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Monetary Policy Pass-through, Excess Liquidity and Price Spillover: A Comparative Study of Conventional and Islamic Banks of Pakistan

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Monetary Policy Pass-through, Excess Liquidity and Price Spillover: A Comparative Study of Conventional and Islamic Banks of Pakistan

Muhammad Omer [1]

Abstract

This study investigates the comparative pass-through of policy rate to the retail prices, spillover of prices between Islamic and conventional banking systems, and the impact of excess liquidity on these pass-throughs using data from interbank market of Pakistan. The results suggest that the monetary policy shock affect retail prices of Islamic banks similar to conventional banks, confirming the findings of earlier studies. Moreover, there is a strong spillover between the prices of two systems; Islamic banks are following (leading) the conventional banks in pricing the lending (deposit) products. Islamic bank have acquired advantage in the deposit pricing by taping the religious depositors, which also has promoted financial inclusion in the economy. Our results suggest that the presence of excess liquidity have no effect on pass-through of policy rate in the Islamic system, which is contrary to the prevalent notion. However, excess liquidity significantly affects the spillovers of prices between the systems. These results support the hypothesis that the Islamic banks are investing in government securities indirectly via conventional banks.

JEL Classification: C43, E31, F41

Key Words: Excess Liquidity, Islamic Banks, Monetary Policy Pass-through, VECM, Mediation

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Non-technical Summary

Literature on Islamic finance is preoccupied with assessment of monetary policy effectiveness in a hybrid system; where both Islamic and conventional banks coexist, by assessing specific channel(s) in spirit of conventional monetary transmission mechanism. However, if the financial system has a well-developed interest rate channel in presence of a less developed Islamic financial system, the latter may become conduit to the conventional monetary transmission. Such price transmission, in general, may not be expected by the regulators due to *Shari'ah* restriction. In this situation, differentiated policy tools, if adopted by the central bank for the two systems, may become less effective in regulating the market conditions.

Therefore, an assessment of the policy transmission should incorporate factors specific to the Islamic financial system, such as presence of excess liquidity, prohibition of interest payments and price spillover from conventional to the Islamic financial system. Specifically, presence of excess liquidity in Islamic system may distort the conventional interbank rates. Interbank market of Pakistan has experienced this phenomenon in recent past, where overnight call rates frequently swung to discount, from premium to the repo rate, under the influence of Islamic banks' excess liquidity. Such a distortionary effect may have repercussions for transmission of policy shocks, not only through conventional banks but also through Islamic banks.

This study assess the effectiveness of monetary policy transmission by incorporating the excess liquidity present in both systems using the interest rate channel. In this perspective, this research attempts to answer two key questions; first, how excess liquidity affects the pass-through of the policy rate to the retail rates (rents/investments) in the two systems? Second, how excess liquidity affects the price spillover between the two systems? Answers to these questions would improve our understanding of transmission mechanism and help in effective monetary policy formulation, not only in Pakistan but also in other countries where hybrid financial system exists.

This paper uses vector error correction mechanism for assessing monetary policy pass-through separately for the two systems and spillover of prices between them, using data from January 2004 to October 2016. Our findings, in line with the earlier studies, suggest that the monetary policy shock affects the retail prices of the Islamic banks similar to the conventional banks. Moreover, there is strong spillover of prices between the systems; Islamic banks are following (leading) the conventional banks in pricing the lending (deposit) products. Apparent advantage gained by Islamic banks in deposit pricing could be due to inflow of untapped religious deposits suggesting that the advent of the Islamic banks have promoted the financial inclusion in Pakistan. Literature suggests that Islamic banks generally follow the conventional banks in pricing the retail products, specifically the deposits, as the former faces the 'deposit withdrawal risk'. However, our results show that it is other way around in Pakistan. Conventional banks, being the price taker in the deposit market suffers from the 'deposit withdrawal risk'.

In response to key research questions, our results show that presence of excess liquidity impedes significantly the pass-through of policy rate in conventional banks but insignificantly in the Islamic banks; the latter being contrary to the prevailing notion. The assessment of impact of excess liquidity on

the price spillover suggests that the excess liquidity with the Islamic banks mostly mediates this process. In case of shock to the lending price equilibrium, the Islamic excess liquidity declines, and resurfaces as a conventional excess liquidity in the long run. It is important to note that the excess liquidity with the Islamic banks remains mostly in fungible cash reserves form with the central bank. On the contrary, the conventional excess liquidity remains mostly in the form of short-term government securities, as the central bank frequently intervenes in the interbank market for absorption if this liquidity is more than desired by the central bank. These results endorses the possibility of the liquidity transmission from Islamic banks via conventional banks to the short-term government securities.

1. Introduction

Literature on Islamic finance is preoccupied with assessment of monetary policy effectiveness in a hybrid system, where both Islamic and conventional banks coexist, by assessing specific channel(s) in spirit of conventional monetary transmission mechanism. Such an assessment, however, requires a number of factors specific to the Islamic financial system, such as presence of excess liquidity, prohibition of interest payments and price spillover from conventional to the Islamic financial system, to be taken into account (Khatat, 2016). Specially, in presence of price spillover, the central bank's ability to make precise impact on the market condition may be compromised if the financial system includes a well-developed interest rate channel but less developed Islamic financial system. The latter may become conduit to the conventional monetary transmission, though such price transmission through Islamic banks may not be expected by the regulators due to *Shari'ah* restriction. In this situation, differentiated policy tools, if adopted by the central bank for the two systems, may become less effective in regulating the market conditions.

At the same time, strong presence of Islamic banks could activate credit channel of monetary policy transmission as long as the central bank's actions affect the supply of Islamic credit (Khatat, 2016). Presence of excess liquidity, in either case, may weaken the monetary policy transmission as it affects the ability of the banks to price their retail products effectively.[1] This subject has acquired more importance with the rapid growth of Islamic banking in the global financial landscape, as excess liquidity apparently is a permanent feature of Islamic financial system. Islamic banks have limited investment opportunities since financial instruments complying *Shari'ah* restrictions are not in abundance.[2] Furthermore, Islamic banks cannot participate in the interbank market directly, where banks transact mostly in Repo using non-*Shari'ah* compliant instruments. Neither, it can place excess reserve with the central bank to earn minimum return wherever central banks provide standing facilities for liquidity management through interest rate corridors. It is not surprising that a majority of the Islamic banking scholars surveyed by Iqbal *et al.* (1998) opined that the excess liquidity was a serious problem for some or all Islamic banks.

In addition, the presence of excess liquidity in Islamic system may distort the conventional interbank rates despite the fact that former is expected to remain isolated from the conventional one. Interbank market of Pakistan has experienced this phenomenon in recent past, where overnight call rates frequently swung to discount, from premium to the repo rate, under the influence of Islamic banks' excess liquidity.[3] Such a distortionary effect may have repercussions for transmission of policy shocks, not only through conventional banks but also through Islamic banks.

This study, therefore, assess the effectiveness of monetary policy transmission by incorporating the excess liquidity present in both systems using the interest rate channel only, as the realization of this channel is stronger in Pakistan compared to other channels. Moreover, Islamic banking enjoys a minor share in Pakistan, which makes interest rate channel more interesting for study. In this perspective, this

[1] Even in the conventional system, presence of excess liquidity may impede monetary policy pass-through thereby disturbing the retail products' pricing mechanism [for detail see, Agénor et al. (2004), Aryeetey and Nissanke (2005) and Saxegaard (2006)].

2 By Shari'ahlaws, Islamic banks are required to invest in instruments free of Riba *(interest)*, Gharar (*uncertainty*), Maisir (*gambling*) and non-Halal (*prohibited*) activities.

[3] For more details, see Section 2.

research attempts to answer two key questions; first, how excess liquidity effect the pass-through of the policy rate to the retail rates (rents/investments) in the two systems?[4] Second, how excess liquidity effect the price spillover between the two systems? The answers to these questions will improve our understanding of transmission mechanism, and will help in formulation of effective monetary policy not only in Pakistan but also in other countries where hybrid financial system exists.

This paper contributes to the literature in a number of ways. First, empirically the impact of excess liquidity has hardly been assessed before for the Islamic banking system. Existing literature on conventional system investigated this impact, but only qualitatively, inferring it as obstructive if coefficient is negative.[5] Our study provides the quantitative estimates not only for Islamic system but also for the conventional banking system. Second, this paper divulges into the spillover effect of retail rate adjustments between the conventional and the Islamic systems. To the best of our knowledge, very few studies [including Bacha (2004), Chong and Liu (2009) and Cevik and Charap (2011) and Amar *et al.* (2015)] have assessed this effect. Moreover, the role of excess liquidity as conduit for these spillovers has been assessed thoroughly for the first time. Lastly, this research has used separate retail rates for the conventional and Islamic banks for analysis. Previous work on conventional transmission mechanism used the aggregate retail rates, including that offered/paid by the Islamic banks. Therefore, estimates of those studies reflect the dynamics of overall banking system, even if the motive was to study the transmission mechanism in the conventional banking system.

This paper uses Vector Error Correction Mechanism (VECM) for assessing monetary policy pass-through separately for the two systems, and spillover of prices between them. To assess the impact of liquidity on the transmission mechanism and on the price spillover between the systems, mediator- moderator approach is used. Data from January 2004 to October 2016 is used for analysis. Our findings, in line with the earlier studies, suggest that the monetary policy shock affects the retail prices of the Islamic banks similar to the conventional banks. Moreover, there is strong spillover of prices between the systems; Islamic banks are following (leading) the conventional banks in pricing the lending (deposit) products.

Apparent advantage gained by Islamic banks in deposit pricing could be due to inflow of untapped religious deposits suggesting that the advent of the Islamic banks have promoted the financial inclusion in Pakistan. Literature [Khan (2010), Chong and Liu (2009), Obaidullah (2005) and Ariss (2010)] suggests that Islamic banks generally follow the conventional banks in setting prices of the retail products, specifically the deposits, as the former faces the 'deposit withdrawal risk'. Our finding shows that it is other way around in Pakistan. Conventional banks, being the price taker in the deposit market suffers from the 'deposit withdrawal risk'. For a long time, conventional banks in Pakistan had enjoyed low deposit rate as investment opportunities available to the retail investors were limited. This may have changed since the inception of Islamic finance.

[4] The terminology of rent and investment rate is used to imply the Islamic banks equivalence for lending and deposit rates in the conventional banks.

[5] Notable studies reporting the impact of excess liquidity on monetary policy pass-through are Agénor et al. (2004), Aryeetey and Nissanke (2005), Saxegaard (2006), Lucchetta (2007), Egert and MacDonald (2009), and Gigineishvili (2011).

In response to key research questions, our results show that presence of excess liquidity impedes the pass-through of policy rate significantly in conventional banks but insignificantly in the Islamic banks; the latter being contrary to the findi0ngs of Iqbal *et al.* (1998). The assessment of impact of excess liquidity on the price spillover suggests that the excess liquidity with the Islamic banks mostly mediates this process. In case of shock to the lending price equilibrium, the Islamic excess liquidity declines, and resurfaces as a conventional excess liquidity in the long run. It is important to note that the excess liquidity with the Islamic banks remains mostly in fungible cash reserves form with the central bank. On the contrary, the conventional excess liquidity remains mostly in the form of short-term government securities, as the central bank frequently intervenes in the interbank market for absorption, if this liquidity is more than desired by the central bank. These results endorses the possibility of the liquidity transmission from Islamic banks via conventional banks to the short-term government securities.

Rest of the study is structured as follows. Section 2 is on Perspective of Islamic Finance and its Structure in Pakistan. Section 3 provides literature review. Section 4 discusses methodology. Section 5 explains the data while Section 6 explains the results. Finally, section 7 concludes with policy discussion.

2. Perspective of Islamic Finance and its Structure in Pakistan

Doing business in Islamic way requires Muslims to undertake transactions free of Riba *(interest)*, Gharar (*uncertainty*), Maisir (*gambling*) and non-Halal (*prohibited*) activities. Islamic banks are, therefore, forbidden from taking or offering interest or usury. Unlike in conventional banking, a lender in Islamic finance should shares the risk of the project with the borrower, as neither the borrower nor lender controls the outcome of the venture. This risk sharing in financial contracting by replacing *ex-ante* fixed return, with an *ex-post* uncertain return based on a profit-sharing principle, differentiates Islamic from conventional banking. Under this profit and loss sharing (PLS) paradigm, only the profit-sharing ratio between the financer and borrower is determined *ex-ante* (Chong and Liu, 2009).

In practice, however, Islamic finance institutions offers both PLS and non-PLS products. A financier could opt for direct equity stake, based on participatory financing (or PLS), or non-participatory financing (or non-PLS) with no take on equity (Khan, 2010). The important participatory forms are Mudaraba, and Musharaka. In former contract, a 'sleeping' partner contributes capital while active partner contributes expertise/knowledge. In latter contract, a financier also participates into the activities of the venture. Important non- participatory financing form includes Murabaha ('markup' or cost-plus sale), Ijara (lease), Bay' salam/Istisna (deferred delivery), Bai muajjal (deferred payment), Jo'alah (service fee), and Qard al hasana (charity/beneficence loan).[6]

A large number of institutions offer interest free banking based on Islamic products in predominantly Muslim, as well as, in non- Muslim countries. Only Iran, Pakistan, and Sudan are referred to as countries with full Islamic banking. Despite PLS banking introduced in Pakistan in 1980s, banks never shared losses with the depositors neither their depositors received any share in the windfall profits, which the banks in Pakistan are making (Khan, 2008). Moreover, the contract these banks are making with their client are based on *ex-ante* fixed rate and are benchmarked with the interbank market or policy rate,

[6] For details, see Khan (2010), Chong and Liu (2009), Baele et al. (2014).

which makes them conventional instead of PLS based Islamic banks. This study, therefore, treats all scheduled banks in Pakistan as conventional banks. Moreover, only designated Islamic banks established following the recommendation of Commission for Transformation of Financial System (CTFS) and Pakistan's Supreme Court ruling in June 2002.[7] Since 2002, State Bank of Pakistan (SBP) issued licenses for *Shari'ah* compliant Islamic banks only, with their own *Shari'ah* board that ensures its operational consistency with *Shari'ah* requirements.

Table A1, in Appendix, gives overview of the banking sector of Pakistan; which consists of five public sector commercial banks, 32 local private banks, four foreign banks and four specialized banks. Foreign banks are mostly in non-retail businesses while specialized banks are active in development finance. These specialized banks are meant to support the long term growth objectives of government and are, therefore, excluded from the definition of commercial banks. Besides, there are a number of microfinance banks actively promoting financial intermediation. However, balance sheet size of these microfinance banks is very small compared to the conventional and/or Islamic banks. Table A2 in Appendix, on the other hand, shows the composition of the Islamic banking industry. Islamic banking services provided by six full fledge Islamic banks, and sixteen Branch Islamic banks owned by the conventional banks. These Branch banks operate as a subsidiary of conventional banks, and are required to undertake the financial transactions in accordance with the injunctions of *Shari'ah.*

2.1 Price Determination in Conventional and Islamic Banks

Literature has extensively provided the conjectured explanations of interest rate's influence on pricing of the Islamic products. For example, El Gamal (2006) argues that the Islamic product has to be functionally identical to the conventional product since otherwise it would not be approved by banking regulators in both Islamic and non-Islamic countries. Moreover, Khan (2010), Chong and Liu (2009), Obaidullah (2005) and Ariss (2010) argue that Islamic finance competes with the conventional banks and often follows the conventional banks while setting the prices of their retail products. Following sub-section provides a brief overview of the comparative price setting mechanism in banking sector of Pakistan. SBP regulation requires conventional banks to price their products with reference to certain benchmarks. For example, lending rate is required to be linked with the relevant tenure Karachi Interbank Offered Rates (KIBORs)[8] and deposit rate with the SBP Repo rate (*i.e.*, floor of SBP interest rate corridor).[9]As Islamic banks has yet to develop their own benchmark for lending purposes, the SBP instructions on pricing of lending products (via BPD Circular 01, 2004) remains the guiding framework for loaning business for Islamic banks' as well. Nevertheless, products based on participatory financing (Musharakah, Mudarabah and Wakalah) is exempted from KIBOR benchmarking.[10]

[7] The Commission for Transformation of Financial System (CTFS) was established on 1st order of SAB-SC (January 2000) on appeal against ruling of Supreme Court's *Shari'at* Appellate Bench of December 1999.
[8] Banks & DFIs should use the Karachi Interbank Offered Rate (KIBOR) of one, three & six-month, and other longer tenors, as made available, for pricing of all Rupee Corporate/Commercial bank lending (Vide BPD Circular No. 01, 2004).
[9] Vide BPRD Circular No. 07, 2013. Before, the banks were required to pay minimum deposit rate prescribed by the central bank from June 1, 2008.
[10] Vide IBD Circular No. 01, 2016.

Pricing of the deposits is more complicated in Islamic banking system. Unlike conventional banks, Islamic banks are not required to benchmark the deposit pricing with the SBP Repo rates. On contrary, Islamic banks are required to share their profits from financings, investments and placements with the depositors, as their deposit mix is mostly Mudaraba based. Islamic banks in Pakistan pool funds from depositors similar to asset management companies.[11] These pools are identified by their risk and reward features. Each pool works like a virtual enterprise having explicitly demarcated sources of funds, ownership of specific assets, and income and expenses.[12]

Other factors, such as Profit Sharing Ratio (PSR), Profit Equalization Reserves (PER) and transfer from Mudarib to the depositors as Hiba (or gift) also influences the retail price (or profit rate) a depositor ultimately receives. Islamic bank, as a Mudarib, has to agree with the depositor (Rabbulmal) on the Profit Sharing Ratio (PSR) for distribution of the same between them. Moreover for profit smoothening purposes, an Islamic bank is allowed to create a Profit Equalization Reserve (PER) with well defined criteria from net income of Pool (*i.e*. the gross income less direct expenses and losses, if any).[13]

Islamic banks are allowed to utilize, fully or partly, the amount of PER to improve the returns to the depositors during periods when the pool's profits are below market expectations. Furthermore, the former may forego up to 60 percent of its Mudarib share as Hiba (or gift) to meet the market expectation in case of lower than expected/market return earned by the pool. However, Islamic banks maintaining PER may reduce their (Mudarib's) share, using Hiba, only if the reserve is insufficient to improve the profit payouts to the depositors.

Despite this elaborate framework, Islamic banks have been blamed for exploiting PSR, PER and Hiba only to enhance their competitiveness with the conventional banks. Khan (2010) argues that no Islamic Bank has ever charged its depositor's accounts when it incurred losses due to increased non-performing assets. On the contrary, Islamic Banks often declared market-competitive returns for depositors even when running into financial difficulties. Moreover, sometime central bank's implicit guarantee on Islamic Bank deposits, as practiced in GCC counties, also goes against the very basics of the risk sharing principle of Islamic banks.

2.2 Excess Liquidity: A Comparative Perspective of Pakistan's Banking

Excess liquidity is often defined as the excess reserve of banks, placed with the central banks, over and above the statutory requirements (such as Cash Reserve Requirement (CRR) and/or Statutory Liquidity Requirement (SLR)).[14] Literature (including Agénor *et al*., 2004; Ruffer and Stracca, 2006; Saxegaard,

[11] In this contract, Islamic bank is known as Mudarib and their depositors are known as Rabbulmal, and profit sharing ratio is to be agreed between the parties right from beginning of the contract.

[12] For detailed instruction on profit & loss distribution, see IBD Circular No. 03 of 2012**.**Unlike in an asset management companies where all cost has to be charged to the profit earned, only direct expenses like depreciation of Ijarah assets, cost of sales of inventories, insurance / Takaful expenses of pool assets, stamp fee or documentation charges, brokerage fee for purchase of securities/commodities, and impairment/losses due to physical damages to specific assets is chargeable to the pool in the Islamic banking system. Beside, all indirect cost including the establishment cost is to be borne by the Islamic bank, as a Mudarib.

[13] The monthly contribution into PER will not exceed 2 percent of Net Income, and the accumulated balance of PER shall not exceed 30% of Islamic Bank's Equity or Islamic Banking Fund (IBF) of Islamic Banking Division of Conventional banks.

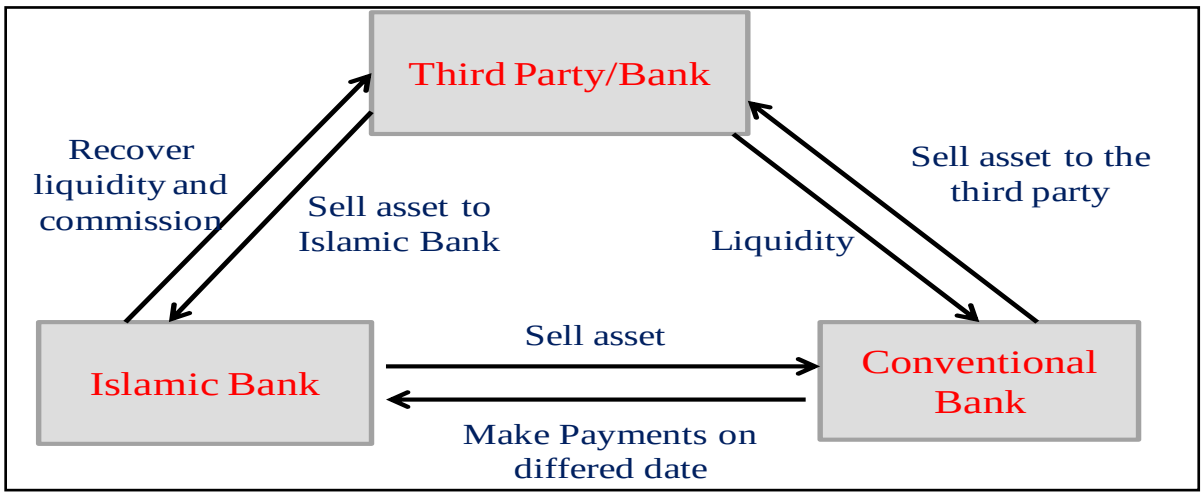
[14] CRR requires banks to deposits a certain part of cash held with the central bank. As per SLR, banks are required to invest a certain part of deposits into the government securities.

2006; and Gigineishvili, 2011) defines excess liquidity as a ratio of reserves deposited with the central bank by the banks and cash in their vault. However banks in Pakistan holds substantial amount of government securities, which are as liquid as cash and provides risk free returns to the holders. Therefore, following Mohanty *et al*. (2006), these eligible government securities are included in the definition of excess liquidity for this research.[15]

Conventional banks, in Pakistan, invested heavily in government securities specifically in last decade when economy was experiencing a slowdown. Banks, generally, park their excess liquidity in treasury bills for short term and in Pakistan Investment Bonds (PIBs) for long term, when credit demand slows down or deceleration in economic activity increases expected default risk (Omer *at al*., 2015).[16] Findings in literature [Agénor et al. (2004), Aryeetey and Nissanke (2005), Saxegaard (2006), Sørensen and Warner (2006), Lucchetta (2007), Egert and MacDonald (2009), and Gigineishvili (2011)], suggests that presence of excess liquidity impedes conventional monetary policy transmission. Like in conventional banks, excess liquidity present in the Islamic system remains a subject of controversy for the policy makers and researchers alike, as its impact remains yet to be assessed.

Apparently, Islamic banks invest only in Government *Ijarah Sukuk* (GIS); a *Shari'ah* compliant Islamic financial instrument. However, volume and frequency of issues of GIS by the government is very low compared to its demand from Islamic banks. Moreover, Islamic banks cannot park their excess funds with central bank using interest rate corridor, as these facilities are not incompliance with *Shari'ah* requirements. Given the limited investment opportunity, Islamic banks often live with excess liquidity which could unexpectedly spillover to the conventional system in a number of ways.

Figure 1: Transmission of Excess Liquidity from Islamic to Conventional Banks



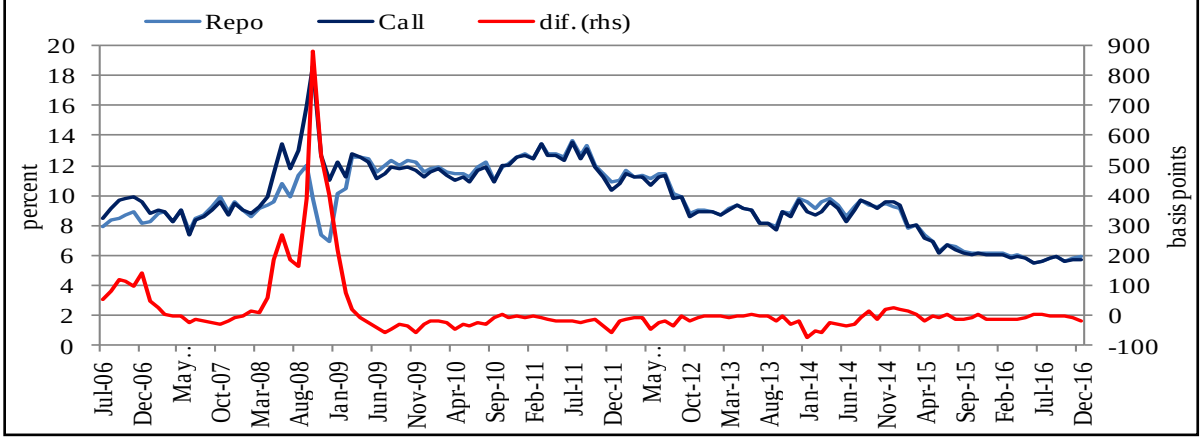
[15] Thus excess liquidity is defined as the ratio of reserves deposited with the central bank by the banks, cash in their vault and eligible government securities, in excess of the statutory limit to the total time and demand liabilities of the banks.

[16] At the top of that conventional banks parks excess fund with the central banks using the central bank's interest rate corridor facility. Banks receives SBP Repo rate (floor of corridor) on their reserve placement with central bank.

Figure 1 shows one such possibility. In this arrangement, an Islamic bank may sell an asset, typically a Ijarah Sukuk to a borrowing bank at a deferred price. The borrowing bank sells this asset to another bank and raise cash liquidity for its own use. The Islamic bank replenishes its security holding from the market (or perhaps from third bank) besides parking liquidity for a specific tenure. As deal matures, the borrowing bank repays cash to the Islamic bank with agreed profit.[17]

Pakistan's interbank market has witnessed such liquidity spillover effect since 2008, as Call market rate frequently slipped below Repo rate in overnight money market (Figure 2). Call rate is a price of unsecure lending/borrowing between the banks in interbank market while repo is a rate on secured lending/borrowing. Theoretically, call rate should be above the Repo rate because of risk premium attached to the unsecured lending. The negative premium (discount) on the call rate suggest that excess liquidity in the call market is distorting price setting mechanism in the interbank market. Therefore, a persistent arbitrage opportunity was present in the market; where a bank can earn an arbitrage profit by borrowing in call market and lending in repo market.

Figure 2: Monthly Average Money Market rates



3. Literature Review

Hypothetically, Islamic banks should be indifferent to the changes in the interest rates, as these rely on interest-free banking. Therefore, bank lending channel attained greater importance for studying the transmission of policy shocks in Islamic banks. Not surpassingly, a large number of studies investigated the country specific bank lending channel such as, [Aysan *et al.* (2017), Ergec and Arslan (2013), and Macit (2012)] for Turkey, [Caporale *et al.* (2016), Akhatova *et al.* (2016), Asbeig and Kassim (2015) and Hasin and Majid (2015)] for Malaysia, Sukmana (2015), Amar *et al.* (2015) and Zaheer *et al.* (2013) respectively for Indonesia, Saudi Arabia and Pakistan. Using different sample periods, these studies

[17] Islamic banks generally report these transactions as 'clean' or 'call' lending. This kind of arrangement, however, requires three banks to materialize. The third bank also seeks 'rent' to get involved in this activity which often depresses the rate received by the Islamic banks.

consensually arrived at the similar conclusion that monetary policy shocks affect the lending of the Islamic banks similar to that in the conventional banks.

In a nutshell, Aysan *et al.* (2017) found that in Turkey, bank lending decreases with the increase in the policy rate because depositor move their deposit to higher return offering banks. They also observed that responses of deposits and credits to monetary shocks were larger for Islamic banks. Similarly for Turkey, Macit (2012) reported a difference in response between conventional and participation banks to monetary policy shocks using quarterly loan growth. In their study, the participation banks showed larger reaction to monetary policy. In terms of bank specific variables, however, banks with higher liquidity ratio tend to had higher loan growth whereas banks with larger asset size had smaller loan growth.

In case of Malaysia, Hasin and Majid (2015) confirmed that Islamic banking was not spared from the interest rate and monetary conditions of the country. Moreover, both Akhatova *et al.* (2016) and Caporale *et al.* (2016) found a significant response from conventional bank credit and Islamic bank financing to monetary policy shocks. However, the dynamic behavior of Islamic banks following monetary policy shocks, as well as other shocks, appears to be different. On the contrary, Asbeig and Kassim (2015) found that changes in the monetary policy had no significant impact on the level of financing extended by the Islamic and conventional banks. However, bank-specific factors, namely size and liquidity influenced the lending behaviour of both the Islamic and conventional banks, whereas capitalization was relevant only for the Islamic banks.

Sukmana (2015) examined the sensitivity of the economic sectors in response to the change in the Islamic and conventional monetary policy rate in the Indonesian economy. Their results showed that the Islamic banks play important role in channeling the monetary transmission. Finding of both Hasin and Majid (2015) and Sukmana (2015) confirmed that specific economic sectors react differently to the Islamic and conventional monetary instruments. Amar *et al.* (2015) investigated the effectiveness of monetary policy transmission in Saudi Arabia's Islamic banks and reported that bank lending channel is relatively effective in influencing non-oil private output, but less effective in influencing consumer prices. Zaheer *et al.* (2013) also looked into the differences in banks' responses to monetary policy shocks across conventional and Islamic banks in Pakistan by incorporating bank size, liquidity, and type. Their results showed that Islamic banks cut their lending less than other small banks with liquid balance sheets, following a monetary contraction.

Though bank lending was the most anticipated channel for transmission of the policy shocks in Islamic banks, a large number of studies [Chong and Liu (2009), Ergec and Arslan (2013), Khan (2010), Hasin and Majid (2015), Akhatova *et al.* (2016), Husin (2015), Zaheer *et al.* (2013) and Husman (2015)] documented that Islamic banks functioning is noticeably influenced by interest rate changes. As Khatat (2016) argued that the Islamic banks may become conduit to the conventional monetary transmission in presence of well-developed interest rate channel but less developed Islamic financial system. The subsequent section discusses a number of studies arguing for the influence of interest rate on the retail pricing of Islamic banks.

For example, Chong and Liu (2009), Husman (2015) and Husin (2015) assessed the influence of the interest rate on the rent/profit on Islamic lending/deposit using interest rate channel of the monetary policy. Specifically, Chong and Liu (2009) found influence of the interest rate on the volume of lending/deposits of the Islamic banks in Malaysia. Their study showed that only a negligible portion of Islamic bank financing is strictly PLS based. Moreover, they concluded that Islamic deposits were not interest-free, but were closely pegged to conventional deposits rates. Husin (2015) measured the pace and magnitude of transmission via profit rate channel for Islamic banks versus interest rate channel of conventional banks. They showed that the pass-through to Islamic banks was quick and sizable. Husman (2015) also compared the monetary transmission through Islamic and conventional banks by investigating how a particular bank asset portfolio determined the equilibrium rate of return on loans and on deposits. Their results showed no significant difference in responses of the two types of banks to the central bank's policy rate. However, the difference becomes apparent and significant after excluding Islamic windows from the sample.

On the question; why Islamic banks functioning is unexpectedly influenced by the interest rate, Weill (2011) observed that the Islamic banks in general have a lower market power than conventional banks which affect their ability to influence the price of products when competing with their conventional counterparts. Ariss (2010) using different measures of competition also concluded that Islamic banking was less competitive compared to its conventional counterpart. It was not surprising to them that the price setting behavior of Islamic banks were mimicking the conventional banks in competitive environment. Khan (2010), Chong and Liu (2009) and Obaidullah (2005) argued that Islamic financial institutions face "withdrawal risk" in deposit market had it offered lower rate of return compared to what its competitor paid. This situation was not very different in loan market where Islamic banks were competing with the conventional banks for winning market share.

Kuran (1993) predicted long ago that the problems of moral hazard and adverse selection would force Islamic Banks to look alike the conventional ones. El Gamal (2006) also argued that the Islamic financial markets had to deal with the allocation of financial credit and risk similar to conventional financial markets and consequently, due to this functional necessity, will mimic conventional finance as closely as possible.

The literature on Islamic transmission mechanism has also documented the degree of sensitivity of Islamic finance to the interest rate. Ergec and Arslan (2013) and Kassim *et al*. (2009) argued that the Islamic banks were more sensitive to the changes in interest rate compared to the conventional banks because they were operating in shallow financial markets. Sukmana and Kassim (2010) found that Islamic deposits responded negatively to the shock to interest rate in Malaysia.

A salient feature of Islamic banks around the world is that they are often surplus in liquidity. Khatat (2016) noted that the prohibition on interest rate; insufficient sterilization; lack of *Shari'ah*-compliant assets and insufficiently developed Islamic financial markets are the key reasons for this surplus liquidity. Though literature on conventional transmission mechanism has documented the deleterious effect of excess liquidity, this assessment for Islamic banks remains overdue as empirical research on this topic is clearly missing. Iqbal and Molyneux (2005) asserted that "excess liquidity" was not a correct way of

characterizing Islamic financial institutions since they cannot turn to the interbank market or the central bank to borrow short-term funds in case of a temporary liquidity crunch as these are interest-based transactions. These institutions, therefore, have to have greater liquidity than non-Islamic ones. Findings of survey by Iqbal *et al.* (1998) contrarily suggested that only 6 Islamic banking scholars said that "excess liquidity" was "not a problem" when 60 of them surveyed. Moreover, 28 of 60 surveyed felt that the excess liquidity was a serious problem for some or all Islamic banks.

Very few studies opted to work on the spillover effect between the conventional and the Islamic banks. Notably, Ergec and Arslan (2013) argued that returns on Islamic bank deposits are likely to be affected by interest rate on conventional deposits. Bacha (2004), Chong and Liu (2009) and Cevik and Charap (2011) found causality between return on Islamic deposits and conventional deposits. The findings in these studies show that Islamic banks' return is affected by the return on conventional deposits. Moreover, empirical results of Amar *et al.* (2015) suggest that though conventional and Islamic banks react to each other, the reaction of conventional banks to a shock on the financing provided by Islamic banks seems to be more significant than the reaction of Islamic banks to a shock on the conventional banks credit.

4. Methodology

To ascertain the data generating process, the variables involved in the model were subjected to unit root tests. The results, which will be discussed in Section 6, suggest that all these variables were following differenced stationary process. Therefore, Vector Error Correction Mechanism (VECM) methodology, as given by the Equation (1), is used for estimation of long run relationship between the variables.

$$\Delta z_t = \mu + \rho(y_{t-1} - \alpha - \beta x_{t-1}) + \sum_{k=1}^{n} \gamma_k \Delta z_{t-1} + \varsigma_t \qquad (1)$$

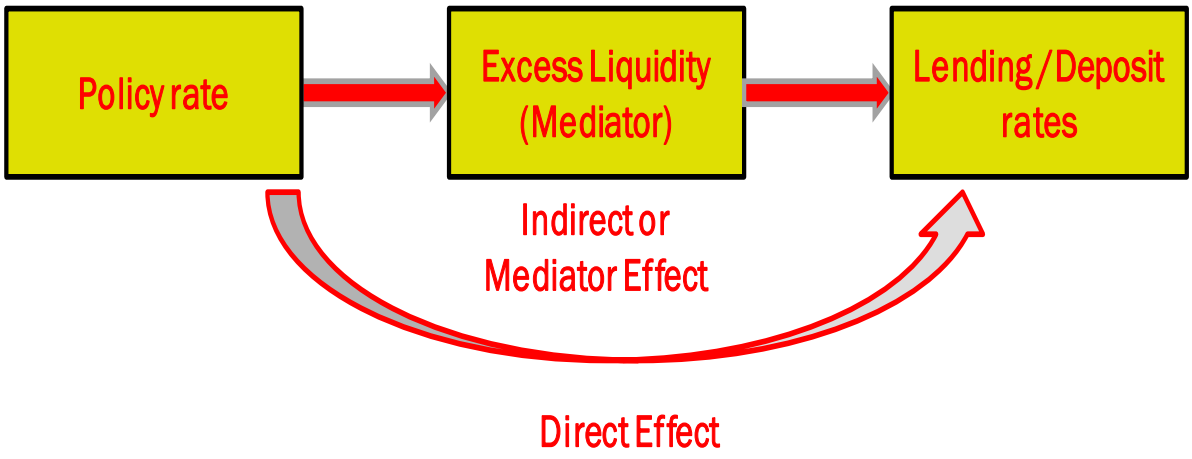
In equation (1), z_t is the vector of regressors $z_t = (x_t, y_t)'$, where y_t is the retail rates and x_t includes explanatory variables such as policy rate and the excess liquidity, where necessary; ρ is a loading vector and measures the speed of adjustment; β is the cointegration vector; γ_k short run adjustment coefficients and; *n* is the number of lags chosen using information criteria. For the existence of a long run relationship ρ must be significantly different from zero. The coefficient β shows the long run relationship between the regressors. In this context, $\beta = 1$ shows a complete pass through of regressors to the dependent variable provided both x_t and y_t have same unit of measurement. Alternatively, $\beta < 1$ implies incomplete pass through.

The long run VECM coefficient provides estimate of the pass-through of the policy rate. When excess liquidity is included as a regressor, its coefficient is less meaningful in quantifying its impact on the pass though of the policy rate, as the former becomes a conduit to the transmission of policy between these two regressors. A change in the policy rate is likely to affect the excess liquidity holdings of the banks, at least theoretically, while disturbing their retail rates. Therefore previously, a negative sign with the liquidity coefficient is used as a qualitative indicator of its impeding effect on the pass through of the policy rate.

This study has adopted a more practical approach, and assumed that the policy shocks affect the retail rates significantly, either directly (direct effect); when a bank changes its retail rates perceiving a positive policy shock will increase its borrowing cost. And/or indirectly (indirect effect), when a policy shock forces banks to manage their excess liquidity more efficiently resulting in an increase in the interbank lending rate. The retail lending and the deposit rates respond eventually. However if demand for loanable funds is weak, fearing slowdown in the retail business, excess liquidity held by banks may prevent them from increasing the lending rate in proportion to the policy shock, (Omer *et.al*, 2015). Interbank liquidity, therefore, plays a role of 'mediator' as it mediates the indirect relationship between the policy shocks and the retail rates (see Figure 3). Thus, the quantitative impact of excess liquidity on pass-through of the policy rate to the retail rates is estimated using mediator approach. The mediator or indirect effect, in this research, is estimated by using the long run β coefficient from VECM.[18]

4.1 Mediator Effect

Figure 3: Excess Liquidity with Mediator Effect



Literature documented two approaches, Judd and Kenny (1981) and Sobel (1982), for estimating mediator or indirect effect. This study benefits from Judd and Kenny (1981) for its simplicity. In this approach, impact of excess liquidity (mediator effect shown by Equation 4) is estimated by differencing the coefficients of the key policy variable (i.e., policy rate), when the excess liquidity is included in (Equation 2) and then excluded (Equation 3) from the model, as shows below.[19]

$$\text{Re}tail_t = B_{01} + B_1 * Policy_t + B_2 * Ex\_liquidity_t + e_1 \quad (2)$$

$$\text{Re}tail_t = B_{02} + B * Policy_t + e_2 \quad (3)$$

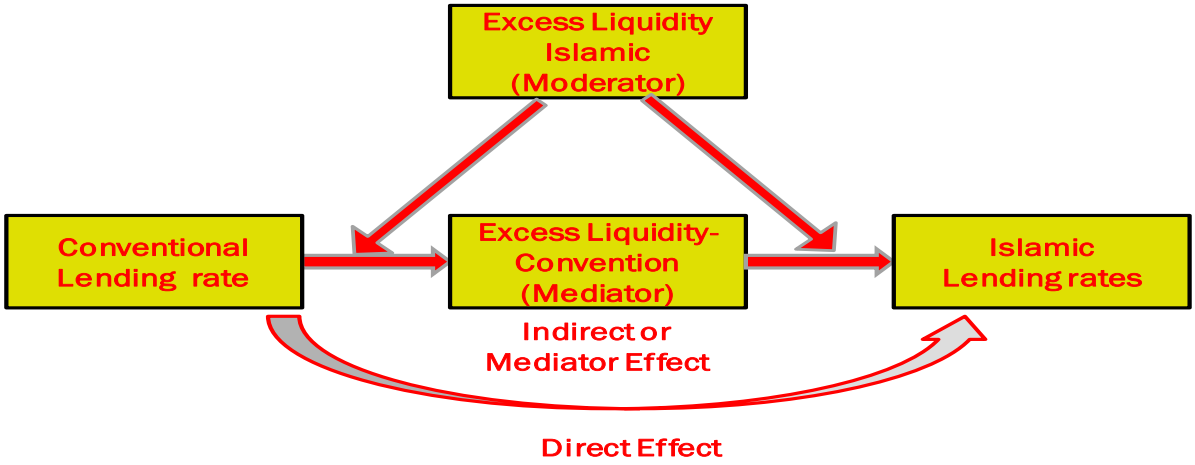
The mediator effect: $B_{mediator} = B - B_1$ (4)

[18] If the direction is known *a priori*, one can estimate the long run relationship using Dynamic OLS procedure.

[19] In Sobel (1982) approach, mediator effect is calculated as $B_{mediator} = (B)(B_2)$. Despite differences, the results of the two approaches are very similar.

Interestingly, estimation of impact of the excess liquidity on the spillover between the retail rates of the two systems is more complicated as nature of excess liquidity present in these systems is very different. Therefore, a more holistic moderated mediation approach is used to capture the impact of excess liquidity on the price spillover between the two systems.

Figure 4: Excess Liquidities in Moderated Mediation



4.2 Moderated-Mediation Effect

A moderator is a variable which may strengthen/weaken an economic relationship between two variables.[20] In a more complicated setting, a mediator variable can be moderated by another variable which may or may not be similar in nature. A moderated mediation is, therefore, a process where economic relationship between the two variables is mediated by a third variable, while performance of the mediator itself is influenced by some other moderator variable.

For example, the relationship between the retail lending rates of the two systems is influenced by the excess liquidities present in the two systems, involving different dynamics (see Figure 4). Existing literature is not very helpful in guiding mediation or moderation nature of these excess liquidities in intermediation between the retail rates. For simplicity, this study assumes one of these liquidities to act as a mediator and other to act as a moderator while transmitting the shock between the retail rates of the two system.

Assuming, variables W and M respectively are moderator and mediator (both being excess liquidities in the two systems) for explaining the relationship between the retail rates (say X and Y or policy and retail rates) of the two systems, the mediation moderation effect can be obtained from long run coefficients obtained from Equation (1), as shown by Equation (7). This gives the quantitative impact of excess liquidity on the price spillover between the Islamic and conventional banks.

[20] A basic moderator effect can be represented as an interaction between a focal independent variable and a factor that specifies the appropriate conditions for its operation.

$$M = \alpha_{01} + \alpha_1 X + \alpha_2 W + \alpha_3 (W * X) + e_1 \quad (5)$$

$$Y = \beta_{01} + \beta_1 M + \beta_2 X + \beta_3 W + \beta_4 (W * X) + \beta_5 MW + e_2 \quad (6)$$

Indirect effect: $(\beta_1 + \beta_5 W) * (\alpha_1 + \alpha_3 W)$ (7)

5. Data

This study uses monthly data from January 2004 to October 2016. For practical purposes, excess liquidity is reported as a ratio of excess fund, including eligible securities with banks, above what is required statutorily to the time and demand liabilities of the banks. Mohanty (2006) advocated for including short term government securities in definition of excess liquidity, which is also being practiced by the central bank. Data Note 1 in Appendix 1 provides details on the usefulness of this definition.

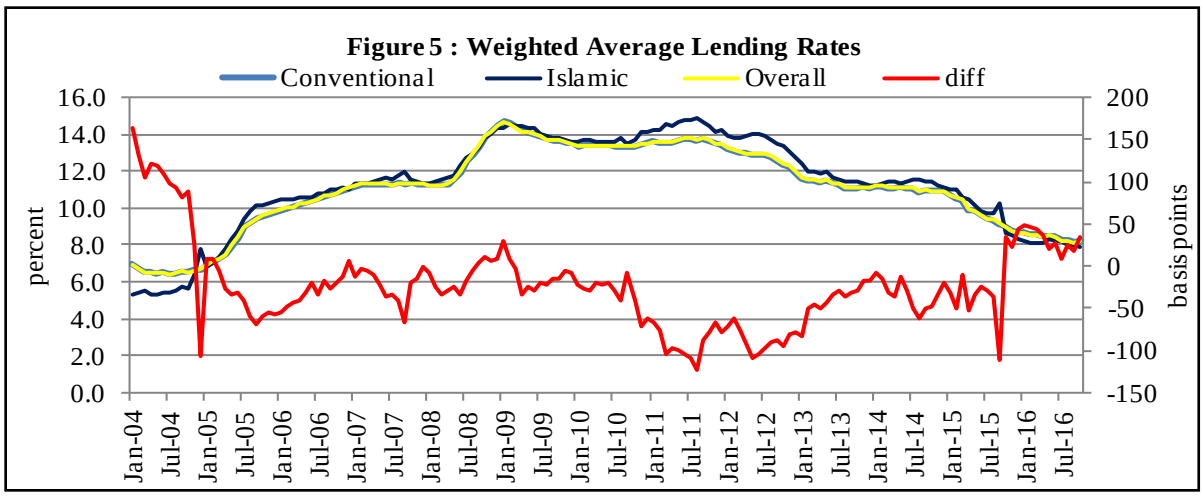
A consistent series of net time and demand liabilities is available from December 2005 only. Fragmented and inconsistent information on this variable is available for a few months before December 2005 (see Data Note 2, in Appendix 1 for detail). For example, data from 23rd April 2005 to 24th December 2005 is missing. Missing data is reconstructed using liquidity ratio. Liquidity ratio is regularly reported by the central bank for individual banks and as a banking sector aggregate. This ratio is defined as the liquidity maintained in specified proportion to the time and the demand liabilities.[21] Following the practice in literature, this study uses the 6-month repo rate as a proxy for the SBP policy rate.

5.1 Lending and Deposit Rates

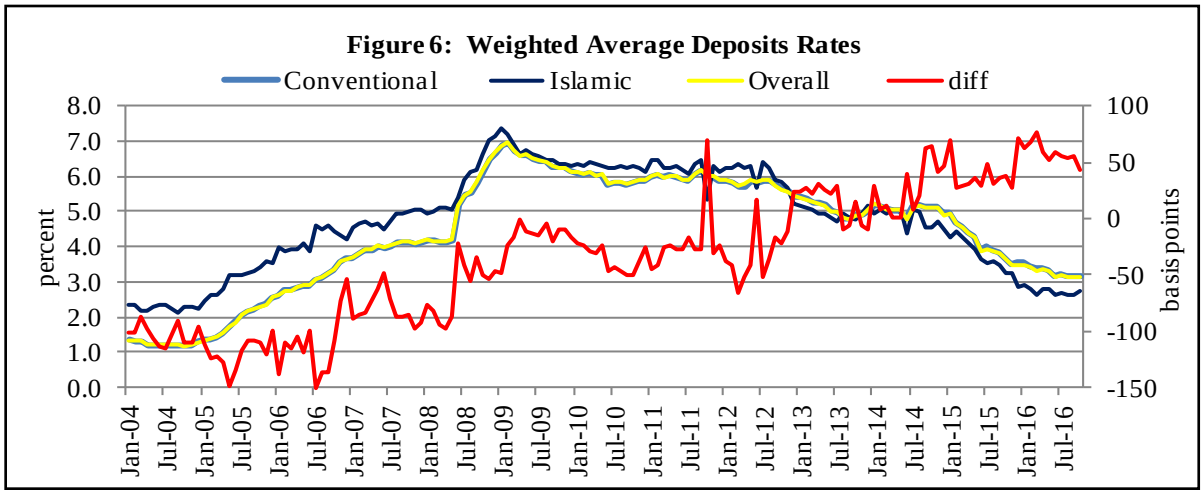
Weighted average lending and deposit rates are acquired separately for Islamic and conventional banks from SBP that publishes aggregate weighted average lending and the deposit rates for the banking sector of Pakistan, without identifying the conventional and Islamic banks. Structurally, Islamic banks are different from the conventional banks and the price setting mechanism in the two sectors should be different, at least theoretically. However, the aggregate retail rates reported by SBP masked the varying dynamics of the retail pricing in the two systems.

For example, Islamic banks were initially offering discounted lending rate compared to the conventional banks to increase their market share (see Figure 5). However, as the Islamic finance quickly developed as an alternate mode, these banks started lending at higher rates compared to their peers. There could be a number of factors such as; expected interest rate risk, stringent regulatory requirements, lack of benchmark for lending and technical and management skills that could have contributed to this change in the pricing behavior.

[21] For further details on the data definition, please see Appendix 1 on Data note.



This situation is not very different for the deposit rates. Initially, Islamic banks were offering a higher deposit rates to woo the depositors however as the industry matured over the years, the premium on the deposit rate started to decline. Currently, Islamic banks are taking deposits at discount (conventional rate minus Islamic rate is negative) compared to that offered by the conventional banks (see Figure 6).



6. Results and Discussion

As indicated earlier, the variables were subjected to the unit root tests. The results are provided in Table A3 in Appendix 2. Since variables involved were differenced stationary, VECM applied to estimate both the long run relationship, as well as, the short run dynamics. This study, however, focuses mainly on the long run pass-through, as policy shocks are expected to bring permanent change in the nominal retail variables. Table 1 and Table 2 shows the long run pass-through of the policy rate to the retail rates for the conventional and Islamic banks, respectively in a nested setting i.e., by excluding and then including excess liquidity. Most of the models appear to have one cointegration relationship, except model (6) and (12). Both models include excess liquidity, which means the presence of two cointegration relationships.

Upper panel of these tables shows the estimates of the error correction coefficient. Statistical significance of coefficients suggests that the long run relationship exists between the variables, where dependent variable adjusts toward equilibrium in response to the shock to the system. Lower panel of these tables show estimates of the long run relationship. 'liquidity effect', at the bottom of the tables, indicates the mediation effect of excess liquidity on the pass-through of the policy shock to the retail rates. The results of the diagnostic tests, provided in Table A4 in Appendix A2, suggest that residuals of the estimated models are mostly uncorrelated, however they are not normally distributed, which is expected given the small size of the sample.[22] Moreover, test for stability of the selected model suggests that the number of stationary cointegration equation correctly identified. In the following sub-section, estimated results are discussed separately for the conventional banks, Islamic banks, and spillover effect of price between the two banking systems.

Table 1: Discount Rate's Long run Pass-Through to Retail rates of Conventional Banks

Dependent Variable	**Lending Rate**		**Deposit Rate**	
Model #	1	2	3	4
No. of CE	1	1	1	1
No. of Lags	3	3	2	1
CE_(lending/Deposit rate)	-0.0115	-0.0468*	-0.0759*	-.07694*
	[0.574]	[0.019]	(0.000)	[0.000]
CE_Policy rate	0.2205*	0.1632*	0.0979	-0.0574
	[0.003]	[0.029]	[0.149]	[0.150]
CE_Excess Liquidity		0.1203		-0.1044
		[0.720]		[0.535]
Policy Rate	0.855*	0.8140*	0.6099*	0.5882*
	[0.001]	[0.000]	[0.000]	[0.000]
Excess Liquidity		-0.0371*		-0.0632*
		[0.009]		[0.003]
Liquidity Effect		0.0107**		0.0162
		[0.069]		[0.106]

Number of lag selected using HQ criteria. P-values are in parenthesis. * and ** shows 5-, and 10- percent level of significance. No. of CE shows the number of cointegrating relationship identified by Johanson's Rank test. No. of lags indicates the optimal number of lags selected using Hannan-Quinn (HQ) criteria. Both lending and the deposit rates, we used nested models when excess liquidity was dropped initially from the model (i.e., Model (1) & (3)) and later included (models (2) & (4)). Liquidity effect shows the mediation effect.

6.1 Monetary Policy Pass-through in Conventional Banks

Table 1 shows the pass-through of the policy rate to the retail rates for conventional banks in a nested setting where excess liquidity was dropped initially [models (i.e. (1) & (3)] and included later [models (2)

[22] Presence of serial correlation is tested using Portmanteau Q-statistic using 12 lags. The null hypothesis of the test is; residuals are not serially correlated. The normality test is conducted using Shapiro-Wilk test. The null hypothesis for test is that the residuals are normally distributed. Eigen Value (EV) Stability test indicates whether the number of cointegrating equations is misspecified or whether the cointegrating equations, which are assumed to be stationary, are not stationary.

& (4)]. Interestingly, the estimates of model (1), showing the policy and lending rate relationship, indicate that the adjustment coefficient of the former is significant while that of the latter is insignificant, at five percent level. This suggests that the policy rate, instead of the lending rate, adjusts significantly towards equilibrium in response to the shock to the system. Previous studies [including, Fazal and Salam (2013), Hanif and Khan (2012)] using aggregate data reported a significant impact of the policy rate on the lending rate. Perhaps, evolving dynamics of the Islamic banks, included in the aggregate data, may have contributed to this deviation from the earlier result. Therefore, an aggregate picture of pass-through may not be very reliable if objective is to bring policy change in the conventional banks alone. As conventional banks preferred risk free securities in wake of strong borrowing demand from government, their lending became less dependent on the policy rate. Possibly, conventional banks anticipate a change in the policy rate *a priori* due to their focus on the government borrowing, and in response, they proactively change their retail lending rates *ex ante*.

However, when effect of excess liquidity is controlled as shown in model (2), transmission of policy shock reappears in both directions indicating that both lending and policy rates adjust toward the long run equilibrium in wake of the shock given to the system. Lending rate falls back while policy rate moves toward the new equilibrium. Almost 0.81 percentage point of the shock to the system passes to the lending rate in the long run in a liquidity controlled environment.

Table 2: Discount Rate's Long run Pass-Through to Returns in Islamic Banks

Dependent Variable	**Financing (Lending rate)**		**Investment (Deposit Rate)**	
Model #	5	6	7	8
No. of CE	1	2	1	1
No. of Lags	7	1	2	1
CE_(Financing/Invetment rate)	-0.1576*	-0.1632*	-0.1057*	-0.1684*
	[0.000]	[0.000]	[0.025]	[0.000]
CE_Policyrate	-0.1162*	-0.0417	0.2563*	0.1609**
	[0.005]	[0.309]	[0.004]	[0.060]
CE_Excess Liquidity		0.5475*		0.0045
		[0.033]		[0.993]
Policy rate	0.8376*	0.9208*	0.5776*	0.5685*
	[0.000]	[0.000]	[0.000]	[0.000]
Excess liquidity		-0.0127		-0.0095
		[0.366]		[0.291]
Liquidity Effect		0.018		-0.0064
		[0.284]		[0.344]

Number of lag selected using HQ criteria. P-values are in parenthesis. * and ** shows 5-, and 10-percent level of significance. No. of CE shows the number of cointegrating relationship identified by Johanson's Rank test. No. lags indicate the optimal number of lags selected using Hannan-Quinn (HQ) criteria. Both for lending and the deposit rates, we used nested models when excess liquidity was dropped initially from the model (i.e., Model (1) & (3)) and later included (models (2) & (4). Liquidity effect shows the mediation effect.

The results of Model (3) and (4), show pass-through of the policy rate to the deposit rate. The estimates suggest that the deposit rate adjusts in response to the shock to the system, independent of the presence of the excess liquidity. Imposition of the regulatory deposit rate, benchmarked with the policy rate, has strengthened the direction of the pass-through to the deposit rate.[23] Estimates of the lower panel suggest that almost 0.60 percentage point of the monetary policy shock passes to the deposit rate in the long run. Moreover, negative sign with this coefficient of the excess liquidity [in Model (2) & (4)] suggests that it impedes the pass-through of the policy rate in the conventional system.

Interestingly the coefficient for the 'liquidity effect' at the bottom of the table, is found weakly significant. This result suggests that excess liquidity is mediating the policy rate's pass-through to the retail rates, though its impact is weak. Around one percentage point of the shock passes through excess liquidity to retail rates. The impact is clearer for the lending rate than the deposit rate primarily due to the conventional banks substantial investment in the government securities.

6.2 Monetary Policy Pass-through in Islamic Banks

Table 2 shows the pass-through of the policy rate to the returns (on financing and investment) in the Islamic banks. Estimates of Model (5) suggest that both return on financing (or lending rate) and the policy rate adjusts toward equilibrium. However when excess liquidity is controlled [in Model (6)], only return on financing adjust towards long run equilibrium. The estimates of the long run relationship at the lower panel of the table suggests that almost 0.84 percentage point of unit shock to the system passes to the return on financing (lending rate) in the long run, which increases to 0.92 percentage point in liquidity controlled environment. This result shows that the pass through of the policy rate to the return on Islamic financing is not similar to conventional banks. In latter's case, the pass-through was not detected between the policy and retail rates until excess liquidity present in the system was controlled. The influence of policy rate on the Islamic bank's financing rate is not unexpected, as the central bank's regulation forces the Islamic banks to benchmark their lending with the KIBOR (see Section 2 for details).

Model (7) and (8) shows the estimates of pass-through for the return on investments (deposit rate) in Islamic banks. The estimates of upper panel suggest that both policy rate and the return on investment (deposit rate) significantly adjust towards the equilibrium in response to the shock to system, independent of the presence of excess liquidity. Estimates of the long run relationship in the lower panel of the table suggest that almost 0.57 percentage point of the shock to the policy rate passes to the return on investment (deposit rate). Not surprisingly, the relationship between the return (deposit rate) and the policy rate in Islamic banking system is similar to the conventional banking system despite the fact that the price setting mechanism is completely different in the two systems; in conventional bank it is driven by the interest based regulatory requirement, while in Islamic system deposit rate is driven by the philosophy of profit sharing. Moreover, similar to the conventional system, sign of long run excess liquidity coefficients are negative indicating that it impedes the pass-through of the policy rate on the returns on investment however, its impact is surprisingly insignificant.

[23] SBP imposed regulatory deposit rate on conventional banks from June 01 2008 to improve the pass-through to the deposit rate. SBP linked the minimum deposit rate, to be paid to a depositor, with SBP repo rate.

At the bottom of the table, liquidity effect, showing the long run mediation by excess liquidity found insignificant. This result suggests that the presence of excess liquidity and its impact on the Islamic pass-through is mostly myth. Perhaps, Islamic banks have to manage their excess liquidity more efficiently as they do not enjoy the luxury of parking these excess reserve in government securities. Moreover, as suggested by Iqbal and Molyneux (2005), excess liquidity with the Islamic banks may not be 'in excess' given their intrinsic risk sharing structure and their limitation to turn to the interbank market or to the central bank to borrow short-term funds in case of a temporary liquidity crunch. Therefore, a general understanding of structure of the Islamic financial system and excess liquidity with them need to be improved significantly.

6.3 Spillover Effect of Price between the Islamic and Conventional Banks

Table 3 shows the spillover effect of retail prices (lending rate versus return on financing, and deposit rate versus returns on investment) between conventional and Islamic banking systems. Model (9) in Table 3 shows the long run relationship between the lending rates of conventional banks and return on investment of Islamic banks. The adjustment coefficients in the upper panel show that the return on financing adjusts to the shock to the equilibrium relationship between them. If the price system receives a shock, say by increase in the lending rate of the conventional banks, Islamic bank's follows the conventional banks in pricing their lending products.

Islamic banks are relatively new phenomenon in the global financial landscape, which was previously dominated by the conventional banks. The finding that the Islamic banks are following the conventional banks in pricing the lending products is not surprising, and is in line with the finding of the literature. Almost 0.97 percentage point of shock to the lending rate of conventional banks, shown in the lower panel of the Table 3 [Model (9)], passes to the rate of return on financing from Islamic banks in the long run.

Surprisingly, the pass-through between the deposit rate and return on investment is not similar to that of the lending instruments, as shown in the upper panel of Table 3 [Model (11)]. The result, in contrast, suggests that any shock to the deposit rate system leads to adjustment in the conventional bank's deposit rate, instead of adjustment in return in investment of Islamic banks. Thus in pricing deposit products, Islamic banks appear to have acquired the status of leaders, while the conventional have become followers. Conventional bank's response, to the shock to the deposit system, suggest that they, instead of the Islamic banks, suffer from the 'deposit withdrawal risk' contrary to the suggestion of Khan (2010) and others. This result is also surprising given the conventional deposit rate is administered rate. Administrative rate refers to lower bound for the deposit rate to be offered by conventional banks to the depositors. Perhaps, conventional banks are also focusing on the competitive Islamic deposit rate, besides offering the administrative rate. The Islamic banks are exempted from paying administered deposit rate.

Table 3: Retail Rates Rate's Long run Pass-Through between the Conventional and Islamic banks

Dependent Variable	Lending (Financing) Rate		Deposit (Investment) Rate	
Model #	9	10	11	12
No. of CE	1	1	1	2
No. of Lags	3	2	2	1
CE_(Financing/Investment)	0.1563*	0.0172	0.1216	0.1317**
	[0.001]	[0.251]	[0.139]	[0.070]
CE_Excess_Isl		-1.0231*		-0.2018
		[0.000]		[0.813]
CE_(lending/Deposit rate)	0.0084	0.0029	-0.1853*	-0.2258*
	[0.702]	[0.694]	[0.000]	[0.000]
CE_Excess_Con		0.1115		0.1880
		[0.341]		[0.739]
Islamic Financing /Investment			1.0248*	1.0196*
			[0.000]	[0.000]
Con_Lending/Deposit rate	0.9657*	0.9854*		
	[0.000]	[0.000]		
ExcessLiquidity_Islamic		-0.2421*		0.0117**
		[0.000]		[0.081]
ExcessLiquidity_Con		0.2061*		-0.0292*
		[0.000]		[0.001]
Liquidity Effect				
Excess_con		-0.0003		0.0200**
		[0.911]		[0.044]
Excess_Islamic		-0.1182*		-0.0062
		[0.000]		[0.808]

Number of lag selected using HQ criteria. P-values are in parenthesis. * and ** shows 5-, and 10-percent level of significance. No. of CE shows the number of cointegrating relationship identified by Johanson's Rank test. No. lags indicate the optimal number of lags selected using Hannan-Quinn (HQ) criteria. Both for lending and the deposit rates, we used nested models when excess liquidity was dropped initially from the model (i.e., Model (1) & (3)) and later included (models (2) & (4). Liquidity effect shows the moderated mediation effect.

Intuitively, Islamic banks raises deposit on religious ground on promise that return on the investment will be in compliance with the *Shari'ah* requirement, which appeals people with religious inclination. Introduction of Islamic bank, therefore, channeled the savings of those who stayed away from banking system on interest prohibition. Islamic banks, thus, should be credited with the increasing the financial inclusion in the economy. Our result suggests that religion's connotation handed Islamic banks advantage in pricing deposit products, which also explains the lower return paid recently by the Islamic banks on investments (see Figure 6). The estimates of the lower panel suggest that the spillover between the two deposit rates is very strong and complete. More precisely, any shock to the return on investment in Islamic banks leads to a similar increase in the deposit rate of the conventional banks.

Besides the strong spillover between the prices, the results also shows very strong effect of excess liquidities on the retail rates of the two system. For example, the result of Model (10) shows that any increase in the excess liquidity of the Islamic banks, say by one percentage point, decreases Islamic financing rate by 0.24 percentage point in the long run. However, if excess liquidity with the conventional banks increases with similar margin, the return on Islamic financing increases by 0.21 percentage point. Increase in the conventional excess liquidity means increased stock of government securities, which conventional banks accumulate to earn higher risk free return. As Islamic banks have limited investment opportunities, conventional banks investment in the government securities is perhaps supplemented by the liquidity from the Islamic banks. This drain in the Islamic liquidity increases the return on financing in Islamic banks.

Similarly, the result of Model (12) suggests that increase in the excess liquidity with the conventional banks, say by one percentage point, deceases the deposit rate of the conventional banks marginally, by 0.03 percentage point. On the contrary, one percent increase in the Islamic excess liquidity leads to 0.01percentage point increase in the deposit rate of the conventional banks. Perhaps, higher flow of deposits to the Islamic banks induces the conventional banks to raise their deposit rate.

The 'liquidity effect', reported at the bottom of the Table 3, indicates mediatory role played by these liquidities in pricing of retail products. In absence of any guiding theory or literature, it is assumed that one of these liquidities is acting as a mediator while the other is acting as a moderator. The role of these liquidities is reversed to obtain a statistically significant relationship. The coefficients reported are liquidity effects only for the mediator variables.

For example, in model (10), the liquidity effect under excess liquidity of Islamic bank is significant at five percent level. This result indicates that when excess liquidity of Islamic banks is mediating (and excess liquidity of conventional bank is moderating), as almost 0.12 percentage point of the shock to the conventional lending rate passes to the return of Islamic financing, through the Islamic liquidity. When the role of these liquidity are reversed (i.e., excess liquidity of the conventional banks become mediator and that of Islamic banks become moderator), their impact become insignificant.

Moreover, in model (12), the results shows that the conventional excess liquidity mediates the spillover of the shock between the deposit rates of the systems, while the Islamic excess liquidity moderates this relationship. Almost, 0.02 percent of the shock to the deposit rate system passes to the conventional deposit rate through conventional excess liquidity.

6.4 Is there any Relationship between the Excess Liquidities?

As discussed earlier, the excess liquidity plays crucial role in transmitting price shock between the two systems; a natural question arises, how these liquidities are related? It should be noted that any bi-directional relationship between the two liquidity is not expected by the *Shari'ah* scholars as well as the financial regulator due to *Shari'ah* restriction.

Table 4: Long run Relationship b/w Conventional and Islamic liquidity

No. of CE	1
No. of Lags	1
CE_Excess_Conventional	-0.0800*
	[0.016]
CE_Excess_Islamic	0.1695*
	[0.001]
Excess_Conventional	1.000
Excess_Islamic	0.9184*
	[0.000]
Trend	0.0525*
	[0.030]

P-values are in parenthesis. * and ** shows 5-, and 10- percent level of significance. No. of CE shows the number of cointegrating relationship identified by Johanson's Rank test. No. lags indicate the optimal number of lags selected using Hannan-Quinn (HQ) criteria.

Table 4 shows the cointegration relationship between two liquidity. The upper panel of the table suggests that the liquidities in both systems adjust toward the long run equilibrium when the system is subjected to a shock. More precisely, excess liquidity with the conventional banks falls back while that of the Islamic banks rises to attain the long run equilibrium if the system receives a shock.

The long run relationship at the lower panel of the Table 4 suggests that any shock to excess liquidity of the Islamic banks leads to almost 0.92 percentage point increase in the excess liquidity of the conventional banks in the long run. This one on one relationship is not expected as Islamic liquidity inflows to conventional system is not expected though conventional banks are allowed to invest in the Islamic banking instruments. Interestingly, the process of adjustment is slower for the conventional banks compared to the Islamic banks perhaps due to their huge asset size.

7. Conclusion and Policy Discussion

This study investigated the comparative pass-through of the policy rate to the retail prices, spillover between the prices of the Islamic and the conventional banking systems, and impact of excess liquidity on these relationships using Vector Error Correction Mechanism (VECM), on data from January 2004 to October 2016, acquired from SBP. Moreover, this study also assessed the quantitative impact of the excess liquidity on these pass-through and the spillovers of prices using mediator- moderator approach. The findings of this research contribute to existing literature in a number of ways.

First, the results of this research suggest that the monetary policy shock affects the retail prices of the Islamic banks similar to the conventional banks, confirming the findings of the earlier studies on this subject. Moreover, the estimates suggest that if excess liquidity with the Islamic banks is controlled for, the pass-through of policy rate to return on Islamic financing (lending rate) strengthens further. Furthermore, the result suggests that there is a strong spillover between the retail prices of the two systems. Precisely, any shock to the loan-price system (between lending rate of conventional banks and

return on Islamic financing) leads to almost similar increase in return on financing (lending rate) of the Islamic banks. A shock to the deposit price system (between deposit rate of conventional banks and returns on investment from Islamic banks) leads to 0.60 percentage point increase in the deposit rate of the conventional banks. The result suggests that Islamic banks have acquired the status of leaders in pricing of the deposit products, where the conventional banks have become follower. This result is unexpected and stand in sharp contrast to the findings in literature which generally depicts Islamic banks as less competitive and follower of the conventional banks in retail product's price setting.

Intuitively, Islamic banks raises deposit on religious ground, complying *Shari'ah* requirements, which appeal people with religious inclination. These people may have stayed away from banking on ground of *riba* (interest) prohibition. Introduction of Islamic banking system thus has helped in channeling these savings into the banking system. This also explains why Islamic banks continue to attract deposit despite recently paying lower return on investments. Islamic banks, therefore, should be credited with the increasing financial inclusion in Pakistan.

Second, the investigation into the impact of excess liquidity on the monetary policy pass-through suggests that presence of excess liquidity impedes monetary policy pass-through in both systems. Surprisingly, the liquidity effect (mediation impact) is found insignificant for the Islamic banks contrary to contention in literature. Our result suggests that presence of excess liquidity and its impact on the Islamic pass-through is mostly myth. Perhaps, Islamic banks manage their liquidity more efficiently, as these do not enjoy the luxury of parking their excess reserves in government securities. Therefore argument by Iqbal and Molyneux (2005) finds support that Islamic excess liquidity may not be 'an excess' given their intrinsic risk sharing structure and their limitation to borrow short-term funds from interbank market or from the central bank in case of a temporary liquidity crunch. Therefore, a general understanding of structure of the Islamic financial system and excess liquidity with them need to be improved, significantly.

Third, though Islamic banks follow the conventional banks in pricing the lending products, the assessment of impact of excess liquidity on the price spillover suggests that the excess liquidity with the Islamic banks mostly mediates this process. In case of shock to the lending price equilibrium, the Islamic excess liquidity declines, and resurfaces as a conventional excess liquidity in the long run. It is important to note that the excess liquidity with the Islamic banks remains mostly in fungible cash reserves form with the central bank. On the contrary, the conventional excess liquidity remains mostly in the form of short term government securities, as the central bank frequently intervenes in the interbank market and absorbs conventional cash liquidity through OMOs; if this liquidity is more than desired by the central bank.

These results endorses the possibility of the liquidity transmission from Islamic banks to the short term government securities. Perhaps, Islamic banks are lending to the conventional banks through some unrevealed mechanism, which drains their liquidity, while conventional banks invest borrowed money into the short term government securities, which results in increase in the conventional excess liquidity. This mediation through Islamic liquidity eventually leads to the increase in the loan prices of the Islamic banks. Nevertheless, this indirect lending to the government may have improved overall efficiency of the financial sector in Pakistan.

On the contrary, in case the deposit price system receives a shock, say due to increase in the return on investment, neither of the liquidity present in the two systems showed significant adjustment. Only conventional deposit rate adjust to bring the system back to the equilibrium. Moreover, conventional excess liquidity decreases while Islamic liquidity increased in the long run. These findings show that conventional banks, instead of the Islamic banks, suffer from the 'deposit withdrawal risk' contrary to the suggestion of Khan (2010) and others. The spillover is mediated by the excess liquidity with conventional banks. Nevertheless, mediation effect of the conventional excess liquidity is notional compared to that of the Islamic liquidity in loan pricing.

Finally, the liquidity effect helps in revealing more important dynamics of excess liquidity with strong policy implication. Though excess liquidity with the Islamic banks has no effect on the Islamic pass-through of the policy shocks, the liquidity effect reveals that it mediates transmission of conventional price shock to the return on the Islamic finance. The strong mediatory effect of the Islamic excess liquidity in lending price transmission compared to notional effect of conventional liquidity on deposit price transmission shows that Islamic excess liquidity, being highly liquid, has greater potential to affect the market conditions adversely, as interbank call market in Pakistan often witnessed recently. Unexpected presence of long run relationship between the excess liquidities of the two systems also points to this prospect where Islamic excess liquidity may have overriding impact on the conventional policy transmission going forwards, as the size of the Islamic banking system grows.

Following caveats are in order. Islamic banks are relatively new and their asset size is small compared to the conventional banks. This study didn't account for the asset sizes of the two system. Moreover, this study limited its scope assuming that impact of a shock would be symmetric which may not be the case. Asymmetric response of the shock may be investigated in future research.

References

Agénor, P. R., Aizenman, J., & Hoffmaister, A. W. (2004). The credit crunch in East Asia: what can bank excess liquid assets tell us?. *Journal of International Money and Finance*, *23*(1), 27-49.

Akhatova, M., Zainal, M. P., & Ibrahim, M. H. (2016). Banking Models and Monetary Transmission Mechanisms in Malaysia: Are Islamic Banks Different?. *Economic Papers: A Journal of Applied Economics and Policy*, *35*(2), 169-183.

Ariss, R. T. (2010). Competitive conditions in Islamic and conventional banking: A global perspective. *Review of Financial Economics*, *19*(3), 101-108.

Asbeig, H. I., & Kassim, S. H. (2015). Monetary transmission during low interest rate environment in a dual banking system: evidence from Malaysia. *Macroeconomics and Finance in Emerging Market Economies*, *8*(3), 275-285.

Aysan, A. F., Disli, M., Duygun, M., & Ozturk, H. (2017). Islamic banks, deposit insurance reform, and market discipline: evidence from a natural framework. *Journal of Financial Services Research*, *51*(2), 257-282.

Bacha, O. I. (2004). *Dual banking systems and interest rate risk for Islamic banks*. MPRA Working Paper No. 12763.

Baele, L., Farooq, M., & Ongena, S. (2014). Of religion and redemption: Evidence from default on Islamic loans. *Journal of Banking & Finance*, *44*, 141-159.

Amar, A. B., Hachicha, N., & Saadallah, R. (2015). The Effectiveness of Monetary Policy Transmission Channels in the Presence of Islamic Banks: The Case of Saudi Arabia. *International Journal of Business*, *20*(3), 237.

Caporale, G., Catik, N., Helmi, M., Menla Ali, F., & Tajik, M. (2016). *The bank lending channel in a dual banking system: evidence from Malaysia*. DIW Berlin Discussion Paper No. 1557. Available at SSRN: https://ssrn.com/abstract=2745234

Charap, M. J., & Cevik, M. S. (2011). *The behavior of conventional and Islamic bank deposit returns in Malaysia and Turkey*. IMF Working Paper No. 11-156.

Chong, B. S., & Liu, M. H. (2009). Islamic banking: interest-free or interest-based?. *Pacific-Basin Finance Journal*, *17*(1), 125-144.

Egert, B., and R. MacDonald (2009). Monetary transmission mechanism in central and Eastern Europe: surveying the surveyable. *Journal of Economic Surveys*, 23(2): 277-327.

El Gamal, M.A., (2006). *Islamic Finance: Law, Economics and Practice*. New York: Cambridge University Press.

Ergeç, E. H., & Arslan, B. G. (2013). Impact of interest rates on Islamic and conventional banks: the case of Turkey. *Applied Economics*, *45*(17), 2381-2388.

Fazal, S. K., and M. A. Salam (2013). Interest rate pass-through: empirical evidence from Pakistan. *The Lahore Journal of Economics*, *18*(1): 39-62.

Gigineishvili, M. N. (2011). *Determinants of interest rate pass-through: Do macroeconomic conditions and financial market structure matter?* IMF Working Paper No. 11-176.

Hanif, N., and M.H. Khan (2012). *Pass-through of SBP policy rate to market interest rates: an empirical investigation*. MPRA Paper No. 39587.

Hasin, Z., and M. S. A. Majid (2015), "The Importance of the Islamic Banks in the Monetary Transmission Mechanism in Malaysia", In El-Karanshawy, H. A., A. Omar, T. Khan, S. S. Ali, H. Izhar, W. Tariq, K. Ginena, and B. Al Quradaghi (Eds.), *Islamic Economics: Theory, Policy and Social Justice*, Volume 2. Bloomsbury Qatar: Foundation Journal.

Husin, M. M. (2013). Efficiency of monetary policy transmission mechanism via profit rate channel for islamic banks in Malaysia. *Journal of Contemporary Issues in Business Research*, *2*(2): 44-55.

Husman, J., (2015). *Essays on Banking and Monetary Policy in the Presence of Islamic Banks*. PhD Dissertation, Department of Economics, University of Warwick.

Iqbal, M., Aḥmad, A., & Khan, T. (1998). *Challenges facing Islamic banking*. Jeddah: Islamic Research and Training Institute. Available at: http://www.irtipms.org/PubDetE.asp?pub=80

Iqbal, M., and P.Molyneux, (2005). *Thirty Years of Islamic Banking: History, Performance and Prospects*. Basingstoke, UK: Palgrave Macmillan.

Judd, C. M., & Kenny, D. A. (1981). Process analysis: Estimating mediation in treatment evaluations. *Evaluation Review*, *5*(5), 602-619.

Kassim, S., Majid, A., & Shabri, M. (2009). Impact of monetary policy shocks on the conventional and Islamic banks in a dual banking system: Evidence from Malaysia. *Journal of Economic Cooperation and Development*, *30*(1), 41-58.

Khan, F. (2008). Islamic Banking by Judiciary: The 'backdoor'for Islamism in Pakistan?. *South Asia: Journal of South Asian Studies*, *31*(3), 535-555.

Khan, F. (2010). How 'Islamic'is Islamic banking?. *Journal of Economic Behavior & Organization*, *76*(3), 805-820.

Khatat, M. H. (2016). *Monetary Policy in the Presence of Islamic Banking*. IMF Working Paper No. 16-72.

Kuran, T., (1993). The economic impact of Islamic fundamentalism. In Marty, M.E., Appleby, R.S. (Eds.), *Fundamentalisms and the State: Remaking Polities, Economies, and Militance* (pp. 302−341). Chicago, USA: University of Chicago Press, Chicago.

Lucchetta, M. (2007). What do data say about monetary policy, bank liquidity and bank risk taking?. *Economic Notes*, *36*(2), 189-203.

Macit, F. (2012). Who responds more to monetary policy, conventional banks or participation banks?. *Journal of Economics Finance and Administrative Science*, *17*(33), 10-14.

Mohanty, M. S., Schnabel, G., & Garcia-Luna, P. (2006). Banks and aggregate credit: what is new?. *BIS papers*, *28*(2), 11-39.

Aryeetey, E., & Nissanke, M. (2005). *Financial integration and development: liberalization and reform in sub-Saharan Africa*. UK, Landon: Routledge.

Obaidullah, M. (2005). *Rating of Islamic financial institutions: some methodological suggestions*. Islamic Economics Research Centre, King Abdul Aziz University.

Omer, M., De Haan, J., & Scholtens, B. (2015). An empirical analysis of excess interbank liquidity: a case study of Pakistan. *Applied Economics*, *47*(44), 4754-4776.

Rüffer, R., & Stracca, L. (2006). *What is global excess liquidity, and does it matter?*. ECB Working Paper Series No. 696.

Saxegaard, M. (2006). *Excess liquidity and the effectiveness of monetary policy: evidence from Sub-Saharan Africa* (No. 6-115). IMF Working Paper No. 6-115.

SBP (2016). *Quarterly Performance Review of the Banking Sector Q3, 2016*. Pakistan, Karachi: State Bank of Pakistan.

Sobel, M. E. (1982). Asymptotic Confidence Intervals for Indirect Effects in Structural Equation Models. In S. Leinhardt (Ed.). *Sociological Methodology*. (pp. 290-312). Washington DC: American Sociological Association.

Sørensen, C. K., & Werner, T. (2006). *Bank interest rate pass-through in the euro area: a cross country comparison*. ECB Working Paper No. 580.

Sukmana, R. (2015). Economic sectors Sensitivity to Islamic and Conventional Monetary Instruments: Case study in Indonesia. In El-Karanshawy, H. A., A. Omar, T. Khan, S. S. Ali, H. Izhar, W. Tariq, K. Ginena, and B. Al Quradaghi (Eds.). *Islamic Economics: Theory, Policy and Social Justice*, Volume 2. Qatar, Bloomsbury: Qatar Foundation Journal.

Sukmana, R., & Kassim, S. H. (2010). Roles of the Islamic banks in the monetary transmission process in Malaysia. *International Journal of Islamic and Middle Eastern Finance and Management*, *3*(1), 7-19.

Weill, L. (2011). Do Islamic banks have greater market power?. *Comparative Economic Studies*, *53*(2), 291-306.

Zaheer, S., S. Ongena, & S.J.G. van Wijnbergen, (2013). The transmission of monetary policy through conventional and Islamic banks. *International Journal of Central Banking*, *9* (4): 175-224.

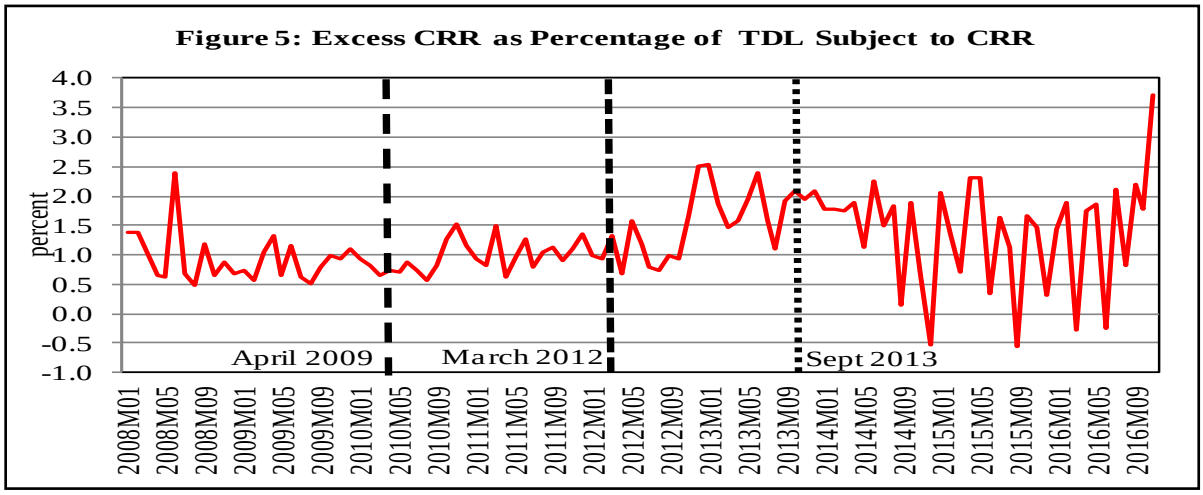
Appendix 1

Data Note 1: Choice of Excess Liquidity

Empirical literature deliberating on inflation, often measures excess liquidity in an economy as a deviation of actual stock of money from its estimated equilibrium level. However, to assess the monetary policy pass-through excess reserves held by banks, in the interbank market, is used as a measure of excess liquidity. In this perspective, excess liquidity could be defined broadly in three different ways; (1) the excess of hard cash held by banks over and above cash reserve requirement (CRR); (2) excess securities held by the banks over and above statutory liquidity requirements (SLR), and; (3) Excess reserves held by banks over and above SLR, including CRR.

Excess of hard cash held by the banks over the cash reserve requirement shows the presence of core liquidity (or cash currency) in the interbank market and is often referred as excess liquidity by the stake holders for operational purposes. Excess cash liquidity may not have the necessary variability besides, modellingit in context of this study may be challenging as a regime switch and multiple structural shifts are expectedwithin thedata span.

As presence ofexcess cash liquidity in the interbank market strongly influences the money market rates, specifically the overnight rates, a central bank monitors it very closely. In case, the excess cash of the system increases/decreases with respect to its desired level, the central bank promptly intervenes is the interbank market; conducts Open Market Operation (OMO) to absorb /inject excess cash liquidity which bring it back to the desired level in line with the objectivesof the interbank monetary management. Excessive interventions are not always in line with the monetary policy objectives and therefore may strip the variable of the necessary variability. Figure 5 shows the three key dates at which the behavior of the excess cash liquidity in the interbank market changed independent of the tight monetary posture adopted by the central bank in this period.



For instance in April 2009, the central introduced the interest rate corridor with specific objective to reduce the volatility in the short term money market rate.[24] However, introduction of the IRC also led to a procedural change in the monetary management of Pakistan. SBP was following monetary targeting regimeprior to the introduction of the IRC;with M2 as its nominal anchor. With the introduction of IRC, the short term money market rate became

[24] Volatility in the money market rates increases the risk premium in the banks' retail rates which ultimately affects the long term saving and the investment decision of the household and the businesses.

nominal anchor for the central bank to conduct the monetary policy. In the changed circumstances, the central bank became least concerned about the monetary growth.

Beside, the introduction of the IRC provided banks opportunity to place additional cash liquidity with them at the central bank's deposit window and receive remuneration as defined by the lower bound or floor of the corridor. On contrary if banks required cash liquidity, they could have acquired them using the SBP discount window at the prevailing SBP reverse repo rate or ceiling of the corridor. Figure 5 shows that the introduction of IRC led to reduction in the volatility of the excess cash holding of the banks.

Moreover in March 2012, the parliament of Pakistan approved amendment in the SBP Act 1956, which required government to retire its borrowing from the central bank by the end of that quarter. Introduction of the clause led to increase in the volatility in the excess cash liquidity holdings of the banks though it is believed that government didn't follow the SBP act in letter and spirit until Pakistan entered in the new IMF program.

In September 2013, Pakistan reentered IMF program. With the start of the IMF program,as Figure 5 suggests, the excess cash liquidity holding of the banks became very volatile, increasing sharply during the quarter, but declining to becomenegative by the end of the every quarter. Government followed the amendment in the SBP Act in spirit and preferred settling the outstanding borrowingfrom the central banks at the end of every quarter.

The expected loss of variability in the excess cash liquidity and the complications involves due to the policy interventions makes excess cash liquidity less desirable candidate as a measure of excess liquidity for Pakistan. Excess liquidity in terms of the excess securities held by the banks above the statutory liquidity requirements (SLR) could be another candidate for this purpose but it has its own shortcoming.

The short term securities held by the banksis the most liquid asset of the banks after hard cash, and these can be used by the banks to raise hard cash, as and when it requires. But their impact remains meaningful only when these are excess than what is required by SLR, only by a margin. Contrastingly, banks are sitting on huge amount of the government security, the effectiveness of SLR has waned and hence this measure of excess liquidity may not very informative from the perspective of the research questions of this study. Therefore, this study uses the definition which includes both cash above CRR and the eligible securities above SLR for measurement of excess liquidity.

Data Note 2: Consistency of Time Demand Liability Series

Moreover, time and demand liabilities reported prior to 31st December 2006, includes Islamic banks' and foreign currency deposits. SBP started reporting net time and demand liabilities by excluding foreign currency and Islamic banks deposits from December 31, 2006.

Though Islamic banking group emerged separately in SBP's SLR reports on weekly liquidity holdings of banks from 21st February 2004, the segregation remained blurred as some Islamic banks kept appearing with conventional banks till 23rd October 2004. Moreover, discrepancy witnessed on a number of calculations in SLR reports generated in 2004. Given relatively smaller size of the Islamic banks' deposits and foreign currency deposits, we assume that the inconsistency will not affect the inferences drawn in this paper significantly.

Appendix 2

Table A1: Group-wise Composition of Banks

As of September 2016

	A. Public Sector Commercial Banks (5)
1	First Women Bank Ltd.
2	National Bank of Pakistan
3	Sindh Bank Ltd.
4	The Bank of Khyber
5	The Bank of Punjab
	B. Local Private Banks (22)
1	Al Baraka Bank (Pakistan) Ltd.
2	Allied Bank Ltd.
3	Askari Bank Ltd.
4	Bank AL Habib Ltd.
5	Bank Alfalah Ltd.
6	BankIslami Pakistan Ltd.
7	Burj Bank Ltd.
8	Dubai Islamic Bank Pakistan Ltd.
9	Faysal Bank Ltd.
10	Habib Bank Ltd.
11	Habib Metropolitan Bank Ltd.
12	JS Bank Ltd.
13	MCB Bank Ltd.
14	MCB Islamic Bank Ltd.
15	Meezan Bank Ltd.
16	NIB Bank Ltd.
17	SAMBA Bank Ltd.
18	Silk Bank Ltd
19	Soneri Bank Ltd.
20	Standard Chartered Bank (Pakistan) Ltd.
21	Summit Bank Ltd
22	United Bank Ltd.
	C. Foreign Banks (4)
1	Bank of Tokyo - Mitsubishi UFJ, Ltd.
2	Citibank N.A.
3	Deutsche Bank AG
4	Industrial and Commercial Bank of China Ltd.
	D. Specialized Banks (4)
1	Industrial Development Bank Ltd.
2	Punjab Provincial Co-operative Bank Ltd.
3	SME Bank Ltd.
4	ZaraiTaraqiati Bank Ltd.
	All Commercial Banks (31)
	Include A + B + C
	All Banks (35)
	Include A + B + C + D

Source: SBP (2016)

Table A2: Composition of Islamic Banking Institutions

As of September 30, 2016

	Islamic Banks
1	Al Baraka Bank (Pakistan) Ltd.
2	Bank Islami Pakistan Ltd.
3	Burj Bank Ltd.
4	Dubai Islamic Bank Pakistan Ltd
5	MCB Islamic Bank Ltd.
6	Meezan Bank Ltd
	Conventional Banks having Islamic Banking Branches
1	Askari Bank Ltd.
2	Allied Bank Ltd.
3	Bank Al Habib Ltd
4	Bank Alfalah Ltd
5	Faysal Bank Ltd.
6	Habib Bank Ltd
7	Habib Metropolitan Bank
8	National Bank of Pakistan
9	Silk Bank Ltd
10	Sindh Bank Ltd
11	Soneri Bank Ltd
12	Standard Chartered Bank
13	Summit Bank Ltd.
14	The Bank of Khyber
15	The Bank of Punjab
16	United Bank Ltd.
	Grand Total 22 (6+16)

Source : SBP (2016)

Table A3: Unit root test results

	Augmented Dickey-Fuller test		**Philips-Perron test**	
	No trend	**Trend**	**No trend**	**Trend**
Discount rate	-1.669	-1.141	-1.918	-1.262
Conventional banks				
Lending rate	-1.734	-1.629	-1.531	-0.647
Deposit rate	-2.108	-0.850	-1.764	-0.351
Excess liquidity	-1.027	-1.629	-1.140	-2.353
Required reserves				
Islamic banks				
Lending rate	**-1.681**	**-1.498**	**-1.972**	**-1.012**
Deposit rate	-1.577	-0.899	-1.348	-0.557
Excess liquidity	-1.523	-1.725	-2.414	-3.155
Required reserves				
**5% Critical Value*	*-2.887*	*-3.445*	*-2.886*	*-3.443*

Notes: Augmented Dickey fuller test uses optimal lags to control the serial correlation, while Philips-Perron test applies non parametric Kernel to address the problem of the serial correlation.

Table A4: Diagnostic Checks of the Estimated Relationship

	Conventional Bank				Islamic Bank				Conventional-Islamic Bank			
Model #	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variable	**Lending Rate**		**Deposit Rate**		**Lending Rate**		**Deposit Rate**		**Lending Rate**		**Deposit Rate**	
Excess Liquidity	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Serial Correlation	7.64	10.07	13.19	21.71	8.33	4.24	27.22	34.89	10.91	18.04	15.64	23.00
	[0.81]	[0.60]	[0.36]	[0.04]	[0.76]	[0.96]	[0.01]	[0.00]	[0.54]	[0.11]	[0.21]	[0.03]
Normality	1.78	2.57	7.24	6.90	4.87	6.53	4.57	5.00	1.74	1.60	6.96	6.36
	[0.04]	[0.01]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.04]	[0.06]	[0.00]	[0.00]
EV Stability Condition	Stable	NA	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable

Notes: Serial Correlation and Normality shows the Portmanteau Q-statistic at 12 lags and Z-statistics for Shapiro-Wilk test for Normal residuals for the concerned Equation in VECM models. Eighen Value (EV) Stability test provides indicators of whether the number of cointegrating equations is misspecified or whether the cointegrating equations, which are assumed to be stationary, are not stationary. Stable indicates that number of stationary cointegration equation correctly identified.