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Abstract

This study measures the degree and the speed of the pass-through of the policy rate to individual banks' retail rates in Pakistan, and investigates variation in interest rate pass through across banks in the context of banks' market power and ownership structure. Monthly data of lending and deposit rates of 31 banks along with 6-month KIBOR (proxy for policy rate in this study) from June 2005 to October 2015 is used to estimate an unrestricted autoregressive distributed lag (ARDL) model. In aggregate, the results indicate the presence of co-integration between the 6-month KIBOR and banks' retail rates. There is a complete pass-through from 6-month KIBOR to lending rate on fresh loans, and it takes only two months to realize the full impact. However, the pass-through is incomplete (0.58 bps in the long run and 0.37 bps in short run) in case of deposits. Large five banks have considerably different level of pass-through as compared to the small banks. Public sector commercial banks have relatively low level of pass-through as compared to the private banks. Furthermore, specialized banks have relatively low level of pass-through as compared to commercial banks.

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Non-technical Summary

The banking sector plays an instrumental role in the monetary policy transmission mechanism both through interest rate channel and credit channel. Through, interest rate channel, changes in the policy rate impacts the lending and deposit rates (retail rates) of the banking system. If the commercial banks transmit these changes completely and timely, it implies that the monetary policy is more effective. On the other hand, incomplete and slow pass-through impairs the effectiveness of monetary policy transmission mechanism. It is therefore imperative for central banks to have credible information on the adjustment in banks' lending and deposit rates following the change in the policy rates. This study estimates the degree and the speed of interest rate pass-through on 31 commercial banks of Pakistan and investigates variation in interest rate pass through across banks in the context of banks' market power and ownership structure.

In aggregate, the empirical results indicate the presence of co-integration between the policy rate (proxy by 6-month KIBOR) and banks' retail rates. There is a complete pass-through from policy rate to lending rate on fresh loans, and it takes only two months to realize the full impact. However, the pass-through is incomplete (37 percent in short run and 58 percent in the long run) in case of deposits. The bank-wise analysis suggests that the banks-size and the ownership have significant impact on the level of their pass-through. Specifically, big five banks have considerably different level of pass-through as compared to the small banks. We measured size of bank on the basis of its assets share in the total assets of the banking industry. The results imply that big banks have more market influence as compared with small banks. Similarly, public sector commercial banks have relatively low level of pass-through as compared to the private banks. Furthermore, specialized banks have relatively low level of pass-through as compared to commercial banks. In our sample, there are two Islamic banks. The level pass-through for both these banks is lower as compared to conventional banks and the industry level.

1. Introduction

In a bank-dominated financial sector, the effectiveness of monetary policy critically depends on the size and the speed of interest rate pass-through to ultimate objectives of price stability and economic activity. A crucial link in this transmission mechanism is the responsiveness of banks' retail rates to changes in the policy rate. Ideally, there should be one-to-one relationship between the change in policy rate and banks' retail rates, reflecting full pass-through of the policy changes to the bank customers. Incomplete and slow adjustment will undermine the ability of central bank to achieve desired objectives during a specified period. In the worst case, sub-optimal adjustment in the policy rate may induce volatility in economic activity and impair the price stability, instead of doing any good. It is therefore imperative for central banks to have credible information on the adjustment in banks' lending and deposit rates following the change in the policy rates.

In practice, the uncertainty arises as the policy rate is only one of the many factors, which determine the changes in banks' retail rates. Key factors generally impacting banks' retail rates are the market power of banks, ownership structure and development level of the financial sector; efficiency of financial institutions; funding structure of corporate and households; access to international resources; and the last but not the least, the level of short-term interest rates. Among these, the market power of banks is of special importance as it reflects the underlying competitive structure of the banking system, and banks' ability to set their retail rates. The role of this issue is widely acknowledged in the literature. For example, Bernanke and Blinder (1988), and Bernanke (1993) noted that banks are not "neutral conveyor" of monetary policy changes to the economy. It is also well documented that banks exercise their market power in setting retail prices of their financial products [Borio and Fritz (1995); Hoffman and Mizen (2004); and Vajanne (2009)].

The above issues are all the more important in case of Pakistan because: (a) the country has gradually moved from quantity (money supply) targeting to price (interest rate) targeting during the last 15 years – a market based implementation of monetary policy; (b) commercial banks are the prime source of external funding for private businesses; and (c) the banking sector of Pakistan is consistent with a monopolistically competitive market structure [SBP (2007-08) and Khan (2009)]. Against this backdrop, it is of great importance to measure the degree and the speed of the pass-through of the policy rate to individual banks' lending and deposits rates in Pakistan. In the second step, we intend to analyze the variation in pass-through across banks in relation to their market power, which we proxy by the asset share of respective banks.

The discussion in this paper is organized in seven sections. Following this section, we provide a brief review of literature on the subject. In section 3, importance of banks' market power and ownership structure is discussed. Methodology is described in section 4, and choice of variables and data details are provided in section 5. Section 6 discusses results, while the concluding remarks are in the last section.

2. Review of Literature

A large number of studies have been conducted to assess the pass-through of policy rate to retail rates of banks, especially for countries in the European Union. Hannan and Berger (1991) concluded that pass-through of policy rate to the deposit rates is influenced by the menu costs. To our knowledge, Cottarelli and Kourelis (1994) were the first to explicitly analyze the pass-through of money market rate to banks lending rates for a group of 31 countries, including both industrial and developing economies. The authors also explored how the financial structure affected the degree of stickiness of

bank lending rates. Their results showed that pass-through is almost complete (on average 0.97, with a range of 0.75 to 1.25) in the long run. However, in short run (within a month), the pass-through is only one third of that in the long run. Furthermore, the results showed that the degree of stickiness varies across countries. They also linked the degree of lending rate stickiness to the financial structure. Key findings included that lending rate adjust at a faster rate in an inflationary environment, and for prime borrowers. Moreover, regulatory environment, and development of financial markets, also influenced the degree of pass-through.

Another important contribution to the subject came from Borio and Fritz (1995). To build a conceptual framework, the authors argued that short-term (money market) rates play an important role in determining lending rates because the former represents both the marginal cost of borrowing (funding) and the opportunity cost of extending loans to financial institutions. The authors estimated a loan rate response function for 12 OECD countries by using monthly data on key interest rates from January 1984 to July 1994. The results indicated that the long-run multiplier ranges from 0.8 to 1.1 across countries. Like Cottarelli and Kourelis (1994), the authors also acknowledged the role of market power in setting the lending rate by banks.

In another study, Mojon (2000) analyzed the role of differences in financial structure across the euro area countries, in pass-through of the policy rate to banks' retail rates. The results suggested that the level of pass-through continue to differ across countries (0.50 bps in Italy to 99 bps in Netherlands). Moreover, short-term rates were more responsive to the policy rate as compared to the long-term rates (such as mortgage rates). The results also indicated that competition among banks played an important role in improving the pass-through mechanism.

Key findings of Mojon (2000) were largely reconfirmed by Bondt (2002). The author noted that the banks' retail rates saw an adjustment of 50 percent in the short-run (i.e. during the month). However, there is a complete pass-through in the long-run. The author also found a long-term relationship (co-integration) between banks' retail rates and the market rates for the euro area.

Tieman (2004) analyzed the pass-through from market rates to retail rates in the transition economies of the euro area (with special focus on Romania). The author estimated an error-correction model by using monthly data from January 1995 to February 2004 for each country. The author concluded that the level of pass-through in Romania was not much different from transition economies of Central and Eastern Europe.

It is interesting to note that most of the studies on the subject are focused on the euro area. This could be due to: (a) bank-dominated financial sectors of European countries; and (b) the implementation of Monetary Union, which facilitated flow of funds by eliminating foreign exchange risks, and shifted monetary policy decision making (setting short-term interest rates) from the country's central banks to the European Central Bank. It implies that differences in pass-through largely depend on the country-specific factors, as all member countries face the same market rates.

Given the bank-dominated financial sector of Pakistan, this topic has attracted the attention of many researchers over the past one and a half decades. To the best of our knowledge, the first estimates of the interest rate pass-through in Pakistan appeared in Qayyum et al. (2005). The authors estimated a transfer function by using monthly time series data of key interest rates from March 1991 to December 2004. In the first step, the authors analyzed the responsiveness of the money market rates to the policy rate (which was proxy by 6-month treasury bills). The results showed that a complete pass-through (one to one) over the estimation period. In the second step, the author investigated the

impact of money market rates to banks' lending and deposits rates. The results indicated that pass-through at this stage was not only slow, but also incomplete for both the lending and deposits rates.

Another important contribution on the subject during the same period came from SBP (2005). The results based on a distributed lag model indicated a 100 bps change in 6-month Treasury bill rates led to only 20 bps change in average lending rate during a month, and it takes 5 months to complete the pass-through (i.e 98 bps, which was not statistically different from one). However, the pass-through was not only slow, but incomplete in case of bank deposit rates.

Khawaja and Khan (2008) contributed to the subject by measuring the pass-through of the changes in 6-month Treasury bill rate to 6-month KIBOR, weighted average deposit rate and weighted average lending rate. The authors used monthly time series data from September 2001 to February 2009, to estimate a transfer function initially developed by Box, Jenkins, and Reinsel (1994). The authors found that 83 percent change in 6-month T-bills rate is passed on to the 6-month KIBOR during the first month. However, the pass-through in short-run (during a month) was quite low in case of lending (43 percent) and deposits (16 percent) rates. The authors ascribed this slow pass-through to asymmetric adjustment in retails rate during an increasing or decreasing interest rate environment; and interest insensitive nature of depositors.

Mohsin and Rivers (2011) used panel co-integration for the analysis of weighted average lending rate (WALR), weighted average deposit rate (WADR) and T-bill rates (used as policy rate). Results based on monthly time series data from 2001 to 2009 indicate that lending and deposit rates are estimated to be sluggish in terms of their response to a change in monetary policy rate. There is also evidence of asymmetry in the pass through of four types of banks (i.e., privatized, nationalized, foreign and specialized). Overall, the domestic banks' pass through is estimated to be higher than that of foreign bank. Although the IRPT (deposits) is estimated to be incomplete, the degree of lending rate pass-through is not very low.

While above studies related to Pakistan focused on a representative policy, money market, lending and deposits rates, Khan and Hanif (2012) measured interest rates pass-through across full spectrum of money market and banks' retail rates. The authors also explicitly explored the potential asymmetric pass-through by estimating separate regressions for an increasing and decreasing interest rate scenarios. An autoregressive distributed lag model for set of interest rates was estimated by using monthly time series data from July 2001 to August 2011. The results indicate that: (a) 6-month T-bill cut-off rates played a key role in determining money market rates over the estimation period – an immediate impact of 72 to 80 bps on KIBOR rates of different tenor in response to 100 bps change in 6-motnh T-bill cut-off rates; (b) 6-month KIBOR has relatively strong pass-through to banks retail rates – marginal lending and deposits rates; and (c) the lending and deposits rates adjust differently in an increasing and decreasing interest rates scenario.

In a recent study, Mirza (2014) investigated how the retail rates responded in Pakistan when a change in policy rate occurred and how long it takes to converge to their long-run level. The author used Engel Granger Co-integration technique and error correction framework on monthly data on central bank's policy rate, weighted average overnight repo rates, open market operations cut off rate, money market rate, interbank rate of various tenors and bank-wise WALR and WADR from July 2003 to December 2013. The study concludes that there is sluggish pass-through in case of WADR and less than 50 percent of the change induced in policy variables is transmitting to WADRs. Similarly, lending rates (WALR) are also found to be sluggish but the degree is higher than in case of WADRs.

WALRs are more responsive to T-bill Cut-off rates as it changes by 87 bps (on average) in response to 100 bps change in T-bill rate in the short-run.

It is interesting to note that none of studies related to Pakistan explored how banks' market power and ownership structure, impacts the interest rates pass-through. This study aims at filling this gap. At first step, we estimate bank-level pass-through by means of Autoregressive distributed lag model; using monthly time series data from June 2005 to October 2015. In the second step, variation in pass-through across banks is investigated to see how important is banks' market power and ownership structure.

3. Why Banks' Market Power and Ownership Structure is Important?

A quick view of lending and deposits rates across banks indicates a good deal of variation. Specifically, Table 1 shows that average deposit rate of big 5 banks (1-5) differs considerably from that of the small banks (21-31).[1] For example, the maximum deposits rate within the big 5 banks was 12.7 percent, compared with 10.6 percent for small banks. This huge gap of over 200 bps in deposits rates, has strong implications for their lending strategies. Moreover, second-tier big banks (6-10) provide relatively better returns to the depositors. Like deposits, the lending rates also witnessed substantial variation across banks and over time. Table 2 shows that maximum lending rate within the top 5 banks was 16.5 percent, which was 180 bps lower than the maximum lending rate of small banks.

Table 1: Descriptive Statistics of Returns on Fresh (Marginal) Deposits

	Max	Min	Range	Mean	S.D
Top 5 banks	12.7	1.2	11.6	6.3	2.4
6-10 banks	12.5	2.1	10.4	6.7	2.1
11-15 banks	15.8	0.0	15.8	5.8	2.1
16-20 banks	12.7	1.9	10.8	6.2	2.2
21-31 banks	10.6	0.7	9.8	5.1	2.3
Overall	**9.5**	**3.0**	**6.6**	**6.2**	**1.3**
K6M	**15.7**	**6.6**	**9.1**	**11.0**	**2.0**

Table 2: Descriptive Statistics of Lending Rate on Fresh (New) Loans

	Max	Min	Range	Mean	S.D
Top 5 banks	16.5	7.5	8.9	12.0	2.1
5-10 Banks	17.3	7.6	9.8	12.1	2.0
11-15 Banks	22.6	5.0	17.6	11.6	2.1
16-20 Banks	17.1	7.0	10.2	12.1	2.1
21-31 Banks	18.3	6.2	12.1	12.1	2.5
Overall	**15.5**	**7.6**	**8.0**	**11.7**	**2.0**
K6M	**15.7**	**6.6**	9.1	**11.0**	**2.0**

A question arise, what explains this variation, while all the banks are facing the same policy rate, same money market rates, and the same set of regulations. One of the contributory factors could be the market power, as Borio and Fritz (1995); Hofmann and Mizen (2004); Gonzalez and Fumas (2005) and Vajanne (2009) noted that banks exercise their monopoly power in setting retail prices of their financial products. Another factor could be the ownership structure of banks. Beck and Hesse

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[1] Bank-size has been estimated by taking the ratio of an individual bank's assets to the overall assets of the banking system.

(2006); Hasan et.al.(2014) highlighted that ownership structure has strong bearing on banks' behavior. The authors further argued that it impacts banks business strategies. Against this backdrop, it is therefore imperative to take into account of bank-characteristics, especially the market power and ownership structure, for analyzing the level of interest rate pass-through.

4. Methodology

A number of empirical techniques can be used to estimate the impact of policy rate on banks' retail rates. In literature, Qayyum et al. (2005) and Khawaja and Khan (2008) used transfer function approach developed by Box, Jenkins, and Reinsel (1994), while SBP (2005) and Khan and Hanif (2012) used a conditional ARDL error correction model developed by Pesaran et.al. (2001). Some of the studies also relied on vector auto regression and co-integration techniques. In this study, we also rely on ARDL model as: (a) it does not require that all variables in the model should be integrated of the same order; (b) it captures the inherent dynamics by using a small number of parameters (as compared to unrestricted VAR or VECM); and (c) it allows the estimation of error correction term along with short and long term multipliers. An unrestricted ARDL for banks retail rates (BRR) and market rates (MR) of order (1,1) is specified as follow:

$$\Delta BRR_t \quad = \quad \alpha_0 \; + \; \alpha_1 MR_{t-1} \; + \alpha_2 BRR_{t-1} \; + \alpha_3 \Delta BRR_{t-1} \; + \alpha_4 \Delta MR_t + \alpha_5 \Delta MR_{t-1} \; + \mu_t$$

Although we have assumed lag structure of (1,1) in above specification to explain the dynamics of ARDL model, in practice structural lags are established by using information criteria like Akaike's Informational Criterion (AIC).

The presence of long-run relationship (or co-integration) in above specification is tested by imposing zero restrictions on the lagged coefficient of variables in levels as follow.

Null Hypothesis: H_0: $\alpha_1 = \alpha_2 = 0$, i.e., there is no long-run relationship.

Alternative Hypothesis: H_1: $\alpha_1 \neq \alpha_2 \neq 0$, i.e., there is a long-run relationship.

Restrictions under Null Hypothesis are evaluated by computing F-Statistic, and using critical values for Lower and Upper bounds provided by Pesaran et al (2001). If there is an evidence in favor of co-integration, the ARDL specification can be used to obtain conditional long-run model by as assuming all deviations (difference terms) equal to zero. This will yield the following specification:

$$0 = \alpha_0 + \alpha_1 MR_{t-1} \; + \alpha_2 BRR_{t-1} + \mu_t$$

Above expression can be rewritten as follow.

$$BRR_{t-1} = \left(\frac{\alpha_0}{-\alpha_2}\right) + \left(\frac{\alpha_1}{-\alpha_2}\right) MR_{t-1} + \mu_t\big/_{(-\alpha_2)}$$

It implies that one can easily retrieve the long-term coefficient from the unrestricted ARDL model in the form of following expression.

$$BRR_{t-1} \quad = \quad \beta_0 + \beta_1 MR_{t-1}$$

5. Data and Choice of Variables

The estimation of above model is complicated by the presence of a large number of banks' retail rates and money market rates. For example, banks offer different returns to depositors, depending on the amount, type and tenor of deposits. Similarly, lending rates also differ across borrowers due to their credit worthiness, loan types, tenor of loan, purpose of borrowing etc. The most widely used method to deal with these intricacies, is to rely on some sort of representative lending and deposit rates.

There are two types of WADR and WALR i.e. fresh and outstanding. We have used both these rates however, in the main text we have utilized weighted average rates on fresh loans and deposits mobilized during a specified period (i.e. a month). These rates are the most suitable for our study as the objective is to analyze the impact of market rate on banks' retails rates, which will be adequately captured in these rates.

Like retail rates, there is a wide range of market rates in case of Pakistan. While almost all the market rates follow the same direction, the level differs due to term premium, credit worthiness of the borrower, and developments taking place in the money market. For this study, we used KIBOR as the representative market rate due to two reasons. First, there is a perfect pass-through from SBP policy rate to market rates including the KIBOR [for reasons see Khan and Hanif (2012)]. Second, KIBOR serves the benchmark rate for the private sector lending. In practice, lending rate to private sector borrower is quoted as KIBOR plus risk premium (say 100 bps). Lastly, Choudhary et al (2012) estimated that the unconditional correlation between the discount rate and the six-month Karachi Interbank Offered Rate (KIBOR/interbank) is close to 0.90

Within different tenors of the KIBOR, this study uses 6-month KIBOR as a representative market rate because: (a) 65 percent of banks' loans to private sector businesses are for working capital, which are reprised on quarterly or half yearly basis; and (b) a recent study, which utilized KIBOR of all tenors as market rates, shows that three and six months KIBOR are the most representative market rates for banks lending rates (Khan and Hanif, 2012).

Another important decision is the selection of sample period. This study uses monthly time series data of above-mentioned interest rates from July 2005 to October 2015. Selection of sample period and the number of banks' to be included are entirely driven by the availability of data. Specifically, monthly data on banks' retail rates is available from July 2005 onwards on a consistent definition. Moreover, the sample period is long enough to take into account at least one full economic cycle.

6. Estimation and Results

Monthly data of lending and deposit rates of 31 banks along with 6-month KIBOR from June 2005 to October 2015 is used to estimate an unrestricted autoregressive distributed lag (ARDL) model.[2] Structural lags are determined by using Akaike's Informational Criterion (AIC). The ARDL of order (1,1) turned out to be the most preferred model. This specification is tested for the presence of long-run relationship by using 'bounds test'. The results indicate the presence of co-integration for both the lending and deposits rates with the KIBOR at aggregate level (Table 3). The bank-level results also indicate the presence of long-run relationship between the returns on fresh deposits and the KIBOR for 25 of 31 banks at conventional level of significance (i.e. 5 percent). Similarly, lending rates on fresh loans are also co-integrated for 26 of 31 banks. For the remaining five banks, we failed

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[2] In terms of assets, these banks (31 banks) have a share of 93.4 percent in the overall banking sector assets.

to reject the null of no co-integration. These are small banks, which have the combined share of 3.1 percent in total assets of the banking system as of end-December 2014.

Another interesting result is the visible fall in number of banks, when the returns on fresh deposits were replaced with the returns on outstanding deposits. Specifically, 15 out of 31 banks indicate no long-run relationship over the estimation period. This was hardly surprising as banks cannot immediately adjust returns on contractual liabilities, especially of fixed deposits. The same is the case, when lending rates of fresh loans were replaced with the lending rates on outstanding loans. These results suggest that findings of Qayyum et al. (2005), SBP (2005) and Khawaja and Khan (2008), must be interpreted with caution as all three studies used banks' retail rates on outstanding amount. Cognizant of this, we focus on the results obtained by using data of retail rates on fresh deposits and lending, while the results based on retail rates on outstanding amounts are presented in appendix (Table A1).

Table 3: F-Statistics for Testing Long Run Relationship between Bank Retail Rates & KIBOR 6-month

	LRO	LRF	DRO	DRF
Aggregate level (at 1% and 5%)	**yes**	**yes**	**yes**	**yes**
No of banks significant at 1%	18	25	15	21
No of banks significant at 5%	21	26	16	25
No long run relationship	10	5	15	6

[2.] The term "yes" in Table 3 implies that at the aggregate level (the weighted average rates of the overall banking system) has a long-term relationship with KIBOR 6-month.
LRO=lending rate outstanding, LRF= rate on fresh loans, DRO=rate on outstanding deposits, DRF=rate on fresh deposits

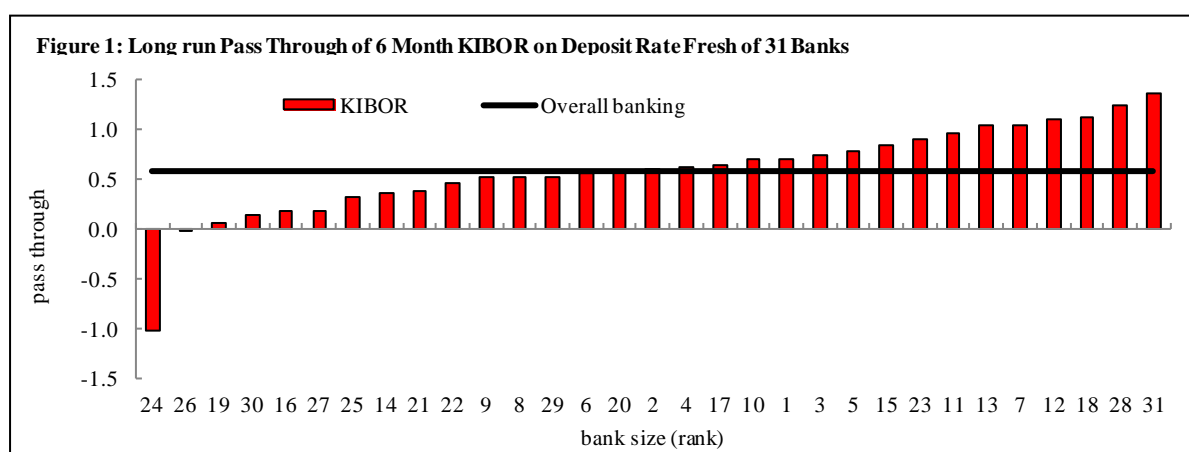### 6.1 Pass Through of Changes in KIBOR to Returns on Fresh Deposits and Loans

The pass-through of 100 bps change in KIBOR to returns on fresh deposits (weighted average deposit rate) of the banking system is only 58 bps in the long-run, indicating an incomplete pass-through to deposits rates over the estimation period. This is little surprising because SBP has linked minimum return on savings deposits with the floor of SBP interest rate corridor to ensure adequate returns to depositors . Composition of bank deposits reveals that incomplete pass-through could be attributed to huge volume of current account deposits (which are generally non-remunerative). As of 31st December 2014, the non-remunerative deposits stood at 31 percent of banks' total deposits. Simple arithmetic shows that the current account deposits suppress the overall returns on deposits by 170 bps.

Though incomplete, the speed of pass-through is high as it takes less than two months to reach its long-term level of adjustment. This quick pass-through could largely be attributed to the linkage of minimum returns on savings deposits with the floor of SBP interest rate corridor framework.

As shown in Table 4 and Figure 1, the aggregate level of pass-through conceals notable variation across banks. The bank-wise results indicate that level of pass-through for 15 of 31 banks falls in the range of 50 to 100 bps. These banks have combined share of 76.4 percent in total assets of the banking sector (Table 4). Moreover, six banks having a combined share of 13 percent in the overall banking assets, has a pass-through level of greater than 1 in the long-run, i.e. a 100 bps change in KIBOR will have more than 100 bps change in returns on deposits. This huge variation reflects the importance of bank-specific factor as all the banks operating in Pakistan are subject to the same regulatory and macroeconomic environment (more on these issues later).

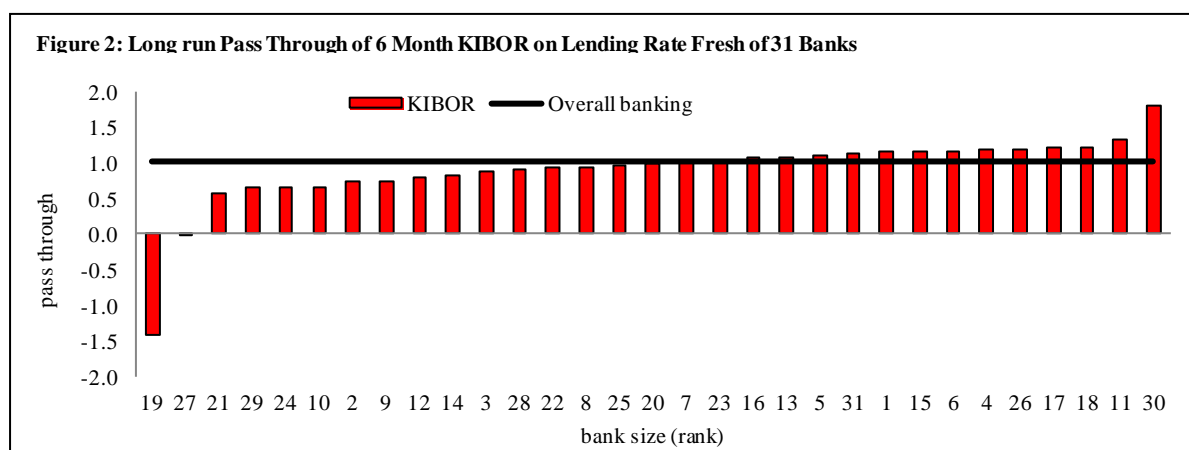**Table 4: Pass Through of 6 Month KIBOR to Returns on Fresh Deposits**

Long-run	No. of banks	Share in total assets
Pass through greater than 1	6	13.1
Pass through less than 1	25	80.3
Between 0.5 and 1	15	76.4
Pass through less than 0.5	10	7.2
Pass through less than 0	2	0.6
Short-run	**No. of banks**	**Share in total assets**
Pass through greater than 1	3	2.9
Pass through less than 1	28	90.5
Pass through less than 0.5	20	47.0
Between 0.0 and 0.5	18	43.4
Pass through less than 0	2	0.3

Figure 1: Long run Pass Through of 6 Month KIBOR on Deposit Rate Fresh of 31 Banks

Table 5: Pass Through of 6 Month KIBOR on Fresh Lending Rate

Long-run	No. of banks	Share in total assets
Pass through greater than 1	15	49.4
Pass through less than 1	16	44.0
Between 0.5 and 1	13	40.8
Pass through less than 0.5	2	2.5
Pass through less than 0	2	2.4
Short-run	**No. of banks**	**Share in total assets**
Pass through greater than 1	3	5.0
Pass through less than 1	28	88.4
Pass through less than 0.5	19	38.5
Between 0.0 and 0.5	15	37.3
Pass through less than 0	2	2.8

Unlike deposits, the pass-through of 100 bps change in KIBOR to weighted average lending rate (on fresh loans) is 102 bps in the long-run and 48 bps in the short-run. It implies that there is a complete pass-through from the market rate to the lending rates. One possible explanation could be the fact that private sector lending is priced according to the KIBOR (which serves as a benchmark for lending rates). The speed of pass-through is high as it is completed approximately in two months.

As in case of deposits, the aggregate level of pass-through conceals variation across banks. Table 5 and Figure 2 show that 15 of 31 banks having combined share of 49.4 percent in banks' assets indicates a pass-through greater than 1 over the estimation period. Similarly, 16 of 31 banks having combined share of 44.0 percent banks' assets indicate that the level of pass-through is less than one. Out of the total 31 banks, there are only two banks having asset share of 2.5 percent, with sluggish pass-through (i.e. less than 50 bps).

Figure 2: Long run Pass Through of 6 Month KIBOR on Lending Rate Fresh of 31 Banks

6.2 Level of Pass-Through and Bank Characteristics

The analysis of bank-wise pass-through of KIBOR to lending and deposits rates clearly show that bank-specific factors play an important role in determining the level and the speed of pass-through from the market rate to the retail rates. It is therefore imperative to explore links between the retail rates and bank-characteristics. As mentioned earlier, we focus on three key characteristics including the bank-size, ownership, and Islamic vs. conventional nature of banks.[3]

Table 6: Pass-through of 6-M KIBOR on Retail Rates (Bank-size Matters)

	DRFB	(Max, Min)	LRFB	Range
Top 5	0.69	(0.79,0.59)	1.02	(1.19,0.73)
5-10 Banks	0.67	(1.04,0.52)	0.91	(1.17,0.67)
11-15 banks	0.86	(1.09,0.36)	1.04	(1.35,0.79)
16-20 banks	0.52	(1.13,0.07)	0.62	(1.23,-1.42)
21-31 banks	0.40	(1.36,-1.03)	0.90	(1.80,-0.03)
Overall	*0.58*	*(1.36,-1.03)*	*1.02*	*(1.80,-1.42)*

6.3 Bank-size and Pass Through

It is well documented that banks exercise some market power in setting their retail rates. While the market power could be attributed to a large number of factors (like opaque nature of financial products, quality of financial services, sources of funding etc.), the most important one is the bank-size, which allow the big banks to act as market leaders in setting their retail rates.

A simple classification of the level of pass-through according to bank-size indicates that the behavior of big banks differs considerably from that of the small banks (Table 6). Specifically, the level of

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[3] A detailed analysis of how bank-characteristics impact the level and the speed of pass-through is beyond the scope of this paper, as the focus was to look at bank level responses, not the underlying causes.

pass-through for top 5 banks is substantially different from relatively small banks, especially having the ranking of 16 to 20. In fact, the mid-size banks seem to be the most efficient in transmitting monetary signals. The lending rates of these banks indicate a complete pass-through (as is the case for top 5 banks). The deposit rates of mid-size banks are also more responsive as compared to other banks. While it could be difficult to provide a definite conclusion on the role of bank size on the level of pass-through, it is quite evident that small banks distort the transmission mechanism of monetary policy.

6.4 Ownership and Pass-Through

Ownership of banks plays a key role in setting their business priorities. It is well-documented that public sector businesses have less incentive to compete with their private counterpart. The bank-level results indicate that the level of pass-through to deposits rate for 3 of 4 public sector commercial banks is lower than industry level. Similarly, 3 of 4 public sector commercial banks have lower pass-through in case of lending rate. Moreover, the level of pass-through of public sector specialized banks is extremely low over the estimation period. None of the three specialized banks in our sample, could reach the average level of pass-through for the banking sector. This could be largely attributed to: (a) heavy reliance of specialized banks on borrowing, instead of deposits to fund their lending activity; and (b) rigidity in their lending rates, which are periodically determined with the consultation of the government. Regardless of the reasons, specialized banks undermine the level of pass-through from the policy rate to banks' retail rates at aggregate level.

6.5 Islamic Bank and the Level of Pass-Through

Islamic banks have emerged as an important player in the banking system over the past one and a half decades. As of 31st December 2015, the share of Islamic banks (including Islamic branches of commercial banks) has reached 11.3 percent in overall assets of the banking system. In our sample, there are two Islamic banks. The level pass-through for both these banks is lower as compared to conventional banks and the industry level (Table7). Interestingly, the difference between their max and min (range) is smallest in Islamic banks.

Looking at weighted average rates on assets and liabilities sides reveals that returns on liabilities of Islamic banks are lower than the average for the banking sector. On the other hand, on the assets side, the rates are higher than the industry average. While this could due to small number of Islamic financing products and limited businesses activity (only Shariah compliant transactions), lower level of pass-through does not bode well for the long term development of Islamic banking.

Table 7: Pass-Through of 6-M KIBOR on Retail Rates (Bank-ownership)

	DRFB	(Max,Min)	LRFB	(Max,Min)
Public (4)	0.46	(0.70,-0.02)	0.90	(1.21,0.67)
Private (17)	0.62	(1.13,-1.03)	1.02	(1.35,0.58)
Specialized (3)	0.26	(0.53,0.07)	-0.26	(0.65,-1.42)
Foreign(5)	0.79	(1.36,0.13)	1.17	(1.80,0.92)
Islamic(2)	0.48	(0.52,0.45)	0.85	(0.94,0.76)
Non-Islamic(29)	0.59	(1.36,-1.03)	0.90	(1.80,-1.42)
Overall	**0.58**	(1.36,-1.03)	**1.02**	**(1.80,-1.42)**

7. Summary and Conclusion

This study measures the level and the speed of pass-through from the market rate to commercial banks' retail rates by using bank-level monthly data from June 2005 to October 2015, and an unrestricted autoregressive distributed lag (ARDL) model. In aggregate, the results indicate the presence of co-integration between the market rate (6-month KIBOR) and banks' retail rates. Moreover, there is a complete pass-through from market rate to lending rate on fresh loans, and it takes only two months to realize the full impact. However, the pass-through is incomplete (0.58 bps in the long-run and 0.37 bps in short-run) in case of banks deposits.

The bank-wise results indicate only six banks having a combined share of 13 percent in the overall banking assets, has a complete pass-through to deposits rates in the long-run, while it falls in the range of 50 to 100 bps for 15 of 31 banks. Unlike deposits, 15 of 31 banks having combined share of 49.4 percent in banks' assets indicates a complete pass-through to lending rates over the estimation period. This huge variation in the level of pass-through to deposit as well as lending rates reflects the importance of bank-specific factors because all the banks operating in Pakistan are subject to the same regulatory and macroeconomic environment.

The bank-wise analysis also indicates that the bank-size and the ownership exert a significant impact on the level of their pass-through. For example, big five banks have considerably different level of pass-through as compared to the small banks. Similarly, public sector commercial banks have relatively lower level of pass-through as compared to the private bank. Furthermore, Islamic banks have relatively low level of pass-through as compared to conventional banks. In totality, the public sector specialized banks, small banks (regardless of their ownership), and Islamic banks impairs the aggregate level of pass-through from the market rate to retail rates.

While above results provide useful information on the level of pass-through, the analysis can be extended to take into account banks' other characteristics like how banks' capitalization impacts the level of pass-through. Similarly, there is a need to explore asymmetric nature of pass-through at both aggregate and bank levels.

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Appendix: Pass Through of Changes in KIBOR to Returns on Outstanding Deposit and Loan Interest Rates

Table A1: F-Statistics for Testing Long Run Relationship between KIBOR and Bank Retail Rates

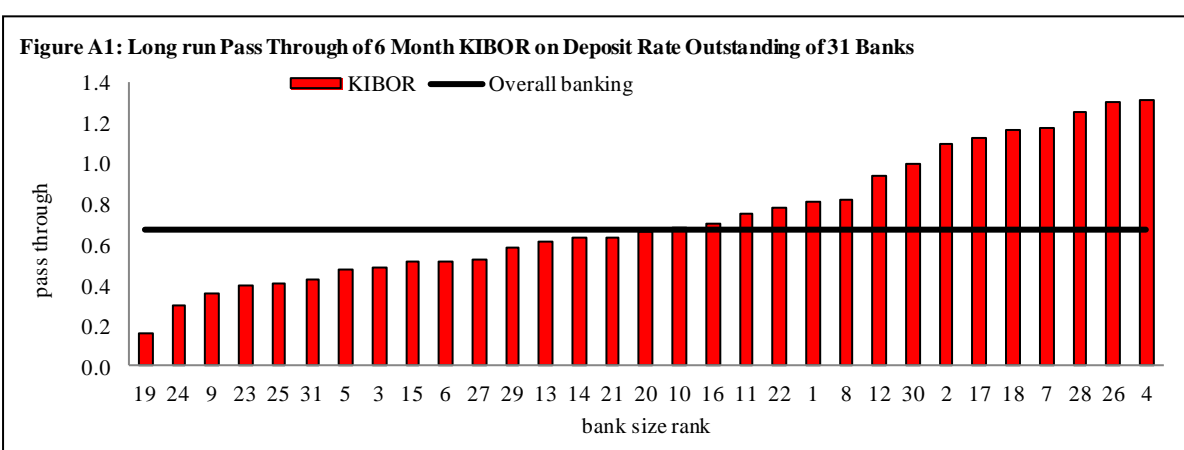|	LRO	DRO
No of banks significant at 1%	18	15
No of banks significant at 5%	21	16
No long run relationship	10	15

*: significant at 1%; **: Significant at 5%

Note: Asymptomatic Critical values at 1% 4.29, 5.61 and 5% are 3.23 and 4.35

The overall pass-through of 6-month KIBOR to weighted average deposit rate (on outstanding loans) is 0.67. Specifically, a 100 bps change in 6-month KIBOR will lead to 67 bps change in outstanding deposit rate in the long-run. In the short-run (during a month), a 100 bps change in 6-month KIBOR will lead to 12 bps change in the outstanding deposit rate. The overall pass-through is completed approximately in 5 months. Table A2 and Figure A1gives a summary of bank-wise pass through of KIBOR.

Table A2: Pass Through of 6 Month KIBOR on Outstanding Deposit Rate

Long-run	*No. of banks*	*Share in total assets*
Pass through greater than 1	8	28.1
Pass through less than 1	23	69.1
Between 0.5 and 1	15	46.2
Pass through less than 0.5	8	19.2
Pass through less than 0	0	0.0
Short-run	*No. of banks*	*Share in total assets*
Pass through greater than 1	0	0
Pass through less than 1	31	100
Pass through less than 0.5	31	100
Between 0.0 and 0.5	24	94.8
Pass through less than 0	7	5.2

Figure A1: Long run Pass Through of 6 Month KIBOR on Deposit Rate Outstanding of 31 Banks

Eight banks having a combined share of 28 percent in the overall banking system, has a pass through greater than 1 in the long-run i.e. a 100 bps change in 6-month KIBOR will lead to more than 100 bps change in the outstanding deposit rate. Twenty three banks having a share of 70 percent in the banking sector, has a pass-through between 0 and 1, while fifteen banks having a share of 46 percent

has a pass-through between 0.5 and 1. This implies that almost two-third of banks have a pass through between 0.5 and 1 in the long-run.

In the short-run, twenty four banks (with share of 95 percent) have a pass-through between 0 and 0.5. The above mentioned facts show that pass-through of KIBOR to deposit rate outstanding is incomplete and sluggish.

The overall pass-through of 6-month KIBOR to weighted average lending rate (on outstanding loans) is 0.83 in the long-run while it 0.15 in the short-run. The overall pass-through is completed approximately within 6 months. Compared to responsiveness of the deposit rate, pass-through of KIBOR to lending rate on outstanding loans is relatively more responsive and complete. Table A3 and Figure A2 give a summary of bank-wise pass-through of KIBOR on lending rate.

Table A3: Pass Through of 6 month KIBOR on lending rate outstanding

Long-run	No. of banks	Share in total assets
Pass through greater than 1	16	43.3
Pass through less than 1	15	50.5
Between 0.5 and 1	11	46.6
Pass through less than 0.5	3	2.3
Pass through less than 0	2	2.1
Short-run	No. of banks	Share in total assets
Pass through greater than 1	0	0.0
Pass through less than 1	31	93.4
Pass through less than 0.5	29	90.6
Between 0.0 and 0.5	25	92.4
Pass through less than 0	3	2.0

16 banks having a combined share of 43 percent in the overall banking assets, has a pass-through greater than 1 in the long-run i.e. a 100 bps cut in 6-month KIBOR will lead to more than 100 bps change in the deposit rate outstanding. Fifteen banks having a share of 50 percent has a pass-through between 0 and 1, while eleven banks having a share of 46 percent has a pass-through between 0.5 and 1. This implies that almost one third of banks have a pass-through between 0.5 and 1 in the long-run, while one half of the banks have a pass-through greater than 1. In the short-run, all banks have a pass-through of less than one

Figure A2: Long run Pass Through of 6 Month KIBOR on Lending Rate Outstanding of 31 Banks