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# **Multivariate–Based Granger Causality between Financial Deepening and Poverty: The Case of Pakistan**

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**Abstract:** This paper deals with the empirical investigation of causal relationship between financial deepening, economic growth and poverty reduction using quarter frequency data in case of Pakistan over the period of 1972-2011. We applied the ARDL bounds testing approach by incorporating structural breaks stemming in the series. The order of integration of the variables is examined by applying structural break unit root test. Our empirical exercise indicated that long run relationship between financial deepening, economic growth and poverty reduction exists in case of Pakistan. The causality analysis implied that causality results are sensitive with the use of proxy for poverty reduction as well as methodology to be applied.

**Keywords:** Financial deepening, economic growth, poverty

**JEL Classification:** G21, O1, 132

## **Introduction**

Financial development plays its vital role by stimulating economic activities in an economy. Sound financial system generates funds through savings mobilization as well as distributes funds in productive ventures, monitors the risk management, adds in economic growth by stimulating accumulation of capital, motivating technological advancements as well as increasing efficient investment activities (Luintel and Khan, 1999; Kirkpatrick, 2000). This implies that financial development Granger causes economic growth i.e. supply-side hypothesis. Economic growth contributes to financial development by raising the demand for financial services. This shows that causality is running from economic growth to financial development is called demand-side effect. But, Demetriades and Hussein, (1996); Apergis et al. (2007) reported that relationship between financial development and economic growth may be bidirectional following feedback effect between both variables. If financial development and economic growth Granger cause each other then this does not mean that poverty reduction (income inequality) is affected by financial development (Beck et al., 2007; Shahbaz and Islam, 2011). The developmental efforts in low income countries are restricted to increase economic growth and to improve income distribution and hence to decline poverty. This implies that economic growth either declines income inequality and poverty or income inequality and poverty is increased with an increase in economic growth. Similarly, financial development deteriorates income inequality if and only elite class of population has access to financial resources then financial sector would not seem to help the poor. The income distribution is improved if poor segment of population (poor entrepreneurs) has easy access to financial resources (Shahbaz, 2009b; Shahbaz and Islam, 2011).

There are numerous studies investigating the impact of financial development on income inequality as well as on poverty reduction besides the close relationship between financial development and economic growth. Financial deepening means financial development. So, financial development allocates the credit efficiently, reduces risk by diversifying investment in financial intermediaries, lowers transactional costs of financial intermediaries through symmetric information. In resulting, financial development promotes economic growth and thus income distribution is improved. This infers that financial development eradicates the credit constraints on the poor segment of population to increase their productivity and efficiency of their productive assets which in return, reduces poverty (Inoue and Hamori, 2012).

In South Asian region, Pakistan is a country where income inequality and poverty were high during the decades of 1980s and early 1990s due to low economic growth. The proper implementation of sound macroeconomic policies by a stable government had not only raised economic growth trends but also improved income distribution and reduced poverty in the late 1990s. Pakistan was recorded the second highest economic growth rate in South Asian in 2005 (GoP, 2006)<sup>1</sup>. The poverty rate was 23.90% (36.50%) in 2005 (2004). Afterwards, inflationary wave has hit Pakistan's economy which not only has exacerbated income inequality but also increased poverty. This has not only reduced the income share of poor segments of population but also increased income inequality as well as poverty in the country. The growth theory implies that poverty declines if income shares of poor individuals would increase with economic growth. Contrarily, income share of bottom 20% population reduced due to hike in consumer prices (inflationary pressure) which led poverty to rise.

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<sup>1</sup> Pakistan was also declared Asian Tiger by Shoukat Aziz

Our focus is to analyze the relationship between financial deepening and poverty reduction by incorporating economic growth. The reason is that Shahbaz and Islam, (2011) examined the impact of financial development and financial instability on income inequality in case of Pakistan. Their results illustrate that financial development reduces income inequality and financial instability increases it. Now, we use two proxies of poverty i.e. headcount ratio and private household consumption expenditures per capita to examine the causal impact of financial deepening on them by using economic growth as control variable. Our results indicate that financial development Granger causes poverty reduction and economic growth but neutral effect exists between economic growth and poverty reduction. This paper contributes to existing literature by five folds: (i) a comprehensive measure of financial deepening is used; (ii) quarter frequency data is utilized over the period of 1972-2011 avoiding the issue of low number of observations; (iii) structural break unit root tests have been applied to test the order of integration of the variables; (iv) the ARDL bounds testing approach to cointegration is applied for long run relationship between the variables by accommodating structural breaks stemming in the variables; (v) the VECM Granger causality and innovative accounting approaches have been used to test the direction of causal relationship between financial deepening, economic growth and poverty reduction.

The balance of study is organized as following: section-II reviews the relevant studies; estimation strategy and data collection are detailed in section-III. Section-IV reports results and their discussions and, conclusion and future directions are explored in section-V.

## II. Review of Literature

There are numerous studies available in existing literature investigating the impact of financial deepening on poverty reduction such as; Jalilian and Kirkpatrick, (2002, 2005); Kirkpatrick, (2005); Beck et al. (2007); Jeanneney and Kpodar, (2008) used cross-section data of large sample countries. For instance, Honohan, (2004) used the data of 70 developing economies to examine the relationship between financial development (proxies domestic credit to private sector as share of GDP) and poverty reduction. The findings showed that financial development reduces poverty by increasing the level of income of bottom 20% population while keeping the impact of inflation constant. Similarly, Jalilian and Kirkpatrick, (2005) investigated the contribution of financial development in poverty reduction using the data of developed and developing economies including Pakistan<sup>2</sup>. Their empirical evidence indicated that financial development reduces poverty through growth-enhancing-effect and income inequality narrowing-effect in developing countries<sup>3</sup> as well as inverted-U shaped relationship exists between financial development and income inequality. For Ethiopian economy, Geda et al. (2006) investigated the relationship between financial development and poverty using time series data over the period of 1994-2000. They reported that financial development smoothens private consumption and reduces poverty but rural households could not smoothen their consumption due to liquidity constrains from the financial sector in Ethiopia. Apart from that, Beck et al. (2007) probed the relationship between financial development and income of poor segments of

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<sup>2</sup>The sample countries are Australia, Austria, Belgium, Bolivia, Brazil, Central African Republic, Canada, Chile, Colombia, Costa Rica, Germany, Denmark, Dominican Republic, Algeria, Ecuador, Spain, Finland, France, United Kingdom, Ghana, Gambia, Greece, Guatemala, Honduras, Indonesia, India, Ireland, Iran, Israel, Italy, Jamaica, Japan, Kenya, Republic of Korea, Sri Lanka, Lesotho, Mexico, Mauritius, Malawi, Malaysia, Niger, Netherlands, Norway, Nepal, New Zealand, Pakistan, Panama, Peru, Philippines, Portugal, Paraguay, Rwanda, Sudan, Senegal, Sierra Leone, El Salvador, Sweden, Thailand, Trinidad and Tobago, United States, Venezuela, South Africa and Zimbabwe.

<sup>3</sup> Shahbaz and Islam, (2011) proved that income inequality narrowing hypothesis works in Pakistan

population using data of developed and developing economies<sup>4</sup>. They reported that financial development declines income inequality by raising the income of bottom 20% population disproportionately and hence reduces poverty. Moreover, Jeanneney and Kpodar, (2008) investigated the impact of financial development and financial instability on poverty reduction using data of 75 developing economies. They applied Generalized Method of Moments (GMM) system to examine said relationship. They found that financial development and economic growth reduces poverty by raising the income of poor individuals but financial instability nullifies this impact i.e. financial instability has positive impact on income inequality and hence increases poverty.

Quartey, (2008) applied trivariate causality to assess the relationship between financial development, savings and reduction in poverty using the data of Ghanaian economy. The empirical of that study revealed that poverty reduction is Granger caused by financial development and neutral effect is found between domestic savings and poverty reduction and same inference is between financial development and domestic savings. In case of South Africa, Odhiambo, (2009) applied trivariate causality approach to examine the link between financial development, economic growth and poverty reduction over the period of 1960-2006. The empirical exercise reveals the existence of cointegration between the variables. The causality analysis indicates that poverty reduction is Granger caused both by financial development and

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<sup>4</sup> Australia, Burundi, Burkina Faso, Bangladesh, Bulgaria, Bahamas, The Bolivia, Brazil, Botswana, Canada, Chile, Cote d'Ivoire, Cameroon, Colombia, Costa Rica, Germany, Denmark, Dominican Republic, Algeria, Ecuador, Egypt, Arab Rep. Spain, Ethiopia, Finland, France, United Kingdom, Ghana, Gambia, Greece, Guatemala, Guyana, Hong Kong, China, Honduras, Croatia, Hungary, Indonesia, India, Jamaica, Japan, Kenya, Korea, Rep. Lao PDR, Sri Lanka, Lesotho, Morocco, Madagascar, Mexico, Mali, Mongolia, Mauritania, Malaysia, Niger, Nigeria, Nicaragua, Netherlands, Norway, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Paraguay, Romania, Senegal, Singapore, Sierra Leone, El Salvador, Slovenia, Sweden, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uganda, Uruguay, United States, Venezuela, Vietnam, South Africa, Zambia.

economic growth and, unidirectional causality is found running from economic growth to financial development confirming demand-side hypothesis in South Africa.

In case of Kenya, Odhiambo, (2010a) collected the data to investigate the relationship between financial development and poverty reduction. The empirical exercise indicated that the variables are cointegrated for long run relationship. The causality analysis showed that financial development Granger causes domestic savings and hence poverty reduction. Further, feedback effect exists between domestic savings and poverty reduction. Odhiambo, (2010b) investigated inter-temporal causality between financial development and poverty using the data of Zambian economy over the period of 1969-2006. The domestic credit to private sector as share of GDP, M2 as share of GDP and ratio between commercial bank assets and sum of commercial assets plus central bank assets have been used as proxy for financial development. Private household consumption per capita and head count ratio are indicators of poverty. The results showed cointegration between the variables for long run relationship. The causality analysis reported that financial development is Granger caused by poverty reduction once M2 as share of GDP is used an indicator of financial development while unidirectional causality running from financial development (proxies by domestic credit to private sector as share of GDP) to poverty reduction. This implies that causality results matter with the measure of financial development. Pradhan, (2010) also conducted same exercise in case of India and concluded that cointegration is found between which confirms the long run relationship. The Granger causality test opines that poverty reduction Granger causes economic growth and vice versa. Financial development Granger causes poverty reduction but financial development is Granger caused by economic growth.



For Turkish economy, Kar et al. (2011) followed Odhiambo, (2009) to detect the direction of causal relationship between financial development, economic growth and poverty reduction applying the VECM Granger causality approach. Their empirical evidence noted that supply-side hypothesis is confirmed between financial development and economic growth, poverty reduction is Granger caused by economic growth and unidirectional but weak causality is found running from financial development to poverty in short span of time. Using Chinese data, Ho and Odhiambo, (2011) explored the relationship between financial development and poverty reduction over the period of 1978-2008. They reported that in long run, poverty reduction Granger causes financial development and feedback effect exists between financial development and poverty reduction in short run. Perez-Moreno, (2011) analyzed the causal relationship between financial development and poverty reduction using the data of 35 developing economies<sup>5</sup>. He found unidirectional causality running from financial development to poverty reduction but not other way round.

In case of Bangladesh, Uddin et al. (2012) probed the relationship between financial development and poverty reduction using data over the period of 1976-2010 by applying the ARDL bounds testing approach to cointegration and the VECM Granger causality for long run and causality relationships respectively. Their results reported cointegration between the variables and feedback effect between financial development and poverty reduction. In case of African countries, Fowowe and Abidoye, (2012) investigated the impact of financial development, inflation and trade openness on poverty reduction. Their results indicated that

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<sup>5</sup>Barbados, Burkina Faso, Burundi, Colombia, Costa Rica, Cote d'Ivoire, Dominican Republic, Ecuador, El Salvador, Caribbean Gabon, Gambia, Ghana, Guatemala, Honduras, India, Jamaica, Kenya, Madagascar, Malaysia, Mexico, Nepal, Niger, Nigeria, Pakistan, Panama, Paraguay, Philippines, Rwanda, Senegal, Sierra Leone, South Africa, Sri Lanka, Thailand, Trinidad and Tobago and Venezuela.

financial development does not seem to reduce poverty but poverty is reduced by trade openness and low inflation.

In case of Pakistan, Shahbaz, (2009b) probed the impact of financial development and financial instability on poverty reduction by applying the autoregressive distributed lag model (ARDL) for long run relationship between the variables by controlling economic growth, inflation, agricultural growth, manufacturing and trade openness. The results indicated that all the variables are cointegrated for long run relationship over the period of 1973-2005. Furthermore, results found that financial development is negatively related with poverty while financial instability increases poverty. Agriculture growth, manufacturing and trade openness seem to reduce poverty and inflation raises it. Ellahi, (2011) investigated the relationship between financial development and poverty reduction by incorporating economic growth as potential variable affecting both financial development and poverty in case of Pakistan. The ARDL bounds testing cointegration approach and the VECM Granger causality approaches were used to examine long run and causality relationships between the variables. The results indicated that cointegration is found between financial development, economic growth and poverty reduction. Financial development, investment and poverty reduction Granger cause economic growth confirmed by the VECM Granger causality approach. Khan et al. (2012) reinvestigated the impact of financial development on poverty reduction by using several indicators of financial development such as broad money supply ( $M_2$ ), domestic credit to the private sector and domestic money bank assets etc. They applied the ARDL bounds testing approach to cointegration for long run relationship between the variables and error correction method (ECM) is used to examine short run dynamics impact of financial development on poverty. Their results

are sensitive with use of methodology and proxy of financial development but overall results found that financial development reduces poverty.

The empirical evidence of above studies may be biased due to ignoring the structural break stemming in the macroeconomic series of an economy. This generates more ambiguity in articulating a comprehensive economic and financial policy to reduce poverty due to having little knowledge about economic happenings in case of Pakistan. We find that above studies used weak proxies such narrow money supply ( $M_1$ ), broad money supply ( $M_2$ ), domestic money bank assets and domestic credit to private sector which cannot capture the phenomenon of financial development. To over this issue, we have used structural break unit root test accommodating an unknown structural break stemming in the series and new financial deepening index. This study is a humble request to fill gap in existing literature for said issue in case of Pakistan.

### **III. Estimation Strategy and Data Collection**

The basic objective of present study is to investigate the causality between financial depending, economic growth and poverty reduction in case of Pakistan using quarter frequency data over the period of 1972Q1-2011Q4. In doing so, we have applied series of unit root tests. The long run relationship between the variable is investigated by applying the ARDL bounds testing to cointegration in the presence of structural breaks. The direction of causality is tested by using the VECM Granger causality approach. These tests are detailed one by one.

Historically, in order to test stationarity properties of the variables unit root tests like ADF by Dickey and Fuller (1979), P-P by Philips and Perron (1988), KPSS by Kwiatkowski et al. (1992),

DF-GLS by Elliott et al. (1996) and Ng-Perron by Ng-Perron (2001) have been used extensively. However, due to lack of information on structural breaks stemming in the series, these tests produce unreliable results. To remove this anomaly Zivot Andrews, (1992) suggested another model that allows to accommodate single structural break point in the variables at level form, in slope of trend component, and in intercept and trend function. Using Zivot-Andrews, (1992) model the structural break in the series can be tested as:

$$\Delta x_t = a + ax_{t-1} + bt + cDU_t + \sum_{j=1}^k d_j \Delta x_{t-j} + \mu_t \quad (1)$$

$$\Delta x_t = b + bx_{t-1} + ct + bDT_t + \sum_{j=1}^k d_j \Delta x_{t-j} + \mu_t \quad (2)$$

$$\Delta x_t = c + cx_{t-1} + ct + dDU_t + dDT_t + \sum_{j=1}^k d_j \Delta x_{t-j} + \mu_t \quad (3)$$

Where  $DU_t$  denotes dummy variable and gives the mean shift incurred at each point while  $DT_t$ <sup>6</sup> denotes trend shift variable.

$$DU_t = \begin{cases} 1 & \dots \text{if } t > TB \\ 0 & \dots \text{if } t < TB \end{cases} \quad \text{and} \quad DT_t = \begin{cases} t - TB & \dots \text{if } t > TB \\ 0 & \dots \text{if } t < TB \end{cases}$$

The null hypothesis of unit root break date is  $c = 0$  which indicates that series is not stationary with a drift not having information about structural break stemming in the series while  $c < 0$

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<sup>6</sup>We used model-4 for empirical estimations following Sen (2003)

hypothesis implies that the variable is found to be trend-stationary with one unknown time break. Zivot-Andrews unit root test fixes all points as potential for possible time break and does estimation through regression for all possible structural breaks successively. Then, this unit root test selects that time break which decreases one-sided t-statistic to test  $\hat{c}(=c-1)=1$ . Zivot-Andrews intimate that in the presence of end points, asymptotic distribution of the statistics is diverged to infinity point. It is necessary to choose a region where end points of sample period are excluded. Further, Zivot-Andrews suggested the trimming regions i.e.  $(0.15T, 0.85T)$  are followed.

Since traditional approaches to cointegration have certain demerits, we have used the structural break autoregressive distributed lag model or the ARDL bounds testing approach to cointegration in the presence of structural break stemming in the series. The ARDL bounds testing approach to cointegration has certain merits like it is flexible regarding integrating order of the variables whether variables are found to be stationary at  $I(1)$  or  $I(0)$  or  $I(1) / I(0)$ . In addition, Monte Carlo investigation confirms that this approach is better suited for small sample size (Pesaran and Shin, 1999). Moreover, a dynamic unrestricted error correction model (UECM) can be derived from the ARDL bounds testing through a simple linear transformation. The UECM integrates the short run dynamics with the long run equilibrium without losing any information for long run. The empirical formulation of the ARDL bounds testing approach to cointegration is given below:

$$\begin{aligned}\Delta \ln P_t = & \alpha_1 + \alpha_T T + \alpha_{DUM} DUM + \alpha_P \ln P_{t-1} + \alpha_F \ln F_{t-1} + \alpha_Y \ln Y_{t-1} + \sum_{i=1}^p \alpha_i \Delta \ln P_{t-i} \\ & + \sum_{j=0}^q \alpha_j \Delta \ln F_{t-j} + \sum_{k=0}^r \alpha_k \Delta \ln Y_{t-k} + \mu_t\end{aligned}\quad (4)$$

$$\begin{aligned}\Delta \ln F_t = & \alpha_1 + \alpha_T T + \alpha_{DUM} DUM + \alpha_P \ln P_{t-1} + \alpha_F \ln F_{t-1} + \alpha_Y \ln Y_{t-1} + \sum_{i=1}^p \beta_i \Delta \ln F_{t-i} \\ & + \sum_{j=0}^q \beta_j \Delta \ln P_{t-j} + \sum_{k=0}^r \beta_k \Delta \ln Y_{t-k} + \mu_t\end{aligned}\quad (5)$$

$$\begin{aligned}\Delta \ln Y_t = & \alpha_1 + \alpha_T T + \alpha_{DUM} DUM + \alpha_P \ln P_{t-1} + \alpha_F \ln F_{t-1} + \alpha_Y \ln Y_{t-1} + \sum_{i=1}^p \beta_i \Delta \ln Y_{t-i} \\ & + \sum_{j=0}^q \beta_j \Delta \ln P_{t-j} + \sum_{k=0}^r \beta_k \Delta \ln F_{t-k} + \mu_t\end{aligned}\quad (6)$$

Where,  $\ln P_t$ ,  $\ln F_t$  and  $\ln Y_t$  indicates natural log of poverty (we have used two indicators of poverty reduction. Head-count ratio is denoted by  $P_t$  and private household consumption per capita by  $PC_t$ ), natural log of financial depending index and real income per capita.  $\Delta$  is for difference operator,  $\mu_s$  denotes residual terms, and  $DUM$  denotes dummy variable to capture the structural breaks arising in the series<sup>7</sup>. F-statistics are computed to compare with upper and lower critical bounds generated by Pesaran et al. (2001) to test for existence of cointegration. The null hypothesis to examine the existence of long run relationship between the variables is  $H_0 : \alpha_P = \alpha_F = \alpha_Y = 0$  against alternate hypothesis ( $H_a : \alpha_P \neq \alpha_F \neq \alpha_Y \neq 0$ ) of cointegration for

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<sup>7</sup> The structural breaks are based on Zivot-Andrews (1992)

equation-4. Using Pesaran et al. (2001) critical bounds, if computed F-statistic is more than upper critical bound (UCB) there is cointegration between the variables. If computed F-statistic does not exceed lower critical bound (LCB) the variables are not cointegrated for long run relationship. If computed F-statistic falls between lower and upper critical bounds then decision regarding cointegration between the variables is uncertain. However, since our sample size is large (160 observations) and critical bounds generated by Pesaran et al. (2001) may be suitable. Therefore, we use lower and upper critical bounds developed by Pesaran et al. (2001) rather than Narayan (2005). Once long run relationship is confirmed between the variables then next step is examine the direction of causality as below:

$$(1-L) \begin{bmatrix} \ln P_t \\ \ln F_t \\ \ln Y_t \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix} + \sum_{i=1}^p (1-L) \begin{bmatrix} b_{11i} & b_{12i} & b_{13i} \\ b_{21i} & b_{22i} & b_{23i} \\ b_{31i} & b_{32i} & b_{33i} \end{bmatrix} \times \begin{bmatrix} \ln P_{t-1} \\ \ln F_{t-1} \\ \ln Y_{t-1} \end{bmatrix} + \begin{bmatrix} \alpha \\ \beta \\ \delta \end{bmatrix} ECT_{t-1} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix} \quad (7)$$

Where  $(1-L)$  denotes the difference operator and  $ECT_{t-1}$  denotes the lagged residual term generated from long run relationship,  $\varepsilon_{1t}, \varepsilon_{2t}$  and  $\varepsilon_{3t}$  are error terms assumed to be normally distributed with mean zero and finite covariance matrix. The long run causality is indicated by the significance of t-statistic connecting to the coefficient of error correction term ( $ECT_{t-1}$ ) and statistical significance of F-statistic in first differences of the variables shows the evidence of short run causality between variables of interest. Additionally, joint long-and-short runs causal relationship can be estimated by joint significance of both  $ECT_{t-1}$  and the estimate of lagged independent variables. For instance,  $b_{12,i} \neq 0 \forall_i$  shows that financial development Granger-causes

poverty reduction and causality is running from poverty reduction to financial development indicated by  $b_{21,i} \neq 0 \forall_i$ . The same hypothesis can be drawn for other variables.

### **III. Data Collection and Financial Deepening Index Construction**

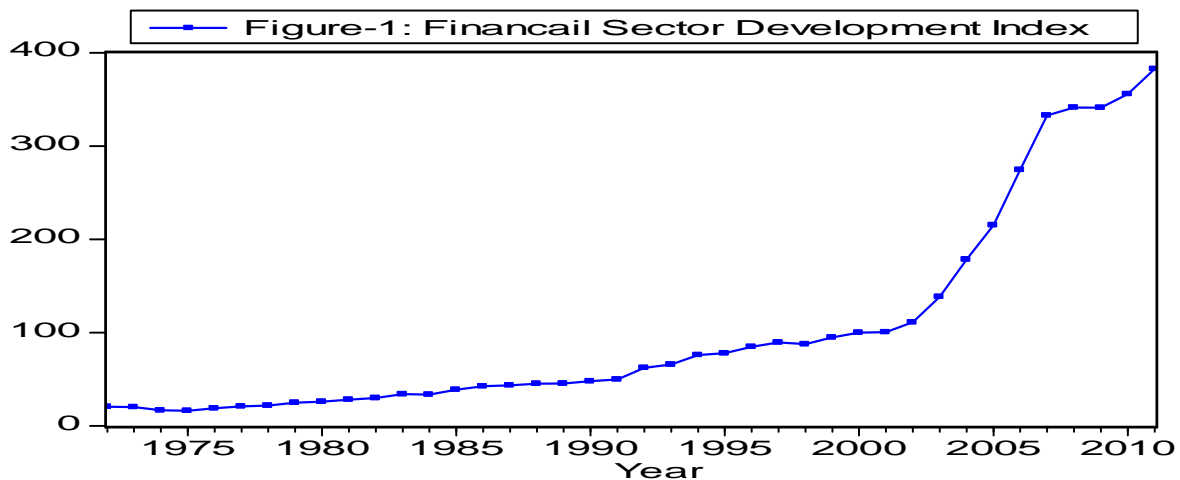
We have used data on poverty proxies by head-count ratio borrowing from Jamal, (2005) and real private household consumption expenditures. The data on private household consumption expenditures has been collected from Pakistan Economic Survey (various issues). The data on real GDP,  $M_1$  (narrow money supply),  $M_2$  (broad money supply), stock market capitalization of listed companies and domestic credit to private sector has also collected from Pakistan Economic Survey (various issues). We have converted all the series into per capita dividing on population. Further, we have converted all series in logarithm following Shahbaz, (2010, 2012). The present study covers the period of 1972-2011 using quarter frequency data.

Existing growth literature provides numerous studies investigating the relationship between financial development and economic growth using cross-section and time series data. Researchers have used many proxies to capture the impact of financial development on economic growth. This implies that appropriate proxy for financial sector development is still a problem. The measurement of financial sector development is not an easy task itself and hence its impact on economic growth. This intends to generate an index of financial development covering the several aspects of government regulations and financial sector reforms (see Bandiera et al. 2000) but measuring the aspect of government policy again is not an easy task as we think (Kelly and Mavrotas, 2003). Inclusion of all policy variables separately may be cause of spurious results or multi-collinearity (Khan and Qayyum, 2007). This leads us to generate an



appropriate financial sector development index (financial deepening) to avoid biasedness of empirical analysis. We have used the principal component method (PCM) to generate the index of financial deepening in case of Pakistan.

Various researchers have used financial development index using numerous indicators of financial development. For instance, in case of Malaysia, Ang and Mckibbin, (2007) used domestic credit to private sector, liquid liabilities and commercial bank assets to commercial and central banks. All the indicators have been used as percentage of gross domestic product. Khan and Qayyum, (2007) generated an index of financial deepening by using total bank deposits liabilities as share of GDP, clearing house amount as share of GDP, domestic credit to private sector as share of GDP and stock market capitalization as share of GDP. Jalil and Feridun, (2011) did same exercise in case of Pakistan by dropping stock market capitalization variable and generated an index of financial deepening. Hye, (2011) generated an index of financial development for India by adding financial innovations to capture the impact of research & development activities in financial sector.



The indicators which we choose four indicators to generate an index of financial deepening have already been used as an indicator of financial development in finance-growth literature. For example,  $MC_t$  is the real stock market capitalization (of listed companies) per capita (Rahamn and Salahuddin, 2010);  $M2_t$  indicates the broad money supply per capita (Tahir, 2008);  $M1_t$  shows the real narrow money supply per capita (Hye, 2011) and  $DC_t$  illustrates the real domestic credit to private sector per capita (Khan and Qayyum, 2007; Shahbaz, 2009a; Jalil and Feridun, 2011; Hye, 2011; Shahbaz, 2012). We have preferred to use all the series into per capita 'rather than ratio or as share of GDP' to normalize the data (See, Shahbaz, 20102).

**Table-1: Principle Component Analysis**

	PAC 1	PAC 2	PAC 3	PAC 4
Eigenvalue	3.6323	0.2964	0.0639	0.0072
Variance Prop.	0.9080	0.0741	0.0159	0.001
Cumulative Prop.	0.9080	0.9821	0.998	1
Eigenvectors:				
Variable	Vector 1	Vector 2	Vector 3	Vector 4
$MC_t$	-0.512	-0.103	0.8228	-0.222
$M2_t$	-0.512	-0.291	-0.522	-0.6155
$M1_t$	-0.511	-0.387	-0.1643	0.7491
$DC_t$	-0.4619	0.8689	-0.1505	0.1010
Note: $MC_t$ is the real stock market capitalization (of listed				

companies) per capita,  $M2_t$  indicates real broad money supply per capita,  $M1_t$  shows the real narrow money supply per capita and  $DC_t$  illustrates the real domestic credit to private sector per capita

We used PCM showing the relative importance of each series. The PCM indicates that 1<sup>st</sup> principal component explains 90.80 per cent, 2<sup>nd</sup> shows 7.41 per cent, 3<sup>rd</sup> indicates 1.59 per cent and 4<sup>th</sup> accounts 0.1 per cent of standard variance. It can be seen that 1<sup>st</sup> principal component is better than other indicators of financial development because high level of variance is explained by 1<sup>st</sup> principal component. So, we utilize the values of 1<sup>st</sup> eigenvector as a weight to construct an index of financial deepening which is indicated by  $F_t$ . The figure-1 shows the behaviors of financial deepening index in Pakistan. It shows that Pakistan took imitative after 1990s seriously to develop financial sector and financial deepening index has moderate rising trend after 2000s.

#### **IV. Results and their Discussions**

The primary step is to investigate the order integration of the variables. This is a prerequisite to apply the ARDL bound testing approach to cointegration to examine the long run between the series. The main assumption of the bounds testing is that the variables should have unique order of integration I(1) or I(0) or I(1)/I(0). If any variable is integrated at I(2) then application of the ARDL bounds testing to compute F-statistic becomes questionable. In doing so, we have applied the ADF (Dickey and Fuller, 1981) and PP (Philips and Perron, 1988) unit root tests with intercept and deterministic trend to test the stationarity properties of the all the variables. The empirical evidence reported in Table-2 show that poverty reduction (head count ratio, private

household consumption per capita), financial deepening and economic growth are found to be non-stationary at level. The variables are stationary at 1<sup>st</sup> difference. This entails that variables are integrated at I(1). The results of these unit root test may be biased because these test do not seem to have information about structural breaks stemming in the series. Without capturing the information about structural breaks, perhaps results would not be helpful to policy makers to organize a comprehensive economic and financial policy to reduce poverty in the country. This issue is solved by applying Zivot-Andrews (1998) unit root test which accommodates information about single unknown structural break point in the series. The results are reported in Table-3. Our empirical exercise indicated that the variables have unit root problem at level but financial deepening, poverty and economic growth are stationary at 1<sup>st</sup> difference. This shows that variables have unique order of integration that leads us to apply the ARDL bounds testing approach to cointegration for long relationship between the variables. These structural breaks in series of financial deepening index, poverty (private household consumption per capita) and economic growth may deal with the adoption of PRCF (prudential regulation for consumer finance) to enhance conveniences for consumer, implementation of structural adjustment program (implementation of safety nets such as cash transferee to smoothen consumption and invest in human capital) and invasion of Soviet union in Afghanistan ‘which directly affect the economy Pakistan’ respectively.

**Table-2: Unit Root Analysis**

Variable	ADF Unit Root Test			PP Unit Root Test		
	T-statistic	Prob. value	Decision	T-statistic	Prob. value	Decision
$\ln F_t$	-2.2012 (4)	0.4851	Non-stationery	-2.2161 (6)	0.4770	Non-stationery

$\ln P_t$	-1.5991 (4)	0.7891	Non-stationery	1,2134 (3)	0.9084	Non-stationery
$\ln PC_t$	-2.6518 (13)	0.2584	Non-stationery	-2.8861 (9)	0.1698	Non-stationery
$\ln Y_t$	-2.9350 (10)	0.1547	Non-stationery	-1.7791 (3)	0.7704	Non-stationery
$\Delta \ln F_t$	-6.1000 (3)*	0.0000	Stationery	-5.6342 (9)*	0.0000	Stationery
$\Delta \ln P_t$	-4.5881 (4)*	0.0024	Stationery	-7.2807 (3)*	0.0000	Stationery
$\Delta \ln PC_t$	-3.8282 (12)**	0.0177	Stationery	-6.4087 (6)*	0.0000	Stationery
$\Delta \ln Y_t$	-5.3118 (5)*	0.0001	Stationery	-6.2125 (9)*	0.0000	Stationery
Note: * and ** represent significant at 1% and 5% levels respectively. Lag order is shown in parenthesis.						

**Table-3: Zivot-Andrews Structural Break Trended Unit Root Test**

Variable	At Level			At 1 <sup>st</sup> Difference		
	T-statistic	Time Break	Decision	T-statistic	Time Break	Decision
$\ln F_t$	-4.096 (2)	2003Q <sub>4</sub>	Non-stationery	-7.237 (3)*	2002Q <sub>2</sub>	Stationery
$\ln P_t$	-4.795 (2)	1988Q <sub>2</sub>	Non-stationery	-7.935 (3)*	2003Q <sub>3</sub>	Stationery
$\ln PC_t$	-2.488 (1)	1980Q <sub>1</sub>	Non-stationery	-13.960 (3)*	2004Q <sub>2</sub>	Stationery
$\ln Y_t$	-3.802 (1)	1979Q <sub>2</sub>	Non-stationery	-8.415 (2)*	1992Q <sub>2</sub>	Stationery
Note: * represents significant at 1% level of significance. Lag order is shown in parenthesis.						

**Table-4: Lag Order Selection**

VAR Lag Order Selection Criteria						
Lag	LogL	LR	FPE	AIC	SC	HQ

0	338.7108	NA	1.44e-07	-4.404	-4.324	-4.371
1	1710.918	2654.138	2.56e-15	-22.248	-21.851	-22.087
2	1839.987	242.854	5.78e-16	-23.736	-23.020*	-23.445
3	1846.906	12.653	6.52e-16	-23.617	-22.582	-23.196
4	1850.726	6.7859	7.67e-16	-23.456	-22.104	-22.907
5	1930.997	138.362	3.30e-16	-24.302	-22.631	-23.623
6	1995.619	107.987*	1.75e-16*	-24.942*	-22.952	-24.134*
7	1998.797	5.1426	2.09e-16	-24.773	-22.465	-23.836
8	2003.503	7.369	2.44e-16	-24.625	-21.999	-23.558

\* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Before proceeding to the ARDL bounds testing, it is prerequisite to choose appropriate lag order of the variables to compute F-statistic by using unrestricted vector autoregressive model. The reason is that F-statistic varies with choose and use of lag length. This implies that results may be biased just due to inappropriate choose of lag order. That's why; exact information about lag order of the variable would be helpful in obtaining reliable and consistent F-statistic. We use the AIC (Akaike Information Criterion). This approach provides better results as compared other lag length criterion. Lütkepohl, (2006) noted that dynamic relationship among the variables can be

apprehended by the selection of lag length. Our results reported in Table-4 reveal that we cannot take lag length more than 6 in our large data sample following AIC.

The results of the ARDL bounds testing approach to cointegration are noted in Table-5. We have not used critical bounds generated by Narayan, (2005) because these bounds are suitable for small sample. We have large data sample and critical bounds provided by Pesaran et al. (2001) are much suited to take decision whether cointegration exists or not. Our analysis reported three cointegration vectors once we used head-count ratio as an indicator of poverty because our calculated F-statistics are greater than upper critical bounds at 5%, 1% and 5% respectively.

**Table-5: The Results of ARDL Cointegration Test**

Bounds Testing to Cointegration				Diagnostic tests		
Estimated Models	Optimal lag length	F-statistics	Structural break	$\chi^2_{NORMAL}$	$\chi^2_{ARCH}$	$\chi^2_{RESET}$
$F_p(P/F, Y)$	6, 6, 5	4.494**	1988Q <sub>2</sub>	0.5577	[1]: 0.4203	[1]: 0.4087
$F_F(F/P, Y)$	6, 5, 6	5.780*	2003Q <sub>4</sub>	1.4751	[3]: 1.2422	[1]: 0.7506
$F_Y(Y/P, F)$	6, 5, 5	4.074**	1979Q <sub>2</sub>	1.0940	[1]: 0.0392	[1]: 2.4309
$F_{PC}(PC/F, Y)$	6, 6, 5	5.149*	1980Q <sub>1</sub>	1.7501	[2]: 0.6892	[1]: 0.0014
$F_F(F/PC, Y)$	6, 6, 6	2.417	2003Q <sub>4</sub>	1.6171	[2]: 0.0879	[4]: 1.2341
$F_Y(Y/PC, F)$	6, 6, 6	6.708*	1979Q <sub>2</sub>	0.3783	[3]: 0.3257	[1]: 1.1170
Significant level	Critical values (T= 160)					
	Lower bounds $I(0)$	Upper bounds $I(1)$				
1 per cent level	3.60	4.90				

5 per cent level	2.87	4.00				
10 per cent level	2.53	3.59				

Note: The asterisks \* and \*\* denote the significant at 1, 5 and 10 per cent levels, respectively. The optimal lag length is determined by AIC. [ ] is the order of diagnostic tests. Lower and upper critical bounds are borrowed from Pesaran et al. (2001).

After utilizing private household consumption per capita as an indicator of poverty, we found two cointegrating vectors, once we treated poverty (private household consumption per capita) and economic growth as predicted variables. The upper critical bound is less than our calculated F-statistic at 1% level of significance. This shows that there is long run relationship between financial deepening, poverty and economic growth over the study period of 1972Q1-2011Q4 in case of Pakistan.

The next step is to investigate the causal relationship between financial deepening, poverty and economic growth in Pakistan. The order of integration of all the variables is unique which leads us to apply the VECM Granger causality approach to detect direction of causal relationship between financial deepening, economic growth and poverty reduction. It is pointed by Granger, (1969) that once the variables are cointegrated for long run relationship with same level of stationarity then the VECM Granger causality is most appropriate. The results are reported in Table-6 and we have used head count ratio as proxy of poverty. In long run, feedback effect is found between financial deepening and poverty reduction. The bidirectional causal relation exists between economic growth and poverty reduction. Financial deepening and economic growth



Granger cause each other. This shows that financial deepening, economic growth and poverty reduction are complementary for each other.

The bidirectional causality is found between financial deepening and poverty reduction in short run. Economic growth Granger causes poverty reduction but not from other side. Financial deepening and poverty reduction seem to lead to each other. The significance of joint long-and-short runs also corroborates our long run and short run analysis.

The results are quiet different once we used private household consumption per capita. Our empirical analysis indicates that financial deepening Granger causes poverty reduction in long run. Economic growth and poverty reduction is Granger caused by each other. There is unidirectional causality running from financial deepening to economic growth confirming the validation of supply-side hypothesis for long run.

**Table-6: The VECM Granger Causality Analysis**

Dependent Variable	Direction of Causality						
	Short Run			Long Run	Joint Long-and-Short Run Causality		
	Head-count ratio is measure of poverty						
	$\Delta \ln P_{t-1}$	$\Delta \ln F_{t-1}$	$\Delta \ln Y_{t-1}$	$ECT_{t-1}$	$\Delta \ln P_{t-1}, ECT_{t-1}$	$\Delta \ln F_{t-1}, ECT_{t-1}$	$\Delta \ln Y_{t-1}, ECT_{t-1}$
$\Delta \ln P_t$	....	3.2976** [0.0396]	2.5861*** [0.0786]	- 0.0266*** [-1.8349]	....	2.9311** [0.0355]	2.4651*** [0.0645]
$\Delta \ln F_t$	3.4662**	....	9.7485*	-0.0157**	3.7357**	....	7.8720*

	[0.0335]		[0.0000]	[-2.2806]	[0.0126]		[0.0001]
$\Delta \ln Y_t$	1.0494 [0.3527]	10.8023* [0.0000]	....	- 0.0134*** [-1.9323]	2.0567*** [0.1086]	7.5269* [0.0001]	....
Private consumption per capita is measure of poverty							
	$\Delta \ln PC_{t-1}$	$\Delta \ln F_{t-1}$	$\Delta \ln Y_{t-1}$	$ECT_{t-1}$	$\Delta \ln PC_{t-1}, ECT_{t-1}$	$\Delta \ln F_{t-1}, ECT_{t-1}$	$\Delta \ln Y_{t-1}, ECT_{t-1}$
$\Delta \ln PC_t$	....	0.3295 [0.7197]	2.3426*** [0.0996]	-0.0777* [-4.3248]	....	6.5176* [0.0004]	7.5464* [0.0001]
$\Delta \ln F_t$	0.4708 [0.6254]	....	8.7616* [0.0003]	....	....	....	....
$\Delta \ln Y_t$	2.0548 [0.1813]	9.1470* [0.0002]	....	- 0.0101*** [-1.6815]	2.0793*** [0.1055]	6.9235* [0.0002]	....

Note: \*, \*\* and \*\*\* show significance at 1, 5 and 10 per cent levels respectively.

The results are quiet different when we used private consumption per capita as proxy for poverty. The causality results indicate that bidirectional causality exists between economic growth and private consumption per capita (poverty) in long run. Moreover, financial deepening Granger causes private consumption per capita (poverty) reduction. Economic growth is Granger caused by financial deepening implying the validation of Supply-side effect in long span of time. In short run, feedback effect is found between financial deepening and economic growth. Private consumption per capita (poverty) is Granger caused by economic growth. The joint causality results also corroborated our long run and short run causality findings.

Our analysis indicated that results are sensitive with the use of measure of poverty. This would create problem for policy makers that what measure should be used to articulate a comprehensive economic as well as financial policy to combat with poverty. The VECM Granger causality detects direction of causal relationship between the variables within the selected time period. It does not say anything ahead the sample period. Policy makers would need forecasts to articulate a comprehensive economic policy to reduce poverty in the country. To overcome this issue, we have applied the Innovative Accounting Approach (IAA) to examine direction of causal relationship between financial deepening, economic growth and poverty reduction. This approach is more suitable to forecast the behavior and to show the relative strength of variables. The IAA is a combination of variance decomposition method (VDM) impulse response function (IRF). Numerous researchers have applied the VDM and IRF to determine the causality between the variables rather than the Granger causality approach due to its demerits (mentioned above). The results of IAA would be helpful to policy makers in designing comprehensive economic and financial policy to reduce poverty and sustain economic growth for long run because it shows the relative strength of causality results ahead the sample period (Shan, 2005; Shahbaz, 2012). This approach also provides the magnitude of the feedback from one variable to other variable. The VDM helps in determining the response of the dependent actor due to shocks occurring in independent actors. The IRF is mirror of VDM.

The results of VDM are reported in Table-7 once we used head-count ratio as an indicator of poverty. The results suggest that the contribution of financial development is 22.44% and economic growth explains poverty reduction by 9.05%. A 68.50% portion of poverty is

explained by own innovative shocks (or other factors could not be captured in the model). Poverty reduction and economic growth explain financial development by 3.38% and 7.78% respectively. The shocks stemming in financial development contributes in financial development by 88.82%. The contribution of poverty reduction and financial development is 5.12% and 36.86% to economic growth while rest is contributed by the innovative shocks stemming in economic growth i.e. 58%.

**Table-7: Variance Decomposition Approach: Head-count ratio as poverty indicator**

Horizon	Variance Decomposition of $\ln P_t$			Variance Decomposition of $\ln F_t$			Variance Decomposition of $\ln Y_t$		
	$\ln P_t$	$\ln F_t$	$\ln Y_t$	$\ln P_t$	$\ln F_t$	$\ln Y_t$	$\ln P_t$	$\ln F_t$	$\ln Y_t$
1	100.0000	0.0000	0.0000	4.4053	95.5946	0.0000	0.1132	15.7233	84.1634
2	99.6883	0.1233	0.1882	2.3141	97.6832	0.0025	0.5586	18.1336	81.3077
3	99.1252	0.3556	0.5190	1.2999	98.6984	0.0015	1.0882	20.4899	78.4218
4	98.3877	0.6924	0.9197	0.7590	99.2278	0.0130	1.6713	22.7983	75.5303
5	96.2998	1.6152	2.0849	0.5209	99.2487	0.2303	2.1378	24.2665	73.5955
6	93.4183	3.0109	3.5707	0.4168	99.0182	0.5649	2.5838	25.7607	71.6554
7	89.6669	5.0272	5.3058	0.3893	98.5797	1.0309	3.0149	27.1303	69.8547
8	85.1646	7.6694	7.1658	0.3855	97.9571	1.6573	3.3915	28.2900	68.3184
9	81.9379	9.9473	8.1146	0.3594	97.6328	2.0076	3.9047	29.7261	66.3691
10	79.4623	11.9607	8.5769	0.3169	97.3044	2.3786	4.3722	30.9991	64.6285
11	77.9690	13.4339	8.5969	0.2923	96.9899	2.7177	4.7799	32.1814	63.0386
12	77.4053	14.3014	8.2932	0.3244	96.6745	3.0009	5.1370	33.3007	61.5622
13	76.5110	15.3010	8.1879	0.4465	96.0348	3.5185	5.2647	34.0705	60.6646

14	75.6230	16.2331	8.1437	0.6422	95.3021	4.0555	5.3278	34.7495	59.9226
15	74.4594	17.3003	8.2402	0.9082	94.4142	4.6775	5.3229	35.2858	59.3912
16	72.9089	18.5863	8.5047	1.2395	93.3544	5.4059	5.2579	35.6780	59.0640
17	71.5827	19.7150	8.7023	1.6301	92.3617	6.0081	5.2439	36.0845	58.6714
18	70.2882	20.8175	8.8942	2.1126	91.2440	6.6433	5.2028	36.3890	58.4081
19	69.2318	21.7494	9.0187	2.6940	90.0631	7.2428	5.1615	36.6451	58.1933
20	68.5074	22.4416	9.0508	3.3873	88.8229	7.7897	5.1272	36.8673	58.00539

**Table-8: Variance Decomposition Approach: Private consumption per capita as poverty indicator**

Horizon	Variance Decomposition of $\ln PC_t$			Variance Decomposition of $\ln F_t$			Variance Decomposition of $\ln Y_t$		
	$\ln PC_t$	$\ln F_t$	$\ln Y_t$	$\ln PC_t$	$\ln F_t$	$\ln Y_t$	$\ln PC_t$	$\ln F_t$	$\ln Y_t$
1	100.0000	0.0000	0.0000	3.2857	96.7143	0.0000	2.4207	19.5786	78.0005
2	99.5789	0.3957	0.0253	1.8190	98.1046	0.0763	2.9092	21.0054	76.0853
3	98.8043	1.0834	0.1122	1.1329	98.7019	0.1650	3.4536	22.5898	73.9564
4	97.6006	2.1261	0.2732	0.7217	99.0257	0.2524	4.0204	24.2518	71.7276
5	96.4300	2.9307	0.6392	0.5991	99.1985	0.2023	5.0286	25.2313	69.7399

6	94.8376	4.0827	1.0795	0.4876	99.3500	0.1622	5.8342	26.5035	67.6621
7	92.7400	5.7672	1.4927	0.3884	99.4747	0.1368	6.5683	27.8026	65.6290
8	90.1789	8.0065	1.8144	0.3270	99.5525	0.1204	7.2693	29.0223	63.7083
9	86.3006	11.8351	1.8642	0.3911	99.4186	0.1901	7.7263	30.6271	61.6464
10	81.5500	16.6320	1.8179	0.5536	99.1403	0.3060	8.2424	32.0704	59.6871
11	76.1325	22.1448	1.7225	0.7908	98.7513	0.4578	8.7694	33.4365	57.7940
12	70.3556	28.0397	1.6045	1.0686	98.2942	0.6371	9.3073	34.7287	55.9639
13	65.2958	33.1586	1.5455	1.2384	98.0678	0.6937	9.9687	35.6548	54.3763
14	60.7312	37.7693	1.4994	1.3829	97.8918	0.7251	10.6030	36.5092	52.8876
15	56.8126	41.7193	1.4680	1.4817	97.7886	0.7295	11.2269	37.2381	51.5348
16	53.5453	45.0067	1.4478	1.5372	97.7505	0.7121	11.8172	37.8597	50.3229
17	50.6240	47.9946	1.3813	1.6070	97.6636	0.7293	12.3115	38.5508	49.1375
18	48.0915	50.5915	1.3169	1.6471	97.6103	0.7425	12.7504	39.1878	48.0617
19	45.8348	52.9123	1.2527	1.6773	97.5603	0.7622	13.1137	39.8350	47.0511
20	43.7779	55.0314	1.1906	1.7029	97.5052	0.7917	13.4073	40.5029	46.0896

The Table-8 shows the results of VDM once we used private household consumption per capita as an indicator of poverty reduction. The results indicate that a 43.77% portion of private household consumption is explained by its innovative shocks. Financial deepening contributes to poverty reduction by 55.03% and economic growth explains poverty reduction minimally i.e. 1.19%. The contribution of poverty reduction and economic growth is 1.70% and 0.79% respectively. A 97.50% share of financial deepening is explained by its own shocks stemming in financial deepening. Poverty reduction and financial deepening seem to contribute by 13.40% and 40.50% respectively in economic growth. This shows that a 46.08 portion of economic growth is explained by its own shocks.

Overall results indicate that financial deepening Granger causes poverty reduction. These findings are consistent with Shahbaz (2009a) and, Shahbaz and Islam, (2011) who reported that financial development improves the income levels of bottom segment of population by raising their share from economic growth by equalizing income distribution. The unidirectional causality is found running from financial deepening to economic growth implying supply-side hypothesis. This indicates that financial deepening plays vital role in promoting economic growth in Pakistan by stimulating capital formation and investment-enhancing effect. This supports the view reported by Shahbaz, (2009b) that financial development has positive impact on economic growth. There is a neutral hypothesis exists between economic growth and poverty reduction. This implies that economic growth does not seem to contribute to poverty reduction and no response from poverty reduction to economic growth. This is due to high income inequality in the country. The study conducted by Shahbaz and Islam, (2011) reveal that a positive correlation between economic growth and income inequality is high compared to negative correlation



between financial development and income inequality. This leads to conclude that positive impact of financial development on poverty reduction is nullified by uneven income distribution supported by economic growth. Furthermore, Shahbaz, (2010) reported that linear term of GDP per capita has positive impact on income inequality and U-shaped relationship between economic growth and income inequality is in fact a S-shaped curve. So first turning point of S-shaped curve indicates the relationship between economic growth and income inequality once economy moves from agriculture to manufacturing (ATM). On contrary, second turning points reported the relationship between economic growth and income inequality once economy moves from manufacturing to services sector (MTS) (Shahbaz, 2010, p. 626)<sup>8</sup>. The unidirectional causality is found running from financial deepening to economic growth confirming the supply-side hypothesis in Pakistan.

The results of IRF are shown in Figure-2 and 3. Figure-2 deals with poverty (head-count ratio) and poverty (private household consumption per capita) are indicated in Figure-3. Figure-2 reveals that the response of poverty is positive initially and becomes negative after 5<sup>th</sup> time horizon due one standard deviation shock stemming financial deepening. Economic growth also contributes to reduce poverty but it is insignificant. Poverty reduction does not seem to contribute in financial deepening i.e. response in financial deepening is positive till 5<sup>th</sup> time horizon and become negative after that. The response in financial deepening is showing rising trend due to standard shock occurring in economic growth. High poverty has negative impact on economic growth as response of economic growth is negative due to innovative shock in poverty. This implies that high poverty rate in the country reflects low savings rate which is linked with less investment. This leads to low domestic production and hence economic growth

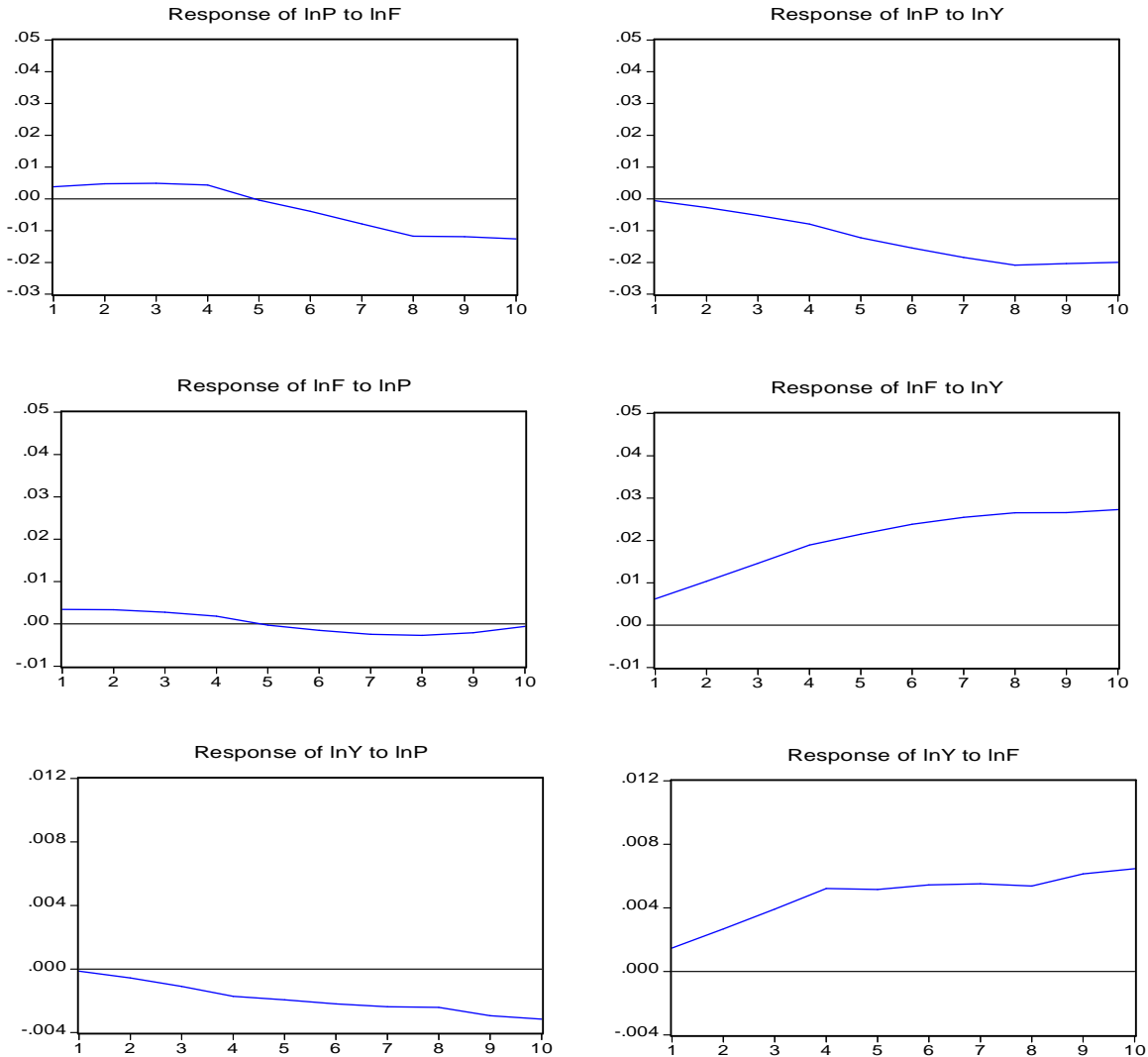
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<sup>8</sup> For more details see (Shahbaz, 2010)

is deteriorated. One standard shock in financial deepening contributes to economic growth. This effect is higher compared impact of economic growth on financial deepening confirming the supply-side effect between financial deepening and economic growth.

**Figure-2: Impulse Response Function**

Response to Generalized One S.D. Innovations



**Figure-3: Impulse Response Function**

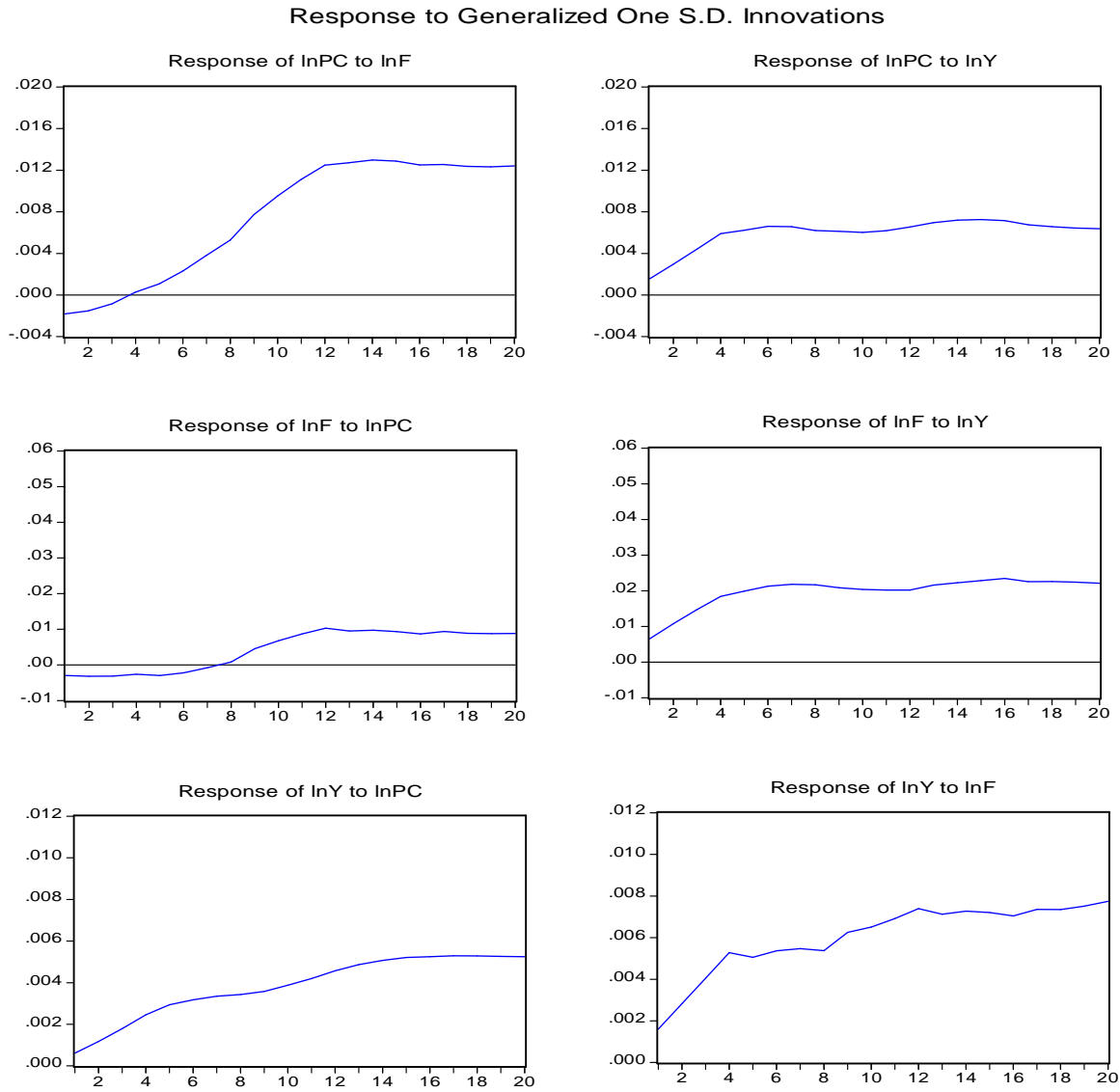


Figure-3 shows the response of poverty (private household consumption per capita) financial deepening and economic growth on each other using response to generalized one S.D. innovations. The results indicate that the response in private household consumption per capita is positive due to one standard deviation shock stemming in financial deepening and economic growth. The impact of economic growth on private household's consumption per capita is

insignificant and financial deepening significantly increases consumption per capita means financial deepening reduces poverty. Private household's consumption per capita contributes in financial deepening positively after 8<sup>th</sup> time horizon and response in financial deepening is positive due to standard deviation shock occurring in economic growth is positive.

The response in economic growth due to standard innovate shocks arising in the series of poverty (private household's consumption per capita) and financial deepening is positive. The impact of financial deepening on economic growth is strong which is statistically significant. Our results of IRF corroborate the findings of VDM reveal that poverty reduction is Granger caused by financial deepening. Financial deepening Granger causes economic growth. There is no causality relation between economic growth and poverty reduction in case of Pakistan.

## **V. Conclusion and Future Directions**

The relationship between financial deepening, economic growth and poverty reduction has not researched well in existing literature generally and with reference to Pakistan particularly. Use of numerous proxies of poverty reduction and financial development has provided contradictory empirical evidence between financial development, economic growth and poverty reduction. This shows that there is a need of comprehensive study to explore the relationship between financial deepening, economic growth and poverty reduction in case of Pakistan to help policy makers in design an appropriate economic and financial policy to reduce poverty and sustain economic growth for long span of time.

The present study investigates the causal relationship between financial deepening, economic growth and poverty reduction in case of Pakistan. We have applied unit root test to accommodate single unknown structural break stemming in the series. The ARDL bounds testing approach cointegration is employed to examine long run relationship between the series. The direction of causal relationship is investigated by applying the VECM Granger causality approach and causality results are confirmed by using innovative accounting approach (IAA). Additionally, we have used a comprehensive proxy of financial deepening compared to previous studies.

Our results confirmed the cointegration between financial deepening, economic growth and poverty reduction in the presence of structural break in case of Pakistan. Causality analysis revealed that causality results are sensitive with the use of proxy for poverty. Using head-count ratio as poverty indicator, we found:

1. Bidirectional causal relationship between financial deepening and poverty reduction.
2. The feedback effect also exists between financial deepening and economic growth.
3. Economic growth and poverty reduction is Granger caused by each other.

The use of private household's consumption per capita (proxy for poverty) shows:

1. Financial deepening Granger causes poverty reduction and economic growth.
2. Bidirectional causality is found between economic growth and poverty reduction

The application of IAA provided consistent results as compared to the VECM Granger causality approach by using both proxies of poverty. The results indicate that: (1) financial deepening Granger causes poverty reduction, (2) financial deepening Granger causes economic growth confirming supply-side hypothesis in Pakistan and (3) neutral effect is found economic growth and poverty reduction.

The findings of IAA help to suggest that state bank of Pakistan should direct the banks to launch microfinance polices at gross root level to reduce poverty in Pakistan. Grameen Bank is the best example can be seen in case of Bangladesh. Side by side, state bank of Pakistan should launch friendly monetary policy to reduce the spread rate which not only will help to increase the savings rate but also boost investment activities. This would lead to raise domestic production and hence economic growth. Government must launch balanced growth policy regarding agriculture, industry and services sectors. This will not only enhance domestic production but also raise income levels of poor segments of population and in resulting poverty is reduced. Government should train a bulk amount of unskilled labor in village areas by spreading a comprehensive network of vocational institutes in the country. This would lead to earn foreign exchange from international market by exporting human skills where it is demanded in the world. Government can take financial help from state bank of Pakistan (other commercial banks in the country) in setting up such technical institutes in the country.

This is not easy to understand the linkages between financial deepening, economic growth and poverty reduction. Although, these variables are interlinked but other potential variables must also be included in the poverty model while doing analysis to capture their impact on poverty

and economic growth, for example, trade openness, carbon emissions, corruption, foreign direct investment, domestic private investment, government development spending, inflation (consumer inflation), income inequality, foreign remittances, agricultural growth, manufacturing and industrial growth, defense spending and many more. Simply, causal relationship between financial deepening, economic growth and poverty reduction would not provide any solution. There is need to find out missing links between financial deepening, economic growth and poverty reduction (especially between economic growth and poverty) otherwise it would remain an open debate.

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