are less prone to the risk of withdrawal during the bouts of liquidity stress, now we would shift our focus to the transmission of this resilience to the borrowers of the banks. To investigate this effect, we run regression (2) (and (3) for borrower fixed effects) and report the results in Table 4 columns I through VII.

Column I presents the results of a parsimonious model with intercept and IBI dummy as the only explanatory variable. The results show that during the liquidity crisis, IBIs on average advanced 77 percent more credit than the conventional banking institutions. Column II of the Table 4 confirms the sensitivity of the decision to grant new loans to the change in deposits, that is expansion (contraction) in loans is sensitive to the expansion (contraction) in deposits positively (negatively) affects fresh lending.

To sort out whether the loan-deposit sensitivity of IBIs and CBIs is any different, we also interact the IBI dummy with change in log deposits. The results in show that for IBIs, the decision of granting new loan is *less* sensitive to change in deposits. One possible reason of relatively less sensitivity of lending decision to change in deposits could be higher capital to

asset ratio of the IBIs (as shown by Zaheer and Farooq (2013)) or other structural differences in the bank, borrower or loan characteristics. We, therefore, add a battery of control variables to account for these factors in subsequent regressions presented in Column III . We observe that after controlling for a variety of factors, the IBIs still appear to grant more new loans during the crisis period as compared to the CBIs[20]. The difference in lending by IBIs might be because of some unobserved heterogeneity that we omit to control. We, therefore, add bank fixed effects in our specification (Model IV), the results show that in the same bank, Islamic operations tend to give more loans during liquidity crisis as compared to the conventional operation of the same bank, this is, however, not very surprising (neither a clean test) as Islamic operations keep their own capital and manage own liquidity that might be different from the parent.

Up to now, we do not distinguish between ISs and IBs, to further explore the potentially dissimilar behavior of ISs and IBs, we split the IBI dummy into these two categories and present the results of the regression in Column V and VI of Table 4. The results show that on average both ISs and IBs grant more loans than CBI during the crisis period and this effect remains there after controlling for a variety of bank, borrower and loan characteristics.

However, as we mentioned earlier, this less (more) off-take of credit from conventional (IBIs) might be because of demand side effects, that is, the borrowers of IBIs who self select themselves to take bank with IBIs might be fundamentally different from borrowers of conventional banks and might be affected differently by the events that contributed the liquidity

[20] In unreported regressions the loan-deposit sensitivity (Islamic*Change in log deposits), diminishes and is no more significant, suggesting that the lower loan-deposit sensitivity that was observed before was due to the difference in the characteristics of bank, borrowers or loan granted by IBIs and CBIs.

shock. Therefore, we turn to the borrower fixed effects estimation to disentangle demand side effects from supply side effects. The result show that the same borrower gets more from IBIs (more so from ISs) as compared to conventional banks during episodes of liquidity crunch. This suggests that to some extent, IBIs might help in shielding the real sector from the shocks in financial sector. Zaheer and Farooq (2013), among others, document that IBIs on average better capitalized and are more liquid as compared to their conventional counterparts. Due to liquidity management challenges as mentioned earlier, IBIs have to be content with less efficient use of funds, but they can afford to operate less efficiently by charging 'religiosity premium' from their customers. However, this less efficient use of capital and funds works as a blessing in disguise during liquidity crunch and enable IBIs to continue to provide credit to the prospective borrowers.

5. Conclusions:

The importance of liquidity risk and the threat of ensuing bank-run cannot be overemphasized. The peculiar structure of Islamic banks and their call to the faith of the customers pose interesting questions regarding their behavior during a liquidity crisis and calls for detailed empirical study. Using a natural experiment from Pakistan we attempt to fill this gap and decipher the differential behavior of Islamic and conventional banking institutions during the episodes of liquidity crunch. Our results show that, Islamic banking branches are less prone to the risk of withdrawal during the bouts of liquidity stress and this effect remains there after introducing an array of controls. Moreover, the Islamic operations of same bank tend to attract more deposits than their conventional operations implying that religious branding might have a role in this phenomenon. The results further highlight that the Islamic banking institutions are

more likely to grant new loans during episodes of liquidity crisis and that at occasions their lending decisions might be less sensitive to changes in deposits. The results suggest that, greater financial inclusion of faith based groups through Islamic banking, for example, may not only increase their economic well being but may also bring in stability in the financial system.

6. References:

AAOIFI (1999a). Statement on the Purpose and Calculation of Capital Adequacy Ratio for Islamic Banks. Manama, The Accounting & Auditing Organization for Islamic Financial Institutions.

Al-Deehani, T., R. Abdel Karim, et al. (1999). "The Capital Structure of Islamic Banks under the Contractual Obligation of Profit Sharing." International Journal of Theoretical and Applied Finance.

Al-Jarhi, M. b. A. (1983). A Monetary and Financial Structure for an Interest-Free Economy: Institutions, Mechanism and Policy. Money and Banking in Islam. Z. Ahmed, M. Iqbal and M. F. Khan. Islamabad, Institute of Policies Studies.

Archer, S., R. A. Abdel Karim, et al. (1998). "Financial Contracting, Governance Structures and the Accounting Regulation of Islamic Banks: An Analysis in Terms of Agency Theory and Transaction Cost Economics." Journal of Management and Governance **2**(2): 149-170.

Beck, T., A. Demirgüç-Kunt, et al. (2013). "Islamic Vs. Conventional Banking: Business Model, Efficiency and Stability." Journal of Banking and Finance **37**: 433-447.

Bernanke, B. S. (2008). 'Federal Reserve Policies in Financial Crises' Speech at Great Austin Chamber of Commerce. Austin, Texas.

BIS (2008). Bank for International Settlements (Bis), Annual Report. Basel, Switzerland.

Boyd, J. H. and M. Gertler (1993). U.S. Commercial Banking: Trends, Cycles, and Policy. Macroeconomics Annual. O. J. Blanchard and S. Fischer. Cambridge MA, National Bureau of Economic Research.

Bryant, J. (1980). "A Model of Reserves, Bank Runs, and Deposit Insurance." Journal of Banking & Finance **4**(4): 335-344.

Chapra, U. (2008). The Global Financial Crisis: Can Islamic Finance Help Minimize the Severity and Frequency of Such a Crisis in the Future? Islamic Development Bank. Jeddah.

Diamond, D. W. and P. H. Dybvig (1983). "Bank Runs, Deposit Insurance and Liquidity." Journal of Political Economy **91**: 401-419.

El-Gamal, M. A. (2003). "Interest and the Paradox of Contemporary Islamic Law and Finance." Fordham International Law Journal.

Errico, L. and M. Farahbaksh (1998). Islamic Banking: Issues in Prudential Regulations and Supervision. . IMF Working Paper 98/30**:** 1-32.

Gerrard, P. and J. B. Cunningham (1997). "Islamic Banking: A Study in Singapore." International Journal of Bank Marketing.

Hasan, M. and J. Dridi (2010). The Effects of the Global Crisis on Islamic and Conventional Banks: A Comparative Study Washington DC, International Monetary Fund.

He, Z. and A. Manela (2013). Information Acquisition in Rumor-Based Bank Runs. Working Paper.

IFSB (2008). Issues in Strengthening Liquidity Management of Institutions Offering Islamic Financial Services: The Development of Islamic Money Markets. Technical Notes. Kuala Lampur: 104, Islamic Financial Services Board.

International Islamic Financial Market (2009). A Comprehensive Study of the International Sukuk Market. Sukuk Report. Manama, International Islamic Financial Market.

International Islamic Financial Market (2010). A Comprehensive Study of the International Sukuk Market. Sukuk Report. Manama, International Islamic Financial Market.

Karim, R. A. A. (2001). "International Accounting Harmonization, Banking Regulation, and Islamic Banks." The International Journal of Accounting **36**(2): 169-193.

Khan, M. S. (1986). "Islamic Interest-Free Banking : A Theoretical Analysis." IMF Staff Papers **33**(1).

Khan, T. and H. Ahmed (2001). "Risk Management: An Analysis of Issues in Islamic Financial Industry." ", Occasional Paper No. 5, IRTI, Islamic Development Bank, Jeddah.

Khwaja, A. and A. Mian (2008). "Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market." American Economic Review **98**(4): 1413-1442.

Mishkin, F. S. (2000). Prudential Supervision: Why Is It Important and What Are the Issues? NBER Working Paper No. 7926

Mohieldin, M. (2012). Realizing the Potential of Islamic Finance, World Bank.

Mudawi, B. (1985). Placing Medium and Long Term Finance by Islamic Financial Institutions. Conference on Islamic Banking and Finance.
London, UK, Business Research International.

Radelet, S. and J. Sachs (2000). The Onset of the East Asian Financial Crisis. Currency Crisis. P. Krugman, National Bureau of Economic Research, Inc**:** 105-162.

S&P (2010). S&P (2010), Islamic Finance Outlook 2010. 1:68

Sadr, K. and Z. Iqbal (2001). Choice between Debt and Equity Contracts and Asymmetrical Information: Some Empirical Evidence. Leicester, UK, The Islamic Foundation.

Siddiqi, M. N. (2006). "Islamic Banking and Finance in Theory and Practice: A Survey of State of the Art." Islamic Economic Studies.

Sundararajan, V. and D. Marston (1998). Monetary Operations and Government Debt Management under Islamic Banking, IMF Working Paper. **144**.

Sundararajan, V. and L. Errico (2002). Islamic Financial Institutions and Products in the Global Financial System: Key Issues in Risk Management and Challenges Ahead. IMF Working Paper**:** 1-28.

Uzair, M. (1955). An Outline of an Interest-Less Banking, Raihan Publications, Karachi.

Zaheer, S. and M. Farooq (2013). On the Co-Existence of Conventional and Islamic Banks: Do These Banks Differ in Business Structure, Financial Stability, Asset Quality and Efficiency. Working Paper.

Table 1: Excess reserves as a percentage of total deposits

	Islamic Banks		Conventional Banks	
	2002	2006	2002	2006
Indonesia	23.65	20.45	2.8	2.9
Iran	6.79	2.81	NA	NA
Malaysia	NA	NA	4	6
Pakistan	3.31	3.81	0.24	0.27
Saudi Arabia	6.95	5.06	2.52	2.38
Singapore	NA	NA	6.59	5.27
Sudan	7.4	7	NA	NA
Bangladesh	69.8	57.3	28.2	24.1

Source: Islamic Financial Services Board

Table 2: Summary Statistics

The table reports the descriptive statistics for the variables used in estimations

	Type / Description	Mean	Median	Maximum	Minimum	Std. Dev.
IB	1/0	0.12	0.00	1.00	0.00	0.32
IBB	1/0	0.23	0.00	1.00	0.00	0.43
Capital to Asset	Ratio	10.06	11.81	76.32	3.36	48.69
Branches	Number	383.17	27.50	1,265.00	1.00	1,760.07
Age of bank	Years	34.50	31.00	86.00	1.00	22.88
Non-deposit Funding to Total Funding	Ratio	21.47	13.25	92.45	0.45	24.44
Operating Cost to Total Cost	Ratio	42.12	42.49	96.16	9.93	20.98
NPL Ratio	Per cent	7.83	6.47	70.17	0.00	7.58
Return on Assets	Per cent	1.76	1.91	4.35	-2.94	1.21
Liq. Assets/Total Assets	Per cent	32.24	32.40	54.43	6.72	5.19
Credit Ratings	Number	6.03	6.50	10.00	1.00	2.32
Log (Assets)	Number	10.01	10.04	13.14	5.99	1.85
Demand Deposits	Rs., millions	63,995.48	12,600.00	450,974.00	16.00	108,978.20
lnL	Log of New Loan during crisis	15.54	15.42	19.81	10.82	1.69
Size	Log Firm Size (measured as sum of all loans)	16.82	16.81	23.31	10.82	2.35
Term	Loan Maturity in Months	10.10	8.95	84.14	1.02	10.02

Table 3: Liquidity Crisis and Deposits

The table reports the estimation results of OLS models. The dependent variable is change in log of deposits over seven-week liquidity crisis for bank i, branch type j. The crisis period runs from 27-Sep-2008 to 14-Nov-2008. For each variable in the specification the table reports the estimated coefficient, statistical significance level and standard error (below in parentheses). In all estimations white heteroskedasticiy consistent standart errors are used.

Models	I	II	III	IV	V	VI	VII
Constant	-7.262***	-6.979***	-9.941	-9.119	-21.148***	26.502	-3.320
	(2.679)	(2.597)	(6.309)	(13.426)	(6.843)	(58.308)	(5.221)
Islamic Banks (IB)	-2.045	-1.383	1.661	2.072	0.919	6.655	
	(10.451)	(10.400)	(9.902)	(10.584)	(9.99)	(11.059)	
Islamic Banking Branches (IBB)	19.086**	19.292**	21.439**	19.645*	49.936***	73.166***	15.144**
	(7.87)	(7.980)	(8.802)	(10.745)	(6.843)	(17.234)	(7.384)
Capital to Deposit Ratio		-0.04**	-0.022	-0.01		-0.159	
		(0.017)	(0.032)	(0.033)		(0.344)	
Log (Nr of Branches)			-0.944	-0.785		-1.428	
			(2.3)	(2.572)		(3.676)	
Age			0.154	0.079		0.216	
			(0.195)	(0.185)		(0.223)	
ROA				1.526		0.446*	
				(1.745)		(0.253)	
Liquid Assets/Total Assets				-0.029		5.191**	
				(0.198)		(2.497)	
NPL Ratio				0.076		-0.196	
				(0.097)		(0.221)	
Credit Rating					2.114**	-6.391	
					(0.821)	(6.213)	
Non-deposit Funding to Total Funding						-0.196	
						(0.221)	
Log (Assets)						-6.391	
						(6.213)	
Bank Fixed Effects	No	No	No	No	No	No	Yes
R-squared	0.157	0.166	0.178	0.188	0.183	0.288	0.277

*** significant at 1%, ** significant at 5%, * significant at 10 %

Table 4: Liquidity Crisis and Bank Credit

The table reports the estimation results of OLS models. The dependent variable is change in log of new loans granted over seven-week liquidity crisis for bank i, branch type j to borrower k. The crisis period runs from 27-Sep-2008 to 14-Nov-2008. For each variable in the specification the table reports the estimated coefficient, statistical significance level and standard error (below in parentheses). In all estimations white heteroskedasticiy consistent standart errors are used.

Models	I	II	III	IV	V	VI	VII
Constant	15.504***	15.537***	6.31***		15.528***	6.233***	
	(0.032)	(0.035)	(0.414)		(0.034)	(0.424)	
Islamic (IBIs)	0.771***	0.721***	0.938***				
	(0.156)	(0.175)	(0.234)				
Islamic Banks(IBs)					0.434**	1.187***	0.487
					(0.215)	(0.394)	(0.837)
Islamic Banking Branches (IBBs)				1.947**	0.861***	0.901***	4.119**
				(0.885)	(0.259)	(0.237)	(1.849)
Change in Log Deposits		0.011**	0.001	-0.047*	0.008**	0.000	0.00300
		(0.005)	(0.003)	(0.026)	(0.004)	(0.004)	(0.0146)
Islamic*Change in Log Deposits		-0.015**					
		(0.007)					
Bank Characteristics							
CAR			0.032***			0.032***	0.0588*
			(0.008)			(0.008)	(0.0323)
Non-deposit Funding to Total Funding			-0.004			-0.004	-0.0377**
			(0.004)			(0.004)	(0.0182)
Log(Branches)			-0.013			-0.023	0.0763
			(0.028)			(0.031)	(0.159)
Credit Rating			0.104***			0.124***	0.381*
			(0.035)			(0.044)	(0.203)
Age			0.154***			0.156***	0.102
			(0.034)			(0.034)	(0.0824)
NPL Ratio			-0.015***			-0.014**	0.0325
			(0.006)			(0.006)	(0.0394)
ROA			-0.154***			-0.16***	-0.231
			(0.036)			(0.037)	(0.183)
Liq. Assets / Total Assets			0.041***			0.041***	-0.0250
			(0.007)			(0.007)	(0.0377)
Borrower / Loan Characteristics							
Size			0.437***	0.495***		0.437***	
			(0.014)	(0.023)		(0.014)	
Term			-0.012***	-0.009**		-0.012***	
			(0.004)	(0.004)		(0.004)	
(66)Sectoral Dummies	No	No	Yes	Yes	No	Yes	No
Borrower Fixed Effects	No	No	No	No	No	No	Yes
Bank Fixed Effects	No	No	No	Yes	No	No	No
R-squared	0.01	0.01	0.41	0.38	0.01	0.41	0.04

*** significant at 1%, ** significant at 5%, * significant at 10 %

Appendix

	Industries (Sectors)
1	Agriculture, hunting and forestry - Others
2	Commerce and Trade- Retail trade
3	Commerce and Trade- Sale, maintenance and repair of motor vehicles and motor cycles
4	Commerce and Trade- Wholesales and commission trade
5	Construction- Buildings
6	Construction- Infrastructure
7	Education
8	Electricity, gas and water supply
9	Fishing, farming, aquaculture and related service activities
10	Foreign constituents
11	Health and social work
12	Hotels, restaurants and clubs
13	Insurance
14	Manufacturing- Basic metals
15	Manufacturing- Chemicals and chemical products
16	Manufacturing- Electrical machinery and apparatus
17	Manufacturing- Fabricated metal products
18	Manufacturing- Furniture and fixture
19	Manufacturing- Handicrafts
20	Manufacturing- Jewellery and related articles
21	Manufacturing- Machinery and equipments
22	Manufacturing- Medical, precision and optical instruments, watches and clocks
23	Manufacturing- Motor vehicles, trailers and semi - trailers
24	Manufacturing- Office, accounting and computing machinery
25	Manufacturing- Other sectors
26	Manufacturing- Other non - metallic mineral products
27	Manufacturing- Other transport equipment
28	Manufacturing- Petroleum products
29	Manufacturing- Radio, television and communication equipments and apparatus
30	Manufacturing- Rubber and plastic products
31	Manufacturing- Sport goods
32	Manufacturing- Food products
33	Manufacturing- Papers, paper boards and products
34	Manufacturing- Printing, publishing and allied industries
35	Manufacturing- Tanning and dressing of leather
36	Manufacturing- Textiles- Weaving

contd…

Appendix

	Industries (Sectors)
37	Manufacturing- Textiles- Spinning
38	Manufacturing- Textiles- Finishing
39	Manufacturing- Textiles- Made-up
40	Manufacturing- Textiles- Knitwear
41	Manufacturing- Textiles- Carpets and rugs
42	Manufacturing- Textiles- Wearing apparel, ready made garments and dressing
43	Manufacturing- Textiles- Other
44	Manufacturing- Tobacco
45	Manufacturing- Wood products
46	Mining and quarrying
47	Other community, social and personal service activities
48	Other service sectors
49	Real estate, renting and business activities
50	Ship breaking
51	Transport, storage and communications
52	Trust funds and non-profit organizations
53	Trading
54	Petroleum
55	Beverages
56	Cement
57	Telecommunication
58	Surgical and medical instruments
59	Footware
60	Sugar
61	Oil and gas expolaration
62	Power generation
63	Refinaries
64	Fertilizers
65	Agriculture- Rice
66	Agriculture- Raw cotton
67	Agriculture- Wheat