

## **Analyzing the Effects of Financial Development on Economic Growth: Empirical Evidence from Pakistan through PCA Approach**

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### **Abstract**

The study examines the relationship between financial sector development and economic growth of Pakistan for a period from 1981 to 2015. Using annual time series data, an econometric model is developed on the basis of theoretical framework in line with previous research. To capture various dimensions of financial development an index is constructed by PCA technique through utilizing relevant proxies of financial sector development. ARDL bound testing approach is applied to identify long run relationship and short run dynamics between financial development and economic growth. Other econometric tests conducted to test stability and reliability of the model. Findings of the econometric estimation reveal that a significant long run association exists among the variables while financial depth and rate of investment have positive significant effect on economic performance of the country. Results reflect the importance of financial sector development for economic growth of Pakistan and draw attention of policy makers for further strengthening the financial sector of Pakistan.

**Keywords:** Financial depth; Financial repression; Economic growth; Capital accumulation

Financial sector of an economy plays a pivotal role in all spheres of its economic activities ranging from providing lucrative options for savers, sharing in business activities through lending, to intermediating in all financial transactions at national and international level. But the effects of financial sector development on economic growth remained a debatable issue in economics literature for many decades. According to one view a well-organized and highly efficient financial sector causes enhancement of economic and business activities thus boosting economic growth [ see, for example ,Gelb (1989), King and Levine (1993b), Fry (1997), Khan and Senhadji (2000), Khan et al (2005), Jalil and Mete (2011)]. On the contrary it is documented in enormous studies that this is the economic growth and development of a nation which pushes its financial sector to improve and innovate its financial services. This argument is endorsed by Liang and Teng (2006), Ang and Mckibbin (2007), and Sethi and Kumar (2012). On this area of research there are studies indicating that a developed and aggressive financial sector causing a negative impact on economic activities [see, for example, Lucas (1988), Kemal et al (2007)]. Finally findings revealed a bi-directional causation among financial sector development and economic

growth, [see, Shan and Jianghong (2006), Obamuyi (2012), Onuoga (2014)].

In Pakistan, financial sector displayed a tremendous growth during last many decades having less than 1% share in GDP in early 1970s to 4% share in GDP in 2010.(State Bank of Pakistan) and grew at a rate of around 6% annually during last many years( Economic Survey of Pakistan 2014-15). It has undergone to comprehensive financial and banking reforms in late 1990s including liberalizing interest rate, converting credit ceiling to open market operation and strengthening the role of State Bank of Pakistan in banking and non-banking sector. Financial sector introduced a range of financial products in the field of short and long term financing, conventional and Islamic insurance schemes and saving schemes for business and consumer needs. But the effects of financial sector development on Pakistan economy has not been sufficiently studied. Very few studies are available in this research field using less span of time after financial reforms presenting inconclusive effects of financial reforms on economic and business activities of the country. This study is bridging this research gap by including a substantial time period after financial reforms as well as adding a dummy variable to differentiate financial non-reforms period to financial reforms period of the study. Secondly it uses a financial depth index of three highly relevant proxies of financial development by applying Principal Component Analysis. On the basis of this combined methodology it is justified to indicate that this study presents a significant contribution in the economic literature of this research area.

The financial sector of Pakistan has made enormous improvement in quality of its services and introduced a large number of new financial products in consumer and business financing including online services, ATM transaction facility, long banking hours and expanded branch network. Previous research in this field indicates inconclusive findings about the effects of financial sector development on economic growth. So, a comprehensive study to analyze the effects of financial sector development on Pakistan economic growth is required.

The paper proceeds as follows. After introduction, a review of literature is presented to describe briefly previous research work in same area in second section. The third section presents model specification, variable selection and econometric estimation procedure which are followed by fourth section presenting the estimation results with their interpretations. Last section consists of conclusion of the study and policy recommendations.

### **Literature Review**

Economic literature is highly rich to explain the relationship between financial development and economic performance of an economy. In this section conceptual issues related to financial

development and financial liberalization and development are discussed first followed by a summary of recent empirical studies in Table-1

### **Finance-Growth Nexus**

Economists present different perspectives on theoretical linkage to describe the role of financial development on economic activities of an economy.

**Financial Development Causes Economic Growth:** The services provided by the financial institutions promote advancement and innovation in business activities resulting growth in businesses which in turn cause economic growth. An established financial system channelizes capital resources to most productive uses enhancing economic activities. It is termed as supply leading hypothesis. This argument was endorsed by McKinnon (1973), Shaw (1973), Bencivinga et al (1996), Fry (1997), Pagano (1993), Levine (2004). McKinnon (1973) describes “Complementarity Hypothesis”, where business firms develop monetary assets through substantial savings which are converted into capital for business purposes. Money acts as a complimentary factor for capital (Khan and Hassan 1998). Another explanation is that a developed financial sector contributes efficient resource allocation which enhances output per worker leading to economic growth (Ahmed and Malik 2009).

**Economic Growth Causes Financial Sector Development:** Another view related to finance-growth nexus is that an expansion in financial sector may occur in response to boom in economic activities. According to this point of view boom in economic activities create demand for financial services, financial instruments and financial institutions which is termed as demand following hypothesis. The conclusion is that the growth in real sector of the economy pushes the growth in financial sector [see, for example, Jung (1986), Berthelemy and Varoudakis (1996), Ndlovu (2013) ]

### **Financial Liberalization and Repression**

Financial liberalization may be an outcome as improvement in financial sector takes place. Policies of liberalizing interest rate, avoiding credit control, promoting competition in financial sector are important constituents of financial development but its results in terms of economic growth and prosperity in long term perspectives are inconclusive on theoretical and empirical grounds. Mckinon-Shaw school of thought calls these policies, like ceiling of interest rate, direct allocation of credit and high reserve requirement, as financial repression which impede progress in financial sector affecting negatively on economic growth. Pagano (1993) and King & Levine (1993b) also termed these policies as financial repressive and do not act as stimulating factors for economic activities and growth.

**Financial Liberalization Negatively Affects Economic Growth:**

Empirical studies suggest that financial liberalization may cause instability and uncertainty in financial system and can result in financial crises. Financial liberalization enhances capital flows which are cyclical in nature consequently causing economic fluctuation (Stiglitz,2000).The financial liberalization hypothesis is based on some assumptions which are not met in practice and this explains the failure of financial liberalization programs launched in 1970s in many countries [see, Arestis et al (2001) and Arner (2007)]. Similarly Mankiw (1986) indicates that the policies of credit subsidy or lending to potential borrowers through government intervention can significantly improve the process of credit allocation. In remarkable economic growth of Korea through export oriented growth strategy , financial repression policies like policy loans at preferential interest rate and direct credit control were essential tools by the government to accelerate growth[ see Arestis & Demetriades (1997) and Demetriades & Luitel (2001)].The recent financial crises 2007-08 is mainly attributed to excessive credit expansion in housing mortgage and wide spread failure of financial regulations and supervision (Orhangazi,.,2014)

*Table 1. Diversified relationship between Financial Development and Economic growth, evidence from some selected studies*

| Authors                          | Variables   | Methodology                                   | Country               | Findings                                    |
|----------------------------------|---|---|-----------------------|---|
| Wang, Li, Abdou,& Ntim (2015)    | GDP, Labor & Capital growth, $M_2 / GDP$ , CPI, Export growth               | OLS multiple regression VIF                   | China 1978-2013       | FD <sup>1</sup> has no effect on GDP growth |
| Shahbaz, Rehman & Muzaffar(2014) | RGDPPC <sup>2</sup> , Capital , Labor, PSC/GDP                              | Bayer-Hanck cointegration , Granger causality | Banglade sh 1976-2012 | FD positively affect GDP                    |
| Okwo,Eze&Ugwunta (2012)          | RGDPPC, $M_2 /GDP$ , PSC/GDP <sup>3</sup> . Public expenditure, Trade ratio | OLS, Granger causality                        | Nigeria 1987-2010     | FD negatively affect GDP                    |
| Jalil & Feridun (2011)           | Real GDP, Proxies of FD, RIR, Trade ratio                                   | ARDL  | Pakistan 1975-2008    | FD positively affect GDP                    |
| Muhammad& Umer(2010)             | RGDP, $M_2 / GDP$ , Domestic Credit to GDP                                  | ARDL & Granger causality                      | Pakistan 1973-2008    | Economic growth causing FD                  |
| Taha,Colombage & Maslyuk         | GDP growth, Monthly stock   | Johansen Cointegratio                         | Malaysia 1980-        | Bi-directional                              |

|                                  |  |   |  |   |
|----------------------------------|--|---|--|---|
| (2009)                           | market index   | n<br>Test, VECM,<br>Granger<br>causality  | 2008   | l<br>causality                            |
| Shahbaz,Ahmed<br>&Ali (2008)     | RGNPPC ,Share<br>of Market<br>Capitalization to<br>GDP   | Johansen<br>Cointegratio<br>n<br>Test, ARDL   | Pakistan<br>1971-<br>2006                          | Bi-<br>directiona<br>l<br>causality.      |
| Ang & Mckibben<br>(2007)         | FD proxies,GDP<br>growth, RIR <sup>4</sup> ,<br>Financial<br>repression                                      | Johansen<br>Cointegratio<br>n Test,<br>VECM   | Malaysia<br>1960-<br>2001                          | GDP<br>growth<br>causing<br>FD            |
| Shan & Jianghong<br>(2006)       | Real GDP, Total<br>Credit to<br>economy, Labor<br>force, Net<br>investment,<br>Trade ratio                   | Impulse<br>response<br>function,<br>Variance<br>decompositio<br>n, Granger<br>causality | China<br>1978-<br>2001                             | FD<br>contribut<br>ed to<br>GDP<br>growth |
| Liang & Teng<br>(2006)           | RGDPPC, RIR,<br>Real physical<br>stock, Trade<br>ratio   | Johansen<br>Cointegratio<br>n<br>Test,<br>Granger<br>causality                          | China<br>1952-<br>2001                             | Economi<br>c growth<br>causing<br>FD      |
| Khan, Qayyum &<br>Shaikh(2005)   | RGDP,M <sub>2</sub> to<br>GDP, Share<br>Investment, Real<br>deposit rate,<br>PSC/GDP, Ratio<br>of investment | ARDL  | Pakistan<br>1971-<br>2004                          | FD<br>positively<br>affect<br>GDP         |
| Abu-bader & Abu-<br>Qarn(2005)   | RGDPPC,M <sub>2</sub> —<br>currency/GDP,<br>PSC/GDP, Share<br>of investment                                  | Johansen<br>Cointegratio<br>n test,<br>VECM,<br>Granger<br>causality                    | Egypt<br>1960-<br>2001                             | FD<br>causes<br>economic<br>growth        |
| Christopoulos<br>& Tsionas(2004) | Real output,<br>Total bank<br>deposit to GDP,<br>Share of<br>Investment, CPI                                 | Johansen<br>panel<br>cointegration<br>, FMOLS   | 10<br>Developi<br>ng<br>Countries<br>1970-<br>2000 | FD<br>causing<br>economic<br>growth       |
| Islam,Habib &<br>Khan(2004)      | RGDPPC,M <sub>2</sub> /G<br>DP, PSC/GDP,<br>Banking credit<br>/GDP,<br>Saving/GDP                            | Johansen<br>Cointegratio<br>n Test,<br>Granger<br>causality                             | Banglade<br>sh<br>1975-<br>2002                    | Economi<br>c Growth<br>causing<br>FD      |

|                      |   |  |                                   |  |
|----------------------|---|--|-----------------------------------|--|
| Al-Yousuf (2002)     | RGDPPC, Ratio of Currency to $M_1, M_2 / GDP$   | Johansen Cointegration Test, Granger causality | 30 Developing countries 1970-1999 | Bi-directional causality                 |
| King & Levine (1993) | RGDPPC, Liquid liabilities to GDP, Bank asset to total asset, Ratio of investment, Capital stock per capita | 3 Stage least square, Correlation              | 77 countries 1960-1989            | Strong link between FD & economic growth |

Note:

<sup>1</sup>FD= Financial Development, <sup>2</sup>RGDPPC=Real GDP Per Capita

<sup>3</sup>PSC/GDP= Private Sector Credit to GDP

<sup>4</sup>RIR= Real Interest Rate

As can be seen from Table-1, the results on relationship between financial sector development and economic performance in case of Pakistan are mixed including bi-directional causality or causality from either side. Secondly no study covers recent data so it is imperative to carry out a fresh study with a different methodology.

### Research Methodology

#### Model specification and Data selection

In line with standard literature, in this study financial depth is used as proxy of financial sector development. According to “Complementarity Hypothesis” of Mckinnon (1973) of money and capital a positive association exists among financial depth and output of an economy. Similarly financial intermediation improves investment which consequently raises output (Shaw 1973). The theoretical linkage develops in the way that a positive real interest rate enhances financial depth by accelerating savings that promotes capital accumulation which results in boosting economic growth. King and Levine (1993,1993a) found in their research that real interest rate causes the strengthening of financial depth in the economy which accelerates economic growth.

Based on above mentioned theory and following Christopoulos and Tsionas (2004), Khan et al (2005) and Jalil & Feridun (2011) empirical investigation related to relationship between financial sector development and output growth in Pakistan, in this study following equation is specified.

$$Y_t = \beta_0 + \beta_1 FDI_t + \beta_2 r_t + \beta_3 S_t + \beta_4 DM_{91} + \mu_t \text{ -----}$$

------(1)

Where Y indicates real GDP, FDI illustrates financial depth index, while r is the real interest rate, S is the share of investment, DM<sub>91</sub>

dummy variable,  $\mu$  is error term and  $t$  indicates a point of time.  $\beta_0$  indicates constant term while  $\beta_1$  to  $\beta_4$  are coefficients of respective variables measuring marginal impact on economic growth.

This study uses annual time series data for a period from 1981 to 2015. For real output(Y), real GDP is taken as GDP in local currency at constant factor cost (1999-00). Financial depth index (FDI) is constructed by Principal Component Analysis technique using three key proxies of financial development as no single proxy reflects all dimensions of financial development in a country. The first proxy is liquid liabilities to GDP ( denoted by LLG) which covers financial intermediation carried out by all significant financial institutions(Levine1993). Second proxy of financial development used in this study is private sector credit to GDP indicating allocation of financial resources for economic activities denoted by CRD. Third proxy is the ratio of commercial bank assets to the sum of commercial banks and central bank assets indicated by BANK(King and Levine 1993).Table-2 illustrates the calculation of PCA and coefficients of individual proxies. The first components having highest eigen value of 1.99 shows 66.62% of standardized variance so it is a better measure of financial development because it can explain the variations in dependent variable better than any other linear combination of these proxies. The individual contribution of the proxies is shown by factor scores and indicated by their coefficients, 0.417, 0.393 and 0.415 for LLG, CRD and Bank respectively. These are the basis of weighting in construction of Financial Depth Index (FDI).The data for the proxies taken from Handbook of Statistics on Pakistan’Economy 2015 published by State Bank of Pakistan.

Table 2. *Principal Component Analysis*

|                     | PC-1           | PC-2          | PC-3         |
|---------------------|----------------|---------------|--------------|
| Eigen Values        | 1.99           | 0.554         | 0.447        |
| % of Variance       | 66.62          | 18.47         | 14.91        |
| Cumulative Variance | 66.62          | 85.09         | 1.000        |
| Variable            | Factor Loading | Commonalities | Factor Score |
| LLG                 | 0.828          | 0.694         | 0.417        |
| CRD                 | 0.785          | 0.617         | 0.393        |
| Bank                | 0.833          | 0.688         | 0.415        |

Note: PCA computed by author through SPSS

In this study a dummy variable  $DM_{91}$  is introduced to specify non-financial reformed period to financial reformed period during whole period of study of 1981 to 2015, as discussed earlier. The value of  $DM_{91}$  From 1981 till 1990 is zero while from 1991 to 2015 value is one.

To capture the investment activity in the country ratio of gross fixed capital formation to nominal GDP is used as proxy of share of investment(S).Data for share of investment is collected from World Bank

(WDI-2015). Real interest rate (r) is calculated as average deposit rate minus rate of inflation. Data on average deposit rate and real GDP is derived from Hand Book of Statistics on Pakistan Economy from State Bank of Pakistan.

For consistent result all variables are converted into log linear form except real interest rate because the specification of variables in log linear estimate efficient results as compared to simple specification (Layson 1983).

### Econometric Application

To detect the relationship among above mentioned variables on long run level as well as short run adjustment this study uses Autoregressive Distributed Lag (ARDL) model that is also termed as bound testing approach (Pesaran et al 2001). This approach offers many econometric advantages over other techniques. Firstly ARDL procedure can be applied to time series data irrespective to their nature of integration which may be I(0) or I(1) or combination of both (Pesaran and Pesaran 1997). Secondly this techniques adopts appropriate number of lags required for estimation to hold the data generating process from general to specific model (Laurenceson and Chai 2003). Besides, all variables of the study are assumed to be endogenous as well as long run and short run parameters are estimated simultaneously (Khan et al 2005). Moreover through simple OLS technique, ARDL model can easily estimate error correction model (Banerjee et al 1993). The ECM indicates how fast long run equilibrium will restore after short run shock or disequilibrium in the system (Pesaran and Shin 1999) and finally small sample properties of ARDL estimation are better than Johansen and Juselius' cointegration technique (Pesaran and Shin 1999).

$$\begin{aligned} \Delta Y_t = & \beta_0 + \sum_{t=1}^p \beta_1 \Delta Y_{t-1} + \sum_{t=1}^p \beta_2 \Delta FDI_{t-1} + \sum_{t=1}^p \beta_3 \Delta r_{t-1} + \\ & \sum_{t=1}^p \beta_4 \Delta s_{t-1} + \theta_1 Y_{t-1} + \theta_2 FDI_{t-1} + \theta_3 r_{t-1} + \theta_4 s_{t-1} + \\ & \theta_5 (DM_{91})_{t-1} + \mu_t \end{aligned}$$

Eq------(2)

Where  $\beta_0$  is drift component  $Y_t$  represents real GDP while other explanatory variables are same and explained earlier,  $\mu_t$  is white noise error term.

The first step in ARDL technique is to find out the presence of long run association among the variables of equation (1) by means of the procedure of bound testing. The procedure is based on  $F$ -statistics or Wald test. The Null hypothesis implies that there is no cointegration among variables ( $H_0 = \theta_1 = \theta_2 = \theta_3 = 0$ ) while alternative hypothesis is they are not equal to zero. The calculated value of  $F$ -statistics is matched with two sets of critical values which were presented by Pesaran et al (2001). One set of value assumes the variables have an integrating order of I(0) while other set assumes they have an order of I(1). If calculated



value is above the presented upper value ,it means long run association or cointegration exists among variables. If calculated value lies below the lower critical value, the null hypothesis cannot be rejected indicating that no cointegration present among the variables and if calculated value is between the two critical values indicating an unclear result.

For optimal lag length of each variable, the ARDL technique estimates a large number of regression of all variables whose number is equal to  $(p+1)^k$  , where  $p$  is the maximum number of lags and  $k$  is the number of variables. To estimate present study *Eviews 9* is utilized which is the latest version and provides the option of automatic selection of lag for each variable in the given equation on the basis of Akaike’s Information Criteria (AIC).

Once a long run relationship is determined with the help of bound testing procedure, the second step in ARDL technique is to find out long and short run parameters of the explanatory variables as well as estimate error correction through ECM. The ECM result reflects the speed of adjustment to long run equilibrium after a short run disequilibrium which is estimated by following equation.

$$\Delta Y_t = \beta_0 + \sum_{t=1}^p \beta_1 \Delta Y_{t-1} + \sum_{t=1}^p \beta_2 \Delta FDI_{t-1} + \sum_{t=1}^p \beta_3 \Delta r_{t-1} + \sum_{t=1}^p \beta_4 \Delta S_{t-1} + \beta_5 (DM_{g1})_{t-1} + \alpha ECM_{t-1} + \mu_{t-1}$$

Eq-----(3)

The  $\alpha$  is the speed of adjustment parameter and *ECM* is the residuals calculated from the estimated cointegration model of equation (1). Finally to test the consistency and reliability of the model some diagnostic tests are applied to ensure the absence of serial correlation , normality and homoscedasticity in residuals and misspecification of model.

**Research Hypotheses**

1. Ho = Financial depth has no effect on economic growth
2. Ho= Investment has no effect on economic growth
3. Ho= Real interest rate has no effect on economic growth
4. Ho= Financial reforms have no effect on economic growth

**Data Analysis and Results**

At first degree of integration is tested because ARDL techniques is not applicable if any of the variable is I(2) because computed F-statistics from Pesaran et al (2001) are not valid if variables are integrated in order 2 [ Sezgin and Yildirin (2002); Ouattarn (2006)] . To do this standard ADF test was applied and results are presented in Table 3. The results indicate that none of the variable is integrated of order 2.

**Table 3. Results of ADF test**

| Variables | Level    |          | First Difference |          |
|-----------|----------|----------|------------------|----------|
|           | Constant | Constant | Constant         | Constant |

|         |        | &Trend |           | &Trend    |
|---------|--------|--------|-----------|-----------|
| $Y_t$   | -2.045 | -3.273 | -4.267*** | -4.391**  |
| $FDI_t$ | -2.193 | -2.236 | -4.961*** | -5.215**  |
| $S_t$   | -1.355 | -2.324 | -4.968*** | -5.029*** |
| $r_t$   | -2.673 | -2.842 | -6.448*** | -6.121*** |

Notes: 1.\*, \*\*,\*\*\* indicate level of significance at 10% , 5% and 1% respectively meaning that Null Hypothesis of Non-stationarity is rejected. 2. Selection of lag on the basis of AIC and SBC

Then long run association among variables examined by application of ARDL bound testing procedure. Equation (2) was estimated through OLS procedure and results are presented in table2.The calculated F-statistics, 8.93, is higher than upper critical values at 1% levels of significance indicating a strong long run relationship among variables under study. To test bi-directional relationship between financial depth and real GDP as described in many studies, [see Demetriades and Hussein (1996);Al-Yousuf (2002)] or financial development is the result of economic development (Ang 2008), cointegration test was applied by keeping financial depth index as dependent variable (Ang 2008). No cointegration was found as presented in Table 4 suggesting that in long run financial depth index is among the explanatory variables causing economic growth.

**Table 4. Results of ARDL Bound Testing**

| Dependent Variable        | F-Statistics     |              |                |                       |
|---------------------------|------------------|--------------|----------------|-----------------------|
|                           | Calculated value | Higher value | Critical value | Level of significance |
| Real GDP(Y)               | 9.8303           | 4.66         |                | 1 %                   |
| Financialdepth index(FDI) | 3.4081           | 4.66         |                | 1%                    |

Note: 1. Critical values were presented by Pesaran et al (2001). 2. Calculated value of Real GDP(Y) is higher than critical value which is significant at 1% level thus rejecting Null Hypothesis that no long run relationship exists. 3. Calculated value of Financial Depth Index (FDI) is lower so result is inconclusive

Next step is the selection of lag order for estimation of equation (3) by using formula  $(p+1)^k$  where  $p$  is maximum number of lag selected and  $k$  represents number of variables. In order to minimize the loss of degrees of freedom , maximum lags taken as 4 that comes to  $(2+1)^5$  number of regressions and on the basis of lowest AIC value lag order which is selected for ARDL estimation is ( 2, 1,1,2,2) .

After appropriate lag selection equation (2) is estimated to determine the long run effects of financial depth index, real deposit rate and share of investment on real GDP through ARDL cointegration

procedure with lag order(2,1,1,2,2). The results are presented in Table 5. The results suggest that financial depth index and investment are important factors to boost economic growth of Pakistan in long run, as both variables have expected positive sign and significant at 5 % level. It supports the hypothesis that improvement in financial system leads to facilitate financial intermediation, mobilize savings, diversification of resources utilization thus boosting investment and contributing economic growth [McKinnon(1973);Greenwood & Jovanovic (1990); Jbili, Enders & Treichel (1997)]. But on the contrary to Shaw(1973) real deposit rate in the study indicates a insignificant negative relation to GDP of Pakistan. In fact in total span of 35 years of present study real deposit rate remained negative for 19 years most probably due to high rate of inflation. It means strong negative income effect might be dominating positive substitution effect. The positive sign of  $DM_{91}$  at 1% level of significance shows financial reforms affected positively on economy.

The estimated model also passes through various diagnostic tests to check serial correlation, functional form for model specification as well as residuals normality and homoscedasticity against the Null Hypothesis that model has no serial correlation, functionally fit, and residuals are normally distributed . The test results are presented in panel B of Table 5.

**Table 5. Results of ARDL estimates**

| Dependent Variable ; Real GDP( $Y_t$ ) |              |                 |                 |              |
|--|--------------|-----------------|-----------------|--------------|
|  | Panel        | A-----Long      | Run             | Results      |
| Null hypothesis                        |              |                 |                 |              |
| Regressors                             | Coefficients | <i>t</i> -value | <i>p</i> -value |              |
| $FDI_t$                                | 1.4818       | 2.137           | 0.048           | Rejected     |
| $S_t$                                  | 0.197        | 2.99            | 0.012           | Rejected     |
| $r_t$                                  | -0.104       | -1.227          | 0.000           | Not Rejected |
| $DM_{91}$                              | 0.542        | 2.33            | 0.015           | Rejected     |
| C                                      | 24.177       | 19.174          | 0.000           | Rejected     |
|  | Panel B      | -----Diagnostic |                 | Test         |
| Statistics                             |              |                 |                 |              |
|  |              | Test Statistics | <i>p</i> -value |              |
| $X^2_{sc}(1)$                          |              | 0.7035          | 0.511           | Not Rejected |
| $X^2_{ff}(1)$                          |              | 0.6550          | 0.522           | Not rejected |
| $X^2_{No}(2)$                          |              | 0.9987          | 0.607           | Not rejected |
| $X^2_{Het}(1)$                         |              | 0.9713          | 0.517           | Not rejected |

Note: 1. ARDL of order (2, 1, 1,2, 2) is selected on the basis of lowest value of AIC. 2. Diagnostic test  $\chi^2_{sc(1)}, \chi^2_{ff(1)}, \chi^2_{nor(1)}, \chi^2_{het(1)}$  represent test statistics for serial correlation LM test, functional form for model specification, normality of residuals and heterkedasticity respectively.

Next step is to estimate short run effects of financial depth index, investment , real interest rate and  $DM_{91}$  on GDP. Table 6 shows short run dynamics of estimated ARDL model represented in equation (3).The estimated error correction term ( $EC_{t-1}$ ), -0.058 ,is negative and highly significant. This result confirms the existence of long run relationship among variables given in equation (1). It further indicates that a shock in previous year slowly adjust back by around 6 % towards equilibrium in current year. In short run financial depth index has positive significant impact on Pakistan economy and these results are consistent with previous studies of Pakistan and the world [King and Levine(1993);Khan and Senhadgi(2000);Khan et al (2005) and Jalil and Feridun (2011)], but contrary to Mohammad and Umar(2010) whose study revealed that economic growth of Pakistan caused financial development. Similarly rate of investment and financial reforms ( $DM_{91}$ ) reflect a positive relation to economic growth. Consistent with long run effect, real deposit rate indicates negative but insignificant effect in short run on Pakistan economic development. The null hypothesis of the study that financial depth, financial reforms and investment have no effect on economic growth are rejected while the null hypothesis for real interest rate has not been rejected it has been negative most of the time period of study.

The value of  $R^2$  and adjusted  $R^2$  demonstrate that model is adequately fit and value of Dubon-Watson statistics shows the absence of autocorrelation.

Table 6. *Short Run Effects & Error Correction Estimates of ARDL Model*

| Dependent Variable: $\Delta Y_t$  |              |               |         |
|-----------------------------------|--------------|---------------|---------|
| Regressors                        | Coefficients | t-value       | p-value |
| $\Delta Y_{t-1}$                  | -0.109       | -0.757        | 0.462   |
| $\Delta FDI_t$                    | 0.059        | 1.761         | 0.083   |
| $\Delta S_t$                      | 0.097        | 2.901         | 0.012   |
| $\Delta DM_{91}$                  | 0.128        | 2.676         | 0.016   |
| $\Delta r_t$                      | -0.004       | -1.566        | 0.079   |
| $\Delta r_{t-1}$                  | 0.004        | 0.424         | 0.004   |
| Constant                          | 2.132        | 4.953         | 0.001   |
| $EC_{t-1}$                        | -0.058       | -5.523        | 0.001   |
| Diagnosis for Model Specification |              |               |         |
| $R^2$                             | 0.896        | Ad $R^2$      | 0.821   |
| RSS                               | 0.001        | D. W. stat    | 2.51    |
| F-Stat                            | 24.325       | Prob (F-Stat) | 0.000   |

Note: 1.ARD L Model selected (2, 1, 1,2, 2 ) on the basis of lowest value of AIC. 2. RSS & D. W. stat indicates residuals sum of square and

Durbin-Watson Statistics. 3. Null hypothesis that all regressors have zero effect on  $\Delta Y_t$  is rejected at p-value 0.000 in F-stat.

Finally to check the stability of coefficients the cumulative sum(CUSUM) and cumulative sum of square(CUSUMSQ) were used, suggested by Brown et al (1975).If statistics of both plots remain within the critical bounds of 5 % level of significance it means all coefficients of given regression are stable. Fig (1) and (2) given below show estimated CUSUM and CUSUMSQ) plots which remain in critical bounds which confirm that all coefficients in ARDL error correction model are stable.

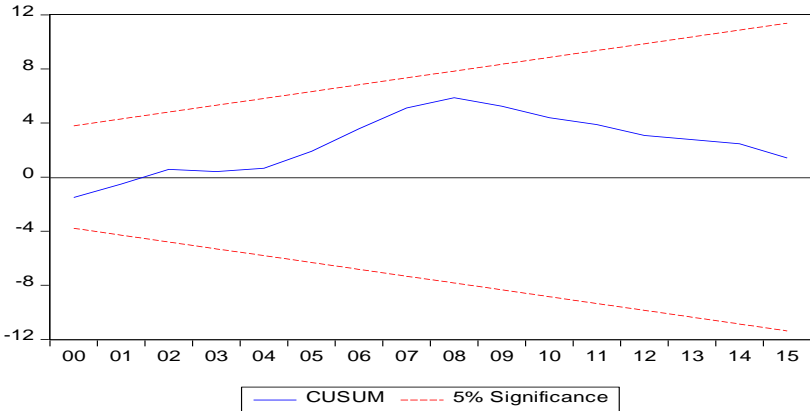


Figure 1. Plot of cumulative sum of recursive residuals

The straight line represents critical bounds at 5 % level of significance which means null hypothesis that model is stable is accepted

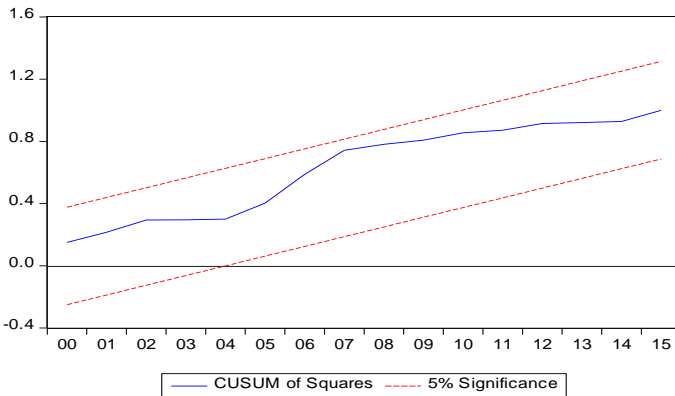


Figure 2. Plot of cumulative sum of square of recursive residuals.

Straight line shows critical bounds at 5 % level of significance means null hypothesis that model is stable is accepted. The findings of econometric applications reveal that selected model of the study is very stable and consistent with previous studies in similar research area and indicated that financial sector development is indispensable for the progress and development of Pakistan. The important indicator of

financial development is financial depth for which the study uses  $M_2$  to the ration of current GDP minus currency in circulation to capture real financial depth. The results of the study indicates that financial depth as well as rate of investment have strong positive impact of economic activities of Pakistan.

### **Conclusion and Discussion**

The paper has examined the relationship between financial sector development and economic performance in terms of Pakistan's economic growth for a period from 1981 to 2015 with the application of ARDL technique. To carry out this study real GDP used for economic growth and to capture financial sector development, financial depth, real deposit rate and rate of investment used as explanatory variables. For financial depth an index is constructed by PCA technique. Model was specified in the line with previous research work with conformity of the economic theory. Econometric tests were carried out to check model specification and fitness for the reliability of the results. The study reveals that financial sector has strong positive and significant effect on macroeconomic improvement of Pakistan. As financial sector develops, it ensures the provision of liquidity for investment needs and it facilitates the allocation of resources to real productive sector. The results of the study indicates, financial depth and rate of investment have positive relation in long and short run with Pakistan's economic growth. So it may be concluded that financial sector enhances economic growth. The results are consistent with previous studies in this area of research[ King and Levine(1993); Khan and Senhadji(2000);Khan et al (2005);Jalil and Feridun(2011)]. On the other hand real deposit rate shows negative relation with real GDP and the reason, as mentioned earlier, most of the time of study it remained negative probably due to high rate of inflation.

### **Implications**

The study develops implications for authorities and policy makers to develop a conducive environment in the country through concrete steps to further strengthen existing financial system which can facilitate financial intermediation and introduce better financial products for consumers and businesses. As largest part of financial sector in Pakistan consists of commercial banks and a fraction of population enjoys the services of commercial banks. Reasons may be complicated procedures, low literacy rate, difficulty to access bank branches and religious barriers. Reason are almost similar for other financial sub sectors. State Bank is the monitory authority to focus on them and to take measures for population of Pakistan to get closer to financial sector. Moreover a large variety of online financial services are available but for common use their cost should be minimized. That will be beneficial for both user and financial institutions leading to boosting economic activities. In Pakistan around 60% of population in rural areas involved

in cultivation, cattle farming, dairy farming and small businesses. Most of them are away from financial institutions. Easy access to financial institutions, increasing awareness to financial services, simple procedure, cooperative behavior of staff, lowering the cost of services, building the trust in rural population, reducing religious barriers, and customized services are some of the requirements for financial institutions to penetrate in rural areas.

### **Limitations and Future Research Directions**

Analyzing the effects of financial sector development on Pakistan economy needs a very comprehensive research which is not the scope of this paper. For financial depth this study uses three proxies but more proxies may be added. Study needs a review of financial sector of Pakistan which is not included in this study due to space and time limitations. For future research in this area the study recommends data for a longer span of time, addition of more variables in financial and real sector, comparison between stock market and banking sector on Pakistan economy, application of other econometric procedures, and analysis of financial sector on various sectors of economy is to be carried out.

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