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Does Islamic Banking Augment Financial Inclusion in Pakistan? A Reinforcement Analysis

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ABSTRACT

This study spells out the role of financial inclusion (FI) to accelerate the efficiency of Islamic banks in Pakistan for the period of 2007 to 2016. It examines the effect of a specially developed broad-based FI index on technical efficiency of Islamic banks through panel ARDL approach along with to explore the macroeconomic as well as bank-specific factors of efficiency. The findings exhibit the possible connection between Islamic banking and financial inclusion in Pakistan. The study offers a variety of useful policy implications for public policy towards effective progress on the National Financial Inclusion Strategy in the country.

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1. Introduction

The axiom of financial inclusion (FI) has attracted the attention of research scholars, policy makers and economists across the globe. An augmentation in financial inclusion is expected to ensure fuller participation by economically vulnerable and weaker segments and low-income groups in the economy. FI is defined as a process that ensures the ease of access, availability and usage of the formal financial system for all members of an economy (Sarma and Pais, 2011). The financial inclusion process is carried out through the formal as well as informal sources of finance; Commercial banks in general and Islamic banks in particular are equally important in this drive both being contributory as well as beneficiary. There stands an immense contribution by the banks towards development of financial inclusion activity. Financial markets have gone through significant changes largely due to positive developments in technological and innovative products. These factors have contributed towards financial inclusion development vis-à-vis improvement in efficiency of banks. Given the dearth of literature on the role of Islamic banks towards financial inclusion, empirical research on the role of Islamic banks and their contribution towards financial inclusion becomes inexorable.

The present study intends to investigate the role of Islamic banks towards financial inclusion as well as the contribution of latter towards performance of Islamic banks in Pakistan. The relationship is an important issue to be explored since Islamic banks generate deposits and then turn these into advances taking the form of Murabaha, Ijarah, Istisna'a and Salam etc. overtime. To what extent these products have been useful in augmenting financial inclusion in the country and what has been the effect of FI towards improvement in performance of these banks. The study intends to explore this issue at three stages where the financial inclusion index (FII) is developed at first stage. The bank performance is estimated through the lens of technical efficiency (TE) by using the data envelopment analysis (DEA) at the second stage while the contribution of Islamic banking towards promotion of financial inclusion along with the effect of financial inclusion across bank efficiency is evaluated at the third stage. The third stage analysis is conducted through the use of autoregressive distributed lag (ARDL) model. Since the number of Islamic banks is too small in Pakistan, the study adopts a panel data approach for estimation. Hence, the present research, being the first of its type on development of financial index in Pakistan, is an attempt to fill the gap and make a valuable contribution both for policy makers and bank executives in the country. This is also anticipated in expanding the role of Islamic banks towards FI in line with the recent National Financial Inclusion Strategy (NFIS) launched by the government of Pakistan vis-à-vis role of the latter towards improving performance of the formers.

Rest of the paper is organized as under. The next section reviews the literature on financial inclusion and bank efficiency around the globe. Section 3 takes care of the developing the index of financial inclusion. Section 4 draws upon the research methodology adopted towards reaching the ultimate goal of testing the contribution of Islamic banks towards financial inclusion. Section 5 presents major findings through the lens of technical efficiency of banks as well as the role of Islamic banks towards augmenting financial inclusion in Pakistan. The final part concludes with policy implications.

2. Review of Assorted Literature

The measurement of financial institutions' efficiency using non-parametric frontier models has received considerable attention over the past two decades. There exists a great amount of literature on bank efficiency across the globe. Among the various approaches used, the use of Data Envelopment Analysis (DEA) approach has been frequent. However, there exists a difference of choice among various studies across variables being used as inputs or outputs. The following discussion refers to some of the studies that have been conducted in context of the issue under consideration.

There exist only a few studies on the determinants of financial inclusion as well as on the development of financial inclusion index worldwide. This is not the case for efficiency analysis of banks where plenty of literature is visible in an immense volume across the world. However, it is difficult to trace a significant amount of literature on the role of Islamic banks towards financial inclusion. Thus, a brief review of literature in these perspectives is presented in Table 1.

It can be observed that the literature on financial inclusion is limited but growing overtime. One can hardly find a study on the role of Islamic banks towards financial inclusion except for the one by Naceur et. al (2015). Hence, the present study is an attempt to extend the literature in various dimensions that have not been addressed by the extant studies. In terms of financial inclusion index, the study has extended the inclusion of more dimensions that have not been considered before in construction of the index. The FII is expected to be useful measure of financial inclusion for understanding the changes at a given time vis-à-vis over a period of time. Having developed the index, the study attempts to determine the influence of Islamic banks on financial inclusion and subsequently the effect of financial inclusion towards efficiency of banks through the use of ARDL approach.

Table 1: Assorted Studies on Bank Efficiency, FII and Determinants of Financial Inclusion

Reference (s)	Time Period Covered	Country	Methodology	Main Results
A) Studies on Technical Efficiency Analysis				
Jackson and Fethi (2000)	1998	Turkey	DEA and Tobit analysis	They discovered the larger and profitable banks were to perform at higher levels of technical efficiency while the capital adequacy ratio had a statistically significant negative effect on performance of Turkish banks.
Al-Muharrami (2008)	1993-2002	DEA	GCC	Smaller banks exhibited a better performance in terms of overall TE than did their large counterparts. The study found the big banks were more successful in adopting the best available technology, while medium banks proved good for optimal levels of output. Islamic banks in the GCC area were seen as more successful in both adoption of best available technology and choosing optimal output levels. Finally, in terms of TE, the banks from Bahrain emerged as the top performers in the region followed by peers from Qatar.
Sufian and Noor (2009)	2001-2006	MENA	DEA	The technical inefficiency appeared larger than the scale inefficiency. The banks from the MENA region dominated the highest part of the efficiency frontier over the period of analysis. A positive relationship was discovered across bank efficiency and variables like loans intensity, size, capitalization, and profitability through the use of Tobit regression.
Sufian and Noor (2009)	2001-2006	MENA	DEA	The technical inefficiency appeared larger than the scale inefficiency. The banks from the MENA region dominated the highest part of the efficiency frontier over the period of analysis. A positive relationship was discovered across bank efficiency and variables like loans intensity, size, capitalization, and profitability through the use of Tobit regression.
Akhtar (2013)	2000-2009	Saudi Arabia	DEA	The banks in KSA stood as least affected by the crisis of 2007 and 2008. The average levels of inefficiency remained high suggesting that KSA banks were laggards. Results of the Tobit regression did reveal that the impact of financial crisis remained weak and inconclusive.

Yayar and Karaca (2014)	2009-11	Turkey	DEA and Tobit regression	The total assets and profitability variables were seen to have a positive effect upon total efficiency scores. Variables like capital adequacy ratio and number of branches had a negative effect.
Hafez and Halim (2019)	2003-2017	Egypt	DEA	The study has compared the efficiency scores of Islamic versus conventional banks and found that Islamic banks are more efficient.
B) Studies on Financial Inclusion Index and Determinants				
Honohan (2007)	2007	160 Countries	Econometric methodology	The study has constructed estimates of fraction of households with access to formal financial institutions. He used the ratio of microfinance accounts and bank accounts to the total population, household survey-based access and the average deposit size and the per capita GDP.
Ardic et al. (2011)	2008-09	46 Selected Countries	Ordinary Least Squares Method	An important panel data study to find out the link between access to financial services and FI in the World. The study infers that there are 56% of adults who do not have bank accounts.
Anzoategui et al. (2011)	1996, 1998, 2000, and 2002.	El Salvador	Probit Estimation	The results indicate variables like remittances, income/wealth levels, education, returned migrants; other household features (agriculture and electricity) have a positive impact on financial inclusion.
Laha and Kuri (2011)	1999-2005	West Bengal, India	Binary Probit regression analysis	This study has developed a composite index of FI and probed the link between access to finance and FI in various states of West Bengal. Using the Binary Probit regression model, the study has pointed out various factors as obstacles related to FI.
Akudugu (2013)	2012	Ghana (Western Africa)	Logit Estimation	Gender (male), Age, literacy, cost, and family influence has positive while distance, lack of documentation, lack of trust and lack of money have negative association with financial inclusion.

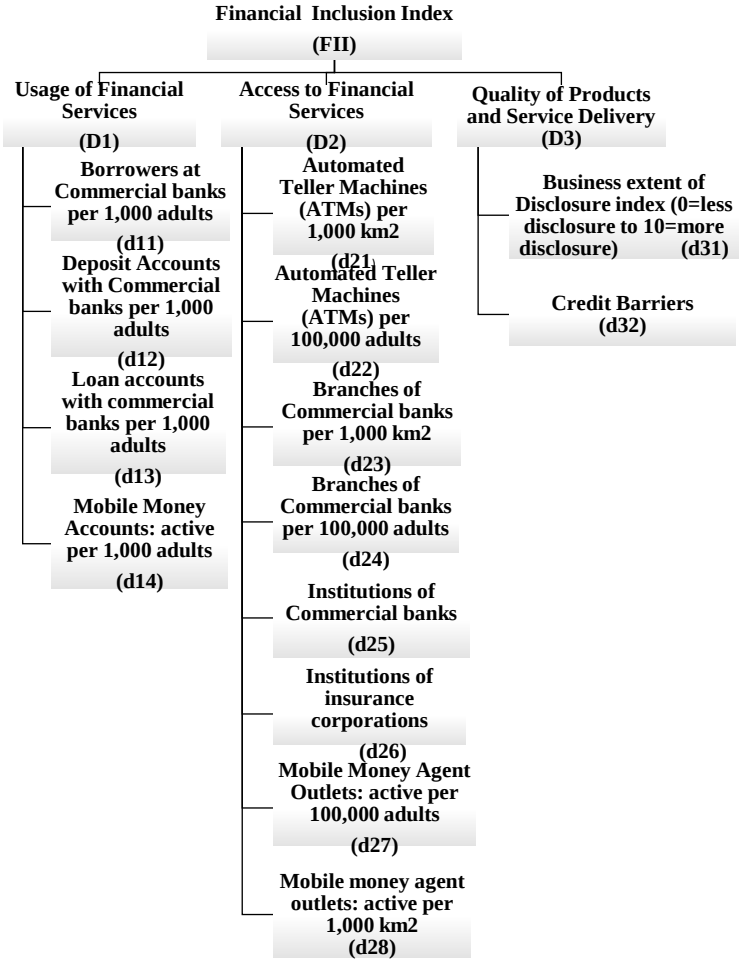
Chithra and Selvam (2013)	1992-2012	28 Indian States	Ordinary Least Squares Method	This paper has investigated the determinants of FI for the various states of India. The study has incorporated various socio-economic factors as the factors determining FI.
Kumar (2013)	1995 -2008	India	Ordinary Least Squares Method	This study has also explored the factors of FI for different Indian states. The study stresses more on economic determinants for FI. The authors have suggested policies to improve FI in India.
Tuesta et al. (2015)	2012	Argentina	Probit Estimation	This study explores the three aspects of FI for Argentina. The study has analyzed FI from the micro economic point of view by including access, use and barriers.
Clamara et al. (2014)	2012	Peru	Probit Estimation	The authors have used micro data to find out the factors of FI in Peru with a focus on barriers to FI.
Tuesta (2014)	2012	Mexico	Multiple Correspondence Analysis	The findings of the study show that Age, position in the household, marital status, education, household behavior in terms of savings, receipt of remittances, wage or salary, financial infrastructure have positive relationship while Locality with less than 15,000 inhabitants has negative relationship with financial inclusion.
Marr et al. (2014)	1981-2009	Peru	Ordinary Least Squares Method	The dummy variable of financial inclusion is total number of newly-banked clients (TOTPERS), dummy variables of MFI characteristics are level of MFI maturity (ANTIGUO) which based on number of years of operation of the MFI since 2008, number of MFI branches (NSUC), total assets in millions of Nuevos soles (ASSETS) and dummy variable of MFI strategic relations is connection with Banco Nación (RBN9). TOTPERS has positive relationship with NSUS, ASSETS and RBN9 while it has negative association with ANTIGUO.

Park et al. (2015)	2004-2012	37 Asian Developing Countries	Ordinary Least Squares Method	The results of the study show that rule of law, PCI and demographic variables have significant effect on FI. The negative relationship between FI and poverty has been observed. Further the study has pointed out a positive association between demographic variables and FI.
Naceur et. al (2015)	2004–13	OIC countries	Regression analysis	The authors discovered that even though the physical access to financial services has grown more rapidly in the OIC countries, the use of such services has not grown at that speed. Results of the regression analysis reveal the existence of a positive link on credit to households and to firms for financing their investments. However, the empirical link remains uncertain and relatively weak.
Zins and Weill (2016)	2014	37 Africa Countries	Probit Estimation	The study has computed determinants of financial inclusion indicators i.e., female, age, income and education. Female and income have negative association while age and education have positive relationship with FI. Moreover, the authors have also calculated the factors related to barriers to financial inclusion and mobile money banking.
Abdu et al. (2018)	2014	Sub-Sahara Africa	Probit, Tobit and Juhn-Murphy-Pierce decomposition	The study supports the fact that Islamic banking has spurred the financial inclusion.
Akhtera et al. (2019)	2005-2014	28 countries of Asia and Africa	Panel Regression	This study has focused on role of Islamic banking by considering demand and supply side factors of financial inclusion. The findings suggest that Islamic banking is playing a vital role in enhancing financial inclusion through the demand side dimension.
Kabiru & Ibrahim (2020)	2013-2018	OIC Countries	GMM, Second-generation cointegration and causality test	The authors have pointed out that Islamic banking is promoting financial inclusion in OIC countries. However, no bi-directional causality has been found between Islamic banking and financial inclusion.

3. Construction of Financial Inclusion Index

The financial inclusion index as reflected in Table 2 has emerged as a result of detailed process starting from the identification of three dimensions of financial inclusion. These dimensions were based on the usage of financial services (D1), access to these services (D2) and quality of products and services delivery (D3). Each dimension was further explained through some indicators where D1 is represented by four, D2 by eight and D3 by two indicators. The descriptive statistics for indicators of three dimensions are produced in Table A1 in the appendix. The construction of FII with three dimensions and their indicators are elaborated through Figure 1.

Figure 1: Components of Financial Inclusion Index



Source: Authors' own elaborations

For each dimension of financial inclusion, a dimension index Di, is calculated as shown in table-A2, through the formula below.

$$d_i = \frac{X_{Ad} - X_{\min d}}{X_{\max d} - X_{\min d}} \qquad (1)$$

Where:

d_i = Dimenssions of Financial Inclusion d.

X_{Ad} = Actual value of dimenssion d

$X_{\min d}$ = Minimum value of dimenssion d

$X_{\min d}$ = Maximum value of dimenssion d

On the next step, the values of X1 and X2 are derived with the formulae given in equations 2 and 3. X1 represents the average of the Euclidian distance between 0 and X where a higher value of X_1 stands for high level of financial inclusion and vice versa while the X2 inverse Euclidian distance between X and W, indicated by the equation 3 for FII.

$$X_1 = \frac{\sqrt{d_1^2 + d_2^2 + d_3^2 + ... + d_n^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2 + ... + w_n^2}} \quad (2)$$

$$X_2 = 1 - \left[\frac{\sqrt{(1- d_1)^2 + (1- d_2)^2 + (1- d_3)^2 + ... + (1- d_n)^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2 + ... + w_n^2}} \right] \quad (3)$$

$$FII = \frac{1}{2}[X_1 + X_2] \quad (4)$$

Equation 4 computes the mean of and given the values of FII, the levels of financial inclusion are reflected by the ranges given below (Goel and Sharma, 2017):

- 0 ≤ FII ≤ 0.4; (low financial inclusion)
- 0.4 < FII ≤ 0.6; (medium financial inclusion)
- 0.6 < FII ≤ 1; (high financial inclusion)

Table 2: Values of Financial Inclusion Index

Years	X1	X2	FII	FII Range	Conclusion
2007	0.5443	0.1703	0.3573	0 ≤ FII ≤ 0.4	LFI
2008	0.5128	0.2298	0.3713		
2009	0.5029	0.2794	0.3911		
2010	0.4736	0.2962	0.3849		
2011	0.4657	0.3115	0.3886		
2012	0.3665	0.2891	0.3278		
2013	0.5181	0.3953	0.4567	0.4 < FII ≤ 0.6	MFI
2014	0.5706	0.3940	0.4823		
2015	0.7185	0.4449	0.5817		
2016	0.7905	0.4641	0.6273	0.6 < FII ≤ 1	HFI

Note: LFI, MFI and HFI stands for Low Financial Inclusion, Medium Financial Inclusion and High Financial Inclusion respectively.

Source: Authors' calculations

The results of Table 2 reveal that Financial Inclusion in Pakistan has increased gradually over the period from 2007 to 2016. From 2007 to 2012, Pakistan can be seen in low level of financial inclusion as the index ranges from 0 to 0.4. However, the level of FII stands at 0.5 to 0.6 showing the medium level of FI during the years 2013 to 2015. In the year 2016, Pakistan seems to have entered the club of high financial inclusion as the index has gone up to 0.63. This might have been the result of National Financial Inclusion Strategy launched by the government of Pakistan during the recent years.

4. Technical Efficiency Analysis

The study is based on a population analysis of all the commercial banks[1] operating in Pakistan during the period of 2007 to 2016. Data for the study was extracted through the Banking Statistics of Pakistan provided by the State Bank of Pakistan (SBP). The model used in the study is based on two inputs and two outputs where the inputs are: (i) deposits and (ii) administrative expenses while the outputs are: (i) loans & advances and (ii) investments. Hence, the model estimates the efficiency of commercial banks in transforming input quantities into amounts of output. The 2×2 model fulfills the DEA concord as the minimum number of decision-making units (DMUs) is greater than three times the number of inputs plus outputs (Dyson et al., 2001). The flow of services provided by banks can be measured through either the production approach or the intermediation approach. The intermediary role tends to be a by-product of the production function of banks. By the same notion, the study assumes intermediation approach where financial institutions are considered as the entities that could convert inputs like deposits into outputs such as advances and investments.

The input and output variables were mainly selected in context of the existing theoretical strands and the extant literature. Banks tend to generate their input resources mainly through deposits which enable them to carry on their lending and investment in the economy. Unlike other businesses, bank expenditures determine to what extent banks are cost efficient. For this reason, administrative expenses are used as the second input. Table-A3 exhibits descriptive statistics for variables used as inputs and outputs in the study.

Studies on the efficiency analysis of commercial banks have mainly used frontier methodologies e.g. econometric frontier analysis and the data envelopment analysis (DEA), both with their own merits and demerits2. The DEA allows the use of multiple inputs and outputs without inflicting any functional form on the data and making any distributional assumptions on the inefficiency term.

Technical efficiency (TE) is essential in measuring the bank performance. It reflects the degree of production efficiency and innovation. Based on the DEA model, technical efficiency scores of each bank in terms of constant returns to scale (CRS) and variable returns to scale (VRS) are reflected in Table 3 for the period 2007-2016. The efficiency scores presented in Table 3 reveal that only one of the Islamic banks appeared to be VRS efficient during the period of analysis. Among the conventional banks, only four of the banks appear to be technically efficient both on CRS and VRS grounds during the whole period with four others being VRS efficient only. Four of the banks that have emerged as both technically CRS and VRS efficient are smaller banks. This refers to the fact that small size banks are better to achieve high technical efficiency levels rather than the larger banks which do not seem to be managing well in terms of their production efficiency due to their large size.

1 As on 31st December 2016, there stood 35 commercial banks in Pakistan (SBP, 2016). However, four of the commercial banks were specialized banks while out of the remaining 31 banks, consistent data could only be found for 24 banks for the period of analysis.

2 For details on the advantages and disadvantages of DEA, see Akhtar (2010).

Table 3: Technical Efficiency Scores of Banks under CRS & VRS and Scale Efficiency (2007-2016)

DMU	Banks	CRS Technical Efficiency	VRS Technical Efficiency	Scale Efficiency	Remarks
Islamic Bank					
1	Dubai Islamic Bank Pakistan Ltd.	0.823	0.828	0.994	IRS
2	Meezan Bank Ltd.	0.74	0.741	0.999	IRS
3	Bank Islami Pakistan Ltd.	0.681	0.757	0.899	IRS
4	Albaraka Bank (Pakistan) Ltd.	0.874	1	0.874	IRS
	Average Scores	0.7795	0.8315	0.9415	
Conventional Banks					
5	Allied Bank Ltd.	0.801	0.834	0.96	DRS
6	Askari Bank Ltd.	0.824	0.849	0.971	DRS
7	Bank Alfalah Ltd.	0.752	0.827	0.909	DRS
8	Bank Al-Habib Ltd.	0.825	0.837	0.985	DRS
9	Faysal Bank Ltd.	1	1	1	-
10	First Women Bank Ltd.	0.731	1	0.731	IRS
11	Habib Bank Ltd.	0.843	1	0.843	DRS
12	Habib Metropolitan Bank Ltd.	1	1	1	-
13	JS Bank Ltd.	0.807	0.822	0.981	DRS
14	MCB Bank Ltd.	0.986	1	0.986	DRS
15	National Bank of Pakistan	0.736	1	0.736	DRS
16	NIB Bank Ltd.	0.923	0.926	0.998	IRS
17	Silk Bank Limited	0.778	0.806	0.966	DRS
18	Soneri Bank Ltd.	0.848	0.86	0.986	IRS
19	Standard Chartered Bank (Pakistan) Ltd.	0.788	0.831	0.949	DRS
20	Summit Bank Ltd.	1	1	1	-
21	The Bank of Khyber	0.79	0.917	0.862	IRS
22	The Bank of Punjab	1	1	1	-
23	United Bank Ltd.	0.876	1	0.876	DRS
24	Samba Bank Ltd.	0.546	0.567	0.963	IRS
	Average Scores	0.8427	0.9038	0.9351	

Source: Authors' calculations

Looking at the performance of Islamic vis-à-vis conventional banks, it can be observed that the average efficiency scores of Islamic banks are lower than those of their conventional counterparts both on CRS and VRS terms but are nearly identical in terms of scale efficiency. However, Islamic banks tend to be operating under the increasing returns to scale (IRS) where doubling of inputs more than doubles the output. On the contrary, majority of the conventional banks appear to be operating under the DRS where doubling of inputs less than doubles the output. This reveals that Islamic banks have the potential to perform better than their conventional peers.

5. Econometric Analysis

Having calculated the FII and TE, our next task is to link these by formulating two econometric models. The first model explains the impact of Islamic banks on financial inclusion while the second model points out the link between financial inclusion and technical efficiency. This is to confirm the fact whether FI and bank efficiency reinforce each other or not? Following are the econometric forms of the both the models:

Model 1: Islamic banks and Financial Inclusion

$$FII = \alpha_0 + \alpha_1 GDPPC + \alpha_2 URBG + \alpha_3 DG + \varepsilon \tag{5}$$

Model 2: Financial Inclusion and Technical Efficiency

$$TE = \beta_0 + \beta_1 FII + \beta_2 ROE + \beta_3 TRADE + \varepsilon \tag{6}$$

Where:
FII = Financial Inclusion Index
GDPPC= GDP per capita growth (annual %)
URBG = Urban population (% of total population) Growth Rate
DG = Deposits Growth Rate of Islamic Banks
TE = Technical Efficiency
ROE = Returns on Equity
TRADE= Trade (% of GDP)

An annual time series data from 2007 to 2016 have been selected for this study. The data on various dimensions of FII have been taken from WB Global Findex, IMF Financial Access Surveys, WB Global Consumer Protection Survey and WBG Doing Business while data on macroeconomic variables i.e. GDPPC, URBG, TRADE have been acquired from World Development Indicators (WDI). The bank-specific data on ROE, Investments, advances, administrative expenditures, and deposits have been attained from Handbook of Statistics on Pakistan economy, a flagship publication of State Bank of Pakistan. The methodology applied is Autoregressive Distributed Lag (ARDL) technique. The ARDL specification of the equations 5 and 6 are given as:

$$\Delta(FII)_t = \alpha + \beta_1 (GDPPC)_{t-1} + \beta_2 (URBG)_{t-1} + \beta_3 (DG)_{t-1} + \sum_{i=1}^{z_1} \phi_1 \Delta(FII)_{t-i} + \sum_{i=0}^{z_2} \phi_2 \Delta(GDPPC)_{t-i} + \sum_{i=0}^{z_3} \phi_3 \Delta(URBG)_{t-i} + \sum_{i=0}^{z_4} \phi_4 \Delta(DG)_{t-i} + \varepsilon_t \tag{7}$$

$$\Delta(TE)_t = \alpha + \beta_1 (FII)_{t-1} + \beta_2 (ROE)_{t-1} + \beta_3 (TRADE)_{t-1} + \sum_{i=1}^{z_1} \phi_1 \Delta(TE)_{t-i} + \sum_{i=0}^{z_2} \phi_2 \Delta(FII)_{t-i} + \sum_{i=0}^{z_3} \phi_3 \Delta(ROE)_{t-i} + \sum_{i=0}^{z_4} \phi_4 \Delta(TRADE)_{t-i} + \varepsilon_t \tag{8}$$

It is imperative to test for the stationarity of data to avoid the spurious regression. To reach this end, ADF unit root test of stationarity has been applied.

Table 4: Results of ADF Unit Root Test

ADF Test at Level							
Variables	**Intercept**	**Lags**	**Intercept and Trend**	**Lags**	**None**	**Lags**	**Conclusion**
FII	0.292650 (0.9617)	0	-1.061389 (0.8738)	0	1.634769 (0.9625)	0	I(1)
TE	-1.463281 (0.5049)	0	-1.212644 (0.8383)	0	-0.437193 (0.4956)	0	I(1)
GDPPC	1.216918 (0.9936)	1	-3.410902 (0.1240)	1	3.084109 (0.9960)	1	I(1)
ROE	-2.249411 (0.2055)	1	-4.023576 (0.0635)	1	-0.524308 (0.4610)	0	I(1)
URBG	-0.677364 (0.7969)	1	-13.28737 (0.0001)	0	-5.620590 (0.0002)	1	I(0)
DG	-1.659327 (0.4166)	0	-3.502680 (0.1020)	0	-1.603348 (0.0993)	1	I(0)
TRADE	-27.15092 (0.0001)	1	-251.8337 (0.0001)	1	-1.258012 (0.1751)	1	I(0)

Source: Authors' calculations

Table 4 demonstrates results of ADF test at level. The two dependent variables i.e. FII and TE are non-stationary (having unit root) at level. The explanatory variables namely GDPPC and ROE have unit root (non-stationary) and URBG and TRADE are stationary (no unit root). It can be deduced from Table 6 that all the variables have mixed order of integration so the appropriate technique to estimate the equations 7 and 8 would be Autoregressive Distributed Lag (ARDL) approach to cointegration.

The first step of the ARDL is to detect the existence of cointegration based on values of F-statistics. The values of F-statistics are compared to the critical values of the bounds. The results of F-Test are displayed in Table 5.

Table 5: F-Test for Cointegration

		5% Critical Value Bounds		10% Critical value Bounds	
	F-Statistic	I(0)	I(1)	I(0)	I(1)
Model 1	7.59	3.23	4.35	2.72	3.77
Model 2	4.85	3.23	4.35	2.72	3.77

Source: Authors' calculations

The results of the F test allude towards rejection of the null hypothesis of no cointegration in both the models since the calculated F-statistics are more than the upper bounds at 5percent and 10

percent levels of significance. The calculated F-statistics are 7.59 and 4.85 that are more than upper bounds values of 4.35 and 3.77 in model 1 and model 2 respectively. Bounds test reveals that cointegration exists which allows us to proceed to the next step by computing the long-run estimates of both the models.

Table 6 presents the long-run estimates of both the models. In the first model of Islamic banks and Financial Inclusion, the regressand is financial inclusion index (FII) and regressors are GDP per capita growth rate (GDPPC), urban population Growth Rate (URBG), and deposits Growth Rate of Islamic Banks (DG).

Table 6: Long-Run Estimates of Model 1 & 2

Model 1			**Model 2**		
Dependent Variable: FII Selected Model: ARDL (1, 1, 1, 1)			Dependent Variable: TE Selected Model: ARDL (1, 1, 1, 0)		
Variables	Coefficient	Prob.	Variables	Coefficient	Prob.
GDPPC	0.095663	0.0224	FII	3.569597	0.0203
URBG	0.942307	0.0833	ROE	-0.822794	0.0264
DG	0.260075	0.0354	TRADE	0.160179	0.0869
C	-2.643771	0.0860	C	-4.985900	0.0975

Source: Author's calculations

The GDP per capita is a proxy for economic growth. There are two views about the financial development3 and economic growth: supply side4 and demand side. The demand-pulling hypothesis suggests that economic growth spurs the financial development (Robinson,1952; Friedman and Schwartz,1963). The sign of the parameter of GDPPC is positive and statistically highly significant. The positive sign can be validated towards the demand-pulling hypothesis which explains that as an economy grows, the demand for financial products increases. In other words, usage of financial services; access to financial services; the quality of the financial products and the service delivery recuperate due to the economic growth and advancement. Thus, the financial system would be more inclusive as economy achieves higher economic growth (Evans, 2015). Our results are consistent with those by Halicioglu, 2007, Sarma and Pais, 2011, Chithra and Selvam, 2013, Camara et al., 2014, Fungáčová and Weill, 2015, Tuesta et al., 2015 and Oyelami, et al. 2017.

Financial system stands as alpha and omega in an economy which mobilizes the resources from surplus to deficit units. Economic theory suggests that urbanization and FI are positively associated as the people in urban areas have greater access and usage of financial services delivery; it results in high level of financial inclusion. The parameter of urbanization appears with the positive sign in our model as expected5. It suggests that urbanization is fostering financial inclusion in Pakistan. Urbanization in Pakistan has increased from 37 percent to almost 40 percent in 2016 (GOP, 2016). The positive association between urbanization and financial inclusion may be supported by the fact that an

3 Financial inclusion is a part of financial development.

4 The seminal study by Patrick (1966) has proposed two competing hypotheses: i) The supply-leading hypothesis and ii) demand-pulling hypothesis. We have not investigated supply leading hypothesis that explains the impact of financial development and economic growth meaning that as financial development occurs in the economy, it escalates savings, capital accumulation, and investment results in economic growth. Goldsmith (1969), McKinnon (1973) and Shaw (1973) also proved the supply-leading hypothesis.

5 The study by Lyons, et al., (2017) supports the negative link between urbanization and financial inclusion.

increasing number of people tend to migrate from rural areas to urban areas for various reasons including high earnings, employment, education, health and various infrastructural facilities. Having moving to urban areas, they can use more financial products through the channels of education, confidence, and banking habits. The finding are supported by Marr et al., 2014; Naceur et al.,2015.

The last regressor in the model is deposits growth rate of Islamic banks (DG). This stands as the core variable in our reinforcement analysis. We have used the proxy of deposits growth rate of Islamic banks to probe the impact of Islamic banks on financial inclusion. The parameter is positively significant confirming role of Islamic banks towards financial inclusion. As an Islamic country, people are more inclined towards the Islamic financial institutions. Hence, religiosity factor seems to be dominant and contributing to escalating the financial inclusion as the Muslims feel tilted towards the use of Shariah-compliant products. They have no fear of 'Riba' as all the Islamic modes of finance are according to 'Shariah'. Our findings are compatible with those by Demirguc-Kunt, et al., 2014; Naceur, et al., 2015 and Shaikh et al., 2017.

Moving forward to model 2 where the responding variable is technical efficiency (TE) while the explanatory variables are Financial Inclusion Index (FII), Returns on Equity (ROE), and Trade as a percentage of GDP (TRADE). The first parameter is Financial Inclusion Index which shows the positive association with the technical efficiency of the banks in Pakistan. This result can be justified on the following grounds. Financial inclusion is a multidimensional phenomenon that accelerates the efficiency of banks as the financial inclusion ensues in any economy; it enhances the provision of formal financial products to community at large regardless of their financial status. At higher levels of FI taking the form of financial literacy and capability, numbers of borrowers, deposit accounts, loan accounts, branches, automated teller machines (ATMs), insurance corporations, mobile money accounts, mobile money agent outlets, the efficiency of financial sector particularly commercial banks escalates. This in turn boosts the technical efficiency along with the quality of financial products and service delivery. The results are consistent with the findings by Jemric and Vujcic, 2002 and Chauvet and Jacolin, 2017.

Return on Equity (ROE) is a bank-specific variable. This as a measure of profitability appears with a significantly negative relationship with the TE. The result reveals that profitability and efficiency do not go in tandem. This reinforces that the efficiency and profitability are independent of each other by the banks in Pakistan. These results are in line with the findings by Akhtar (2013) and Abbasoglu et al. (2007) but are contrary to the findings of Jackson and Fethi (2000), Hassan (2006) and Sufian and Mohamad Noor (2009). TRADE, being a macroeconomic variable is used as the proxy for trade liberalization and globalization. The sign of TRADE is positive and statistically significant. The financial sector is an important contributory and beneficiary of international trade. Both financial and trade sectors stimulate each other, reinforcing the importance of FI. Due to fewer restrictions on international trade and with more globalization of goods and services, the volume of trade has increased where the monetary and financial transactions would take place through the financial sector. Therefore, the banks would improve themselves at par with the other international financial institutions and resultantly, the efficiency of the banking sector would also escalate.

The results of Error Correction Estimates of Model 1 and 2 are displayed in Table 7. The error correction terms in both the models are negative and statistically significant. The error correction term shows the speed of adjustment towards equilibrium. The values of error correction terms in both the models are -1.37 and -1.34 respectively implying that almost one and half years are required to restore the equilibrium.

Table 7: Error Correction Estimates of Models 1 & 2.

Model 1			**Model 2**		
Selected Model: ARDL (1, 1, 1, 1)			Selected Model: ARDL (1, 1, 1, 0)		
Variables	Coefficient	Prob.	Variables	Coefficient	Prob.
D(GDPPC)	0.093167	0.0191	D(FII)	2.478185	0.0949
D(URBG)	-2.674766	0.0315	D(ROE)	-0.052270	0.1153
D(DG)	0.113216	0.0727	D(TRADE)	0.214797	0.1153
CointEq(-1)	-1.377408	0.0145	CointEq(-1)	-1.340983	0.0320

Source: Authors' calculations

6. Conclusions and Policy Implications

The study emerges as forerunner towards estimating the role of whole population of banks including Islamic banks in Pakistan towards financial inclusion for a significant period. The empirical findings allude towards a possible relationship between Islamic banking and financial inclusion, measured through various dimensions with different indicators for each. Hence, the study stands as novel in terms of developing a broad-based index of financial inclusion for Pakistan over a period of 10 years. This facilitates to track the developments on FI front in Pakistan over the period. By entering the high financial inclusion range, Pakistan might enjoy the fruits of inclusive growth along with an improvement in living styles and investment behavior of the masses. The data analysis for a period of 10 years can be considered as fully representative of population of banks in Pakistan along with their Islamic counterparts. The study offers a variety of useful policy implications for public policy towards effective progress on the NFIS in the country as well as bank managers of Islamic banks.

Firstly, although Islamic banks appear to be operating under the IRS yet only one of the banks appears to be efficient. This needs to be improved by utilizing their inputs optimally. Secondly, the banks need to pursue actions that might enable them to become efficient by taking advantage of their specialized Shariah-compliant products. Thirdly, as per growth trajectory of FI in Pakistan, there is a need to improve further by taking measures that could reduce the degree of financial exclusion in the country. This can take place through the growth in per capita GDP, urbanization as well as growth in Islamic banking across the country. Fourthly, since the Islamic banking does contribute towards FI, the latter also is seen as contributing towards making banks efficient. Hence, it supports the notion that Islamic banks and financial inclusion reinforce each other. Fifthly, the operational modalities of Islamic banking need to be strengthened in a way that could create awareness about various products of Islamic banks like Murabaha, Ijarah, Istisna'a and Salam etc. In this regard, the Islamic banks could establish loan units that could finance the needs of small businesses on Shariah-compliant basis. Sixthly, there is a dire need to magnify both the credit base and client base to promote FI in Pakistan. This can be achieved by reducing the information asymmetries prevalent in the market as these tend to reduce the expected benefits from the development of banking systems (Chauvet and Jacolin, 2017). Lastly, there stands a need to strengthen financial infrastructure and regulatory frameworks in the country to augment financial inclusion.

In context of the implications and results discussed above, it can be inferred that the study provides a starting point about financial inclusion status of Pakistan as reflected through the index of FI. Future research can be conducted on the determinants of FI in Pakistan and to evaluate the impact

of National Financial Inclusion Strategy that can support growth process of Pakistan economy.

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Appendices

Table A1: Descriptive Statistics of Three Dimensions of Financial Inclusion (2007-2016)

	D1				D2								D3	
	d11	d12	d13	d14	d21	d22	d23	d24	d25	d26	d27	d28	d31	d32
Mean	25.25	310.44	30.51	22.67	9.82	6.42	14.03	9.30	37.50	53.25	81.92	129.04	5.50	53.31
Median	25.25	309.34	28.55	11.93	9.00	5.98	13.82	9.20	38.00	52.50	57.27	86.61	5.50	53.66
Maximum	29.30	380.10	39.96	77.90	16.05	9.83	16.90	10.36	40.00	56.00	189.04	301.78	6.00	55.96
Minimum	21.75	233.25	26.13	2.00	5.50	4.00	11.79	8.57	34.00	51.00	16.01	24.64	5.00	50.04
Std. Dev.	2.60	51.27	4.83	27.33	3.82	2.13	1.84	0.66	2.14	2.38	72.48	117.22	0.53	2.36
Skewness	0.07	-0.09	1.06	1.24	0.46	0.43	0.29	0.39	-0.42	0.30	0.41	0.44	0.00	-0.38
Kurtosis	1.91	1.82	2.76	3.04	1.84	1.80	1.76	1.77	2.09	1.29	1.49	1.52	1.00	1.67
Jarque-Bera	0.40	0.47	1.53	2.04	0.73	0.73	0.63	0.70	0.51	1.10	0.98	0.99	1.33	0.78
Probability	0.82	0.79	0.47	0.36	0.69	0.69	0.73	0.70	0.77	0.58	0.61	0.61	0.51	0.68
Observations	8	8	8	8	8	8	8	8	8	8	8	8	8	8

Source: Authors' calculations

Table A2: Dimension Index of Three Dimensions of Financial Inclusion

Years	D1				D2								D3	
	d11	d12	d13	d14	d21	d22	d23	d24	d25	d26	d27	d28	d31	d32
2007	0.99	0.02	0.95	-0.03	0.00	0.00	0.00	0.00	1.00	1.00	-0.09	-0.09	0.00	0.50
2008	1.00	0.03	1.00	-0.03	0.08	0.10	0.12	0.16	0.86	0.33	-0.09	-0.09	0.50	0.72
2009	0.74	0.00	0.57	0.00	0.15	0.18	0.18	0.19	0.86	0.83	0.00	0.00	0.50	0.93
2010	0.56	0.17	0.38	0.01	0.21	0.23	0.24	0.21	0.86	0.83	0.01	0.00	0.50	0.88
2011	0.49	0.35	0.20	0.03	0.28	0.30	0.33	0.29	0.57	0.83	0.01	0.01	0.50	1.00
2012	0.41	0.46	0.13	0.11	0.36	0.38	0.44	0.40	0.57	0.00	0.07	0.06	0.50	0.50
2013	0.28	0.57	0.07	0.15	0.51	0.53	0.58	0.55	0.57	0.00	0.40	0.38	1.00	0.72
2014	0.22	0.74	0.05	0.23	0.65	0.67	0.70	0.67	0.43	0.00	0.67	0.66	1.00	0.00
2015	0.05	0.90	0.00	0.64	0.84	0.85	0.85	0.85	0.14	0.33	1.00	1.00	1.00	0.00
2016	0.00	1.00	0.04	1.00	1.00	1.00	1.00	1.00	0.00	0.17	0.87	0.90	1.00	0.39

Source: Authors' calculations.

Table A3: Descriptive Statistics of Key Input and Output Variables (2007-2016)

Variables	Mean	Standard deviation	Max	Min
2007				
Deposits	137,998,534	162521165.3	591,907,435	1879587
Admin expenses	4,080,435	5010387.306	18,297,279	165999
Advances	93,792,241	108971410.5	382,172,734	2118347
Investments	46,155,904	55064439	211,146,038	1318657
2008				
Deposits	151167482	179766920.6	624939016	1892018
Admin expenses	5221954.85	5843319.157	21348016	367798
Advances	111124508	130695603.2	456355507	2526322
Investments	39043187.8	45784223.24	170822491	2045146
2009				
Deposits	171154037	196902040.6	726464825	2203152
Admin expenses	5860863.88	6229720.761	22571470	451930
Advances	112896645	132270999.7	475243431	2500916
Investments	62167641.8	63644218.97	217642822	2822723
2010				
Deposits	197808125	223126845.6	832151888	2225822
Admin expenses	6626376.04	7071170.392	26202577	533679
Advances	119875165	133305770.4	477506564	2510780
Investments	77833922.6	83702158.09	301323804	2892131
2011				
Deposits	232863522	257671742.5	933631525	2647157
Admin expenses	8066601.92	8319288.915	30945203	561436
Advances	115962143	131616566.9	595630955	26243
Investments	85758449.2	90002518.24	319353392	1484124
2012				
Deposits	244583673	274665467.3	1214963700	3328001
Admin expenses	8973154.96	9239587.127	35921902	595700
Advances	132216086	157308389.7	734349374	56596
Investments	102934991	105543197.5	381245903	7263885
2013				
Deposits	303795617	354518045.1	1401229814	3713111
Admin expenses	9701553.38	10147607.62	37677868	605052
Advances	151424980	185146557.8	713042502	3894413
Investments	144312522	194522189.5	826062308	2653388
2014				
Deposits	350303093	384026715	1524644784	3342155
Admin expenses	11106713.2	11332383.08	41518462	634381
Advances	183578032	190919508	731980299	4692044
Investments	196972765	224890812.9	922691101	1379486
2015				
Deposits	396365297	430485112.2	1634944470	4768752
Admin expenses	12160274.6	12885481.01	48400384	682821
Advances	198844948	193206721.1	702561836	8585373
Investments	249378963	304596717	1244887008	48240
2016				
Deposits	477261692	484192783.5	1885959026	5228716
Admin expenses	13931647.2	13553803.29	54416640	740332
Advances	217126048	197108763	748466297	2771720
Investments	296706290	325161208.4	1344404771	4869535

Note: The values are thousands of rupees.