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Investment, Poverty and Growth Nexus in Pakistan: Empirical Evidence from ARDL Modeling Approach to Co-Integration

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Abstract

This study analyzes the nexus of investment, poverty, and growth in Pakistan. It will develop a comprehensive macro-economic model of Pakistan's economy with the desire of amplification and provided that a long-term result for the determined investment-poverty-growth discrepancy veterans. The significant level of investment and sustained economic growth may be the major driving forces for poverty decrease in Pakistan. The level of investment also assists the poor through a direct allocation influence as well as tortuous growth effect, in both the long run and short run. To detect the long and short term effects of economic development, poverty, and investment, an ARDL modeling approach to cointegration is functional, which is the most suitable technique in access to the method of integration after examining the stationary level of the data through ADF Test. The bound approach is exploited for co-integration to analyze the presence of long term association amid variables and ECM models are verbalized for short term analysis. The model is predictable with time-series data from 1972 to 2013 that confines mutually with the long-run and short-run forceful goods of the economy. The model is subjected to a sequence of strategy situations that assesses a mixture of options for the government to recover the prolific ability of the economy, thus attain continued to hasten growth and a decrease in Pakistan`s poverty.

Keywords: *investment, poverty, growth, ARDL to Co-integration*
JEL Classification Codes: *G12, G 14*

1. Introduction

Poverty can be defined as the condition or state of the community or individuals where one cannot fulfill their basic needs which are necessary for their lives. Poverty has many dimensions and forms; it may be presented in the society is the lack of financial resources and low income and consumption of households and individuals. In most developing countries, poverty is defined in consumption level than income level because consumption is a good indicator of welfare achievement while income is a good indicator of welfare opportunity. Secondly, income has fluctuations due to seasonal variations while consumption is the stable indicator of welfare, so economists in Pakistan use the consumption to define the poverty level in the economy. The major problem of developing countries is to alleviate poverty from the economy and to decrease the income inequality among their societies for gaining the fruits of economic growth.

Over the last few years, Pakistan has opened its markets for foreign investors, made its trade policies liberal to promote the foreign investment in the country, gave the tax incentives, cheap labor and good profits on investing in the country to alleviate the poverty and to enhance the income equality in the economy. The lack of assets accumulation of poor people in developing economies may enhance the poverty level and inequality in society. Therefore policies of Government to enhance the investment level in the assets of poor people may be helpful to eradicate poverty from society (Lay, Thiele & Wiebelt, 2004). The FDI decreases the poverty level while inequality enhances the poverty level in the economy (Begum, Deng & Gustafsson, 2012). The experiences of developing nations in South Asia are the signs that the expansions of investment and trade are the core variables to eradicate poverty.

The list of (MDGs) to eradicate poverty is the most important for policymakers in developing economies to gain the attention of international charity (Cicowiez & Conconi, 2008). In the decade of the sixties, with the reference of MDGs statement about Pakistan, poor quality has not slightly declined due to the high economic growth while in the decade of the seventies, poverty declined although growth was not so high. But before 2000, and in the late nineties, due to the high growth of the country, the poverty decline was satisfactory. Pakistan

has set its targets to alleviate poverty from the economy and to reduce its level at 13 percent by 2015. The different social safety and poverty reduction programs reduce poverty at its lowest level in the country.

The gains of trade and investment depend upon the fact that own these gains are distributed to the different sectors of the economy (Naranpanawa, Bandara & Selvanathan, 2011). Poverty, investment, and economic growth nexus work through different channels through the generation of employment, new production methods and techniques, the new development of research, and industrial and agricultural expansions. The investment, trade, and economic growth can reduce the poverty level through different channels like better allocation of resources among society (Mehannaa, 2004). The managerial skills of labor and innovations of new technologies help the economy to produce more output and domestic skill formation for economic growth. Good physical infrastructure and FDI in the economy facilitate the different sectors for expansion of output.

The policies of investment, trade, and poverty reduction are not so straight and easy. The benefits from economic growth, investment, and trade of an economy depend on many factors like the domestic environment, access to international markets, the capacity of productivity, and the extent of financial deepening in trade. Although economic growth, investment, and trade are effective tools to eradicate poverty but still need more efforts for poverty reduction (Buffie & Atolia, 2012). The purposes of the three crams are to analyze and empirically investigating the short and long-run relationships among investment, poor quality reduction along economic development in Pakistan using the Autoregressive distributed lags approach, and the technique of error correction.

The basis of theoretical for the relationships among variables is derived from the literature of macroeconomic growth while the investment is the core variable of economic growth. The impact of trade policies and trade liberalizations is similar to investment policies in Pakistan. This study provides more confirmation of affiliation among the variables in Pakistan which is an emerging economy of 184.35 million in South Asia. This study will provide the facts to identify the viable strategy to promote economic growth, to enhance the investment, and to reduce the poverty level from the economy which is a rising social evil in developing economies.

A study conducted by Baten and Juiff (2014) explored the influence of trade liberalization on the poverty level including urbanization, CPI inflation, investment, economic growth, and agriculture growth. The conclusion of the study suggests that CPI inflation, economic development, and economic shocks have a significant and positive impact on the poverty level while the urbanization and investment reduce poverty from the economy. The growth benefits of agriculture sectors go to the rural population which is the dominant part of the poor people. The FDI, education, and population are the important variables of poverty reduction which are not included in this study, while we have included these variables in our study except the education.

1.1. The Trends of Pakistan Economy

The large part of Pakistan's economy GDP is the agriculture products which is the predominant portion with the limited base. The industrial sector in the economy is not efficient due to the unskilled labor and energy crisis. The different sectors of the economy have been opened through trade liberalization policies and incentives to foreign investors attracted the FDI in the economy. Different investment policies and tax incentives to the investors have increased the investment level which is the solution of estimation of economic growth and welfare of the poor people. Government policies to encourage FDI in the economy are a good sign for enhancing the level of investment and economic development. In the history of Pakistan, it has faced a different political and economic crisis like in 1971 the separation of East part as Bangladesh. Military dictatorship and political instability in 1977 and afterward in 1999 deteriorated the key factors like FDI which badly affected economic development. But after the incident of 9/11 when Pakistan joined the war against terrorism, the foreign assistance of Pakistan increased by Western countries which left a positive impact on the economic indicators.

Table 1: The Trends of Poverty in Pakistan

Years	2000-01	2004-05	2005-06	2007-08	2010-11
Poverty Line (in Rs,)	734.40	989.75	955.58	1252.64	1854.00
Rural	39.2	28.1	27.00	20.6	15.1
Urban	22.6	14.9	13.1	10	7.1
Overall	34.4	23.9	22.3	17.2*	12.4*

Source: The Economic Survey of Pakistan

The scenario of poverty in Pakistan revealed that the poverty level in the economy decreased from 34.4% in 2000-01 to 12.4*% in 2010-11. It is a good sign in which different factors are involved. Between 2000 to 2013, record assistance of the U.S.A and from international donor agencies and an increase of foreign reserves reduced the poverty level in the economy. The rural and urban poverty levels also decreased due to the improvement in the remittances, economic development, and growth in investment. Public and private investment also increased in the rural and urban areas and in agriculture and industrial sectors which also reduced the poverty level in the economy. The poverty reduction challenges in Pakistan are still staggering. Pakistan has made the policy to halve the level of poverty from the economy by 2015 in achieving the goal of the MDGs.

Table 2: Trade, Investment, Poverty and GDP Growth Rate Scenario in Pakistan

Years	Poverty	Investment as Percentage of GDP	FDI as Percentage of GDP	Worker Remittances as Percentage of GDP	Imports as Percentage of GDP	GDP Growth Rate	Exports as Percentage of GDP
1975-76	40.41	16.38	0.13	1.95	17.5	3.9	8.5
1980-81	9.86	17.66	0.30	8.18	19.8	7.3	10
1985-86	23.31	18.27	0.32	9.28	18.7	8.7	9.23
1990-91	20.74	18.93	0.69	5.73	18.5	4.6	13.0
1995-96	21.57	18.57	1.10	3.74	19.0	4.1	13.2
2000-01	34.4	17.22	0.82	1.61	14.2	3.9	12.4
2004-05	23.9	16.57	1.38	4.37	17.1	7.5	13.2
2005-06	22.3	19.33	2.76	4.07	19.4	5.8	13.0
2006-07	22.58	18.79	3.60	3.89	17.5	5.5	11.9
2007-08	17.2*	19.21	3.13	4.17	20.8	5.0	11.4
2008-09	21.04	17.55	2.21	5.10	18.9	0.4	11.1
2009-10	33.8	15.80	2.58	5.42	17.4	2.6	11.1
2010-11	12.4*	14.11	1.36	5.50	16.8	3.7	11.9
2011-12	37.62	15.08	3.30	5.56	18.0	3.8	11.0
2012-13	23.7	14.57	3.35	5.70	17.3	3.7	10.7

Source: State Bank of Pakistan

The list of the Global Competitive Index revealed that Pakistan is ranked third among the lowest countries while it has ranked 74 in 2006. The reasons for this deterioration are poor infrastructure conditions, poor quality control standards, poor productivity, lack of export diversifications, poor level of good governance, high cost of capital, high cost of doing business, and the prevailing conditions of inefficiencies in the country. Political instability, corruption, law and order condition, extremism, increase insurgency, and energy crisis also contributed to deteriorating the condition of the economy. The low rate of growth in different sectors in the past few years slacked down the economy but in 2013-14 the significant growth in the manufacturing

sector and reasonable growth in agriculture and service sectors boosted the economy to high growth. This is due to the stability of macroeconomic indicators, elimination of external account vulnerability, and economic recovery.

Euro Bond's successful launching, high improvement in worker remittances, attainment of GSP, the higher growth rate of exports and imports, fiscal deficit reduction, enhancement in tax collection, and the low inflation rate. Many inventiveness has taken from the Government of Pakistan to improve productivity in different sectors. The government has taken different steps to provide a better security condition in the economy to increase the FDI inflow and investment to GDP ratio so that economic developments increase in the economy. The achievement of a better GDP growth rate is 4.14% in 2013-14 which is higher than the last year is due to better Government policies. It is a good sign which revealed that the fruits of better policies have started to grow which will further enhance the potential level of the economy.
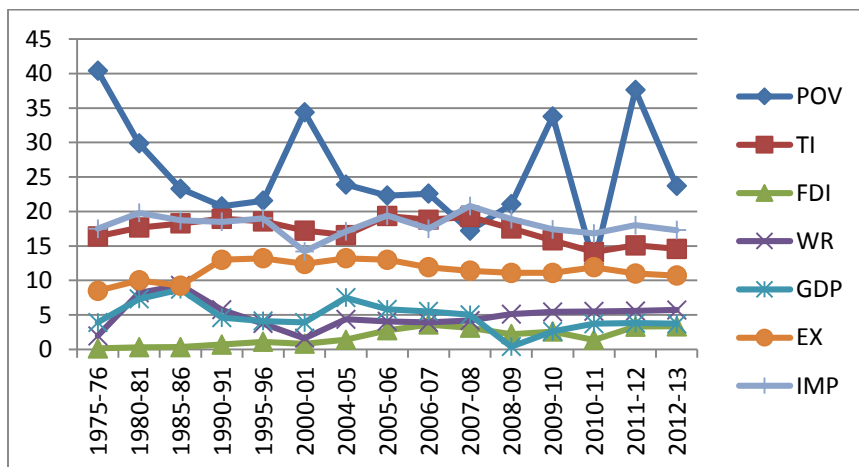

Figure 1: Scenario of Poverty, Investment and Trade in Pakistan

Per capita income is considered an important and key factor of wellbeing in economic literature. In 2013-14 per capita income is counted 3.5% while it was 1.44% in the last year. It is due to the slower growth in population and high economic growth in the current year. The growth rate of total investment in the year 2013-14is recorded 13.99% while it was 14.57% in the previous year. The fixed investment

also decreased from 12.97% to 12.39% in the current year than the last year. The public investment growth rate in 2012-13 remained at -0.35%which is the sign that the Government has changed the policies and strategies. FDI which is an important factor of economic well-being was improved in the country. The new investment policy has been launched by the Board of Investment to increase the FDI in the country. In July-April 2014, FDI in Pakistan has reached $2974 million which is higher almost 133.3% than the last year. The policy of the Government of Remittances Initiative has well worked due to which worker remittances have increased in the economy. It is the key factor of poverty reduction which is free of cost, efficient, and secure. In 2012-13 the total amount of worker remittances was $13,921.16 million which revealed the 14.45% growth rate.

2. Literature Review

Per capita income reduces the poverty level with the enhancement in the allocation of the income among individuals and the impact of poverty reduction can be seen by decomposing the impact of improvement in mean income and distribution of income (Anwar, 2010). For poverty reduction, not only the improvement in mean income is essential but also the distribution of high growth to poor people is also mentionable and important. Some studies have proved that the FDI enhances the GDP growth rate through the different channels like development in research, improvement in production technology, installment of new capital and improvement in the production capacity of the economy but some studies have proved otherwise like (Tsukita, Oishi, Sato, Sagara & Kawai, 1994).

The improvement in the level of FDI in the economy reduces the poverty level while the opposite is proved in income discrimination in the case of Pakistan. The contribution of income variation to enhance the poverty level is larger than the FDI's negative impact on poverty reduction in Pakistan. Sial and Cheema (2012) examined the relationships among income inequality, poverty, and economic growth using the pooled data. The conclusion of the study showed the elasticity of poverty to inequality was less than the urban areas while the growth elasticity of poverty was lower in municipal vicinity than in rustic areas.

Tabassum and Majeed (2008) also explored that for poverty reduction, distribution of income also matters as well as economic growth matters and if the income inequality increased with the increase in economic growth, then poverty did not decrease with the significant increase in economic growth. The study also explored that in developing countries more economic growth and equivalent scattering of income reduced poverty while the human and physical capital also promote economic development and reduce the poverty in developing nations. Salvatore's (2007) study showed that economic growth and poverty reduction have a significant and opposite connection with each other. Analyzing the 50 developing nations of the world and almost 101 intervals in the data set, the study depicted that the economic growth enhanced income inequality less change than in poverty. The income inequality may fall, remain steady, or may rise with the increase in income growth. Jamal (2006) in his study, did the income inequality matter for the eradication of poverty depicted that the priority of developing nations always remains the eradication of poverty with the enhancement in economic growth.

The poverty elasticity of economic growth was significant but was less than the poverty elasticity of income inequality. It may be true that income inequality and redistribution matter less for poverty reduction than economic growth but this factor has important impacts on poverty reduction in Pakistan. So, in developing nations like Pakistan, it should be the agenda that with the sustainable economic growth income inequality also remain in the limited boundaries or prevent poverty from rising. The relationship between the economic growth of developing nations and (Gini Coefficient) was encouraging and important which was depicted that as the mean income of developing nations increased the income inequality also increased but it was insignificant in case of the square of economic growth per capita.

The investment growth rate, CPI inflation, and headcount ratio have an adverse and substantial effect on economic development while the capital formation and education enrollment have positive and substantial relationships with economic development. Zaman and Khilji (2013) explored through their study that FDI has an inverse impact on income disparity in Pakistan while trade openness also does not have a momentous effect on income inequality. The increasing levels of remittances, urbanization, and interest rate have a destructive

impression on income inequality. The conclusion of the study that trade openness did not decrease the income inequality and poverty level due to the relaxation in tariff and trade barriers which enhanced the imports and decreased the employment level in Pakistan.

Naranpanawa, Bandara, and Selvanathan's (2011) study proved that trade openness enhanced economic growth but trade liberalization was not the indicator of development in the case of Pakistan. The study depicted that the trade liberalization did not ameliorate poverty and income inequality in Pakistan. Trade liberalization also decreased the employment level in the economy. Exports of capital goods decreased the employment level while imports of capital intensive goods increased the employment level in the country. The main findings of the study are that the human capital reduced the poverty level while the trade liberalization policies enhanced the poverty level in the economy.

Perera and Lee (2013) analyzed in their study for nine developing countries of South and East Asian countries that income inequality remained unchanged when economic growth increased while for poverty reduction, economic growth was necessary. The elasticity of poverty reduction for these countries remained in the range of -4.21 to -6.09; therefore economic growth can eradicate poverty quickly in this region rather than in other parts of the region. The macroeconomic stability, financial development, and trade openness have not affected the distribution of income while these factors have a negative and significant impact on poverty reduction (Zaman 2012). Trade openness can enhance the mean income of individuals which can increase economic growth through productivity (Zhang and Wan 2006).Fritzen (2006) explored that economic growth which is an engine to eradicate poverty and enhancing the wellbeing of individuals might not work so well due to the income inequality in the economy. So, for poverty reduction, equal distribution of resources in the community, and economic growth is essential.

3. Research Methodology

3.1. Data Source and Model Specification

The current part of the study consists of data and slant used to determine the impact of income inequality, inflation, total investment, FDI, worker remittances, per capita income, and trade openness on poverty in Pakistan. In command to analyze the relationships among

the variables, yearly time sequence data for the years 1972-2012 were engaged and (ARDL) model was applied in this cram. The collected data were taken from the Handbook of Statistics of Pakistan Economy, Pakistan's economic survey (various issues), World Bank Indicator, State Bank of Pakistan's (SBP) libraries and sites, and Investment Board (BOI). Poverty and Gini coefficient data have been collected from the research article of Jamal (2006) which covered the period of data 1973-2003. We also used the same methodology to create more values of poverty and the Gini coefficient up to 2013. The variables for which data have been collected are Poverty (POV), Total Domestic Investment(TI), Foreign Direct Investment (FDI), Gini Coefficient (Gini), Consumer Price Index (CPI), Per Capita Income (PI), Trade Openness (TOP) and Worker Remittances (WR). To discover the long term association amid investment, poverty, and economic growth, we have included the other relevant variables which have the theoretical base in the economic literature and seemed appropriate in the scenario of Pakistan. The special model has been taken in the log-linear form as follows;

$$LPOV = \theta_0 + \theta_1 LGini + \theta_2 LCPI + \theta_3 LPI + \theta_4 LTOP + \theta_5 LWR + \theta_6 DI + \theta_7 LTI + \varphi_t \qquad (1)$$

In the model, POV is the poverty index (headcount ratio) which is used as the dependent variable in the model. Gini Coefficient is taken as the portion of income dissimilarity in the economy and we expect a positive relationship with poverty. CPI is taken as the measure of inflation rate which is prevailing in the economy and we expect a positive relationship with poverty because it increases the prices of goods and services. The inflation rate worsens the condition of the individuals (Kalim and Shahbaz, 2009).

Per capita income in the model is taken as the proxy of economic growth and has expected its relationship with poverty to be negative. Trade openness is the measure of domestic country activities with the rest of the world and expects a negative relationship with poverty. Worker remittances are the foreign reserves sent to the home country from its individuals who lived in foreign countries and we expect the negative relationship with poverty. FDI inflow is the investment by foreigners in domestic country and we expect a negative relationship with poverty. Whole outlay which is the addition of private

and public investment is taken as the proxy of physical capital and it is expected that it has also had a negative relationship with poverty.

3.2. Methodological Issues

Present cram is including annual time succession data so first we examined the possessions of the annual time series data; first, the stationary of the data will be examined, and then it will be decided about the appropriate technique for the estimation of the variables.

3.2.1. Stationarity Test of Data

The results of the ADF unit root test shows that all variables are non-stationary and these variables become stationary at the level and first transformation. The variables integrated into the present study are stationary at I (1) and I (0) so it will be inconvenient to use the traditional method like OLS and the use of tests like F-tests and T-statistics which mislead the results of the study. In this situation, the ARDL technique will be applied for best results and precise estimation of the variables and for identifying the presence of short term and long term interactions among variables.

3.2.2. Auto-Regressive Distributed Lag Model Approach to Co-integration

In the present study, the ARDL test will be used on a single equation and this approach will guesstimate the parameters of variables in the short term and long term simultaneously. The estimated parameters which will attain from using the ARDL technique will be efficient and unbiased. The Auto-Regressive Distributed Lag Model method to co-integration is valuable for small sample size as well as for large sample size; Engel-Granger and Johensan technique is not so trustworthy for small sample size. The results of ARDL for small sample size are better than the Johan co-integration and Engel-Granger tactics.

The ARDL approach to co-integration has an advantage because it is not compulsory that all the variables in the model may be in the same order. The ARDL method can be applied despite variables may be at I (0) or I (1) or mix up of both I (1) and I (0). The ARDL approach will not be applicable if the variables in the model are stationary of the higher order of I (1). This technique is comprised of two stages. First, the long term associations among variables are tested with F-statistics to obtain out the consequence of the lagged values of

the variables. Second, the parameters, their signs, and the magnitude of dealings among variables as well as long term and short term attachment can be analyzed.

3.2.3. Bound Testing Procedure

There are three assumptions of the bound test that are; the first assumption, use the ARDL model technique after confirming the integration arrangement of the variables which are included in the model Pesaran (2001). The second assumption, the sequence of the variables has not identical organize of combination i.e., the variables exist at I (1) and I (0). The third assumption is that the ARDL model technique gives better results after the estimation of variables if the sample size is small.

$$Z_{t=\sum_{i=1}^{P}\beta_{iZt-i}+\varepsilon_i} \tag{2}$$

The $x\ t$ which denotes a set of explanatory variables and $y\ t$ which shows the dependent variable, both are included in the vector zt. Poverty (POV) is pointed out by $y\ t$ and $x\ t$ is the vector milieu which corresponds to situate of explanatory variables [$x\ t$ = TI, FDI, GINI, WR, PI, TOP, CPI,] for Model-1and t *denotes* time indicator in the model.

The VECM (Vector error correction model) for these variables is prearranged as beneath:

$$\Delta Z_{t=\mu+\alpha_t\ +\ \lambda_{Zt-1}}\ +\ \sum_{i=1}^{\rho-i}\emptyset_t\Delta y_{t-1}\ +\ \sum_{i=1}^{p-i}\quad\emptyset_{t\ \Delta x_{t-i}}\ +\ \varepsilon_t \tag{3}$$

The symbol of Δ is represented the 1st difference operator and λ which is long-run multiplier can be written as:

$$\lambda=\begin{bmatrix}\lambda_{yy} & \lambda_{yx}\\ \lambda_{xy} & \lambda_{xx}\end{bmatrix}$$

The elements of the diagonal in the template are unhindered, so the elected series of the variables in the matrix may be either I (1) or I(0). If $\lambda yy=0$ then the variable Y will be of order at I(1) and if $\lambda yy<0$ then the variable Y will be of order I(0). The direction error correction model method above described is very important in the trying of at nearly all one co-integrating vector between the explanatory variables and the dependent variable.

3.2.4. Impact of Explanatory Variables on Poverty

There are two steps in the ARDL model technique for estimating the series of variables in the long-run relationship. The 1st phase is to observe the presence in the long-run association amid all variables in the model which is below examination. Conditional upon the verification of co-integration the long-term and the short-term coefficients are assessed using the linked ARDDL and ECM in the second stage. For testing the co-integration in the model (3) by the bounds test, unobstructed ECM is constructed as follows; the sign of Δ is the 1st difference operative and (φ_t) is a white-noise disturbance term in the model. The model (3) can also be considered as an ARDL model of the order ($a, b, c, d, e, f, g, h, j$). The model (3) points out that poverty is liable to be prejudiced and clarify by its lags ethics. The construction of structural lags is recognized by using Minimum Schwarz information criteria (SIC). The parameters $(\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7, \alpha_8, \alpha_9)$ are the coefficients of variables in short term and parameters $(\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8)$ are the long term coefficients of variables and the sign of (α_0) is the intercept term in the model.

$$\Delta(LPOV)_{i=\alpha_0} \sum_{i=1}^{a} \alpha 1i \, \Delta(LTI)_{t-i} + \sum_{i=0}^{b} \alpha 2i \, \Delta(LGINI)_{t-i} + \sum_{i=0}^{c} \alpha 3i \Delta(LCPI)_{t-i} + \sum_{i=0}^{d} \Delta(LPI)_{t-i} + \sum_{i=0}^{e} \alpha 5i \Delta(LTOP)_{t-i} + \sum_{i=o}^{f} \alpha 6i \Delta(LWR)_{t-i} + \sum_{i=o}^{g} \alpha 7i \Delta(LFDI)_{t-i} + \beta_{1(LTI)_{t-1}} + \beta_2(LGINI)_{t-1} + \beta_3(LCPI)_{t-1} + \beta_4(LPI)_{t-1} + \beta_5(LTOP)_{t-1} + \beta_6(LWR)_{t-1} + \beta_7(LFDI)_{t-1} + \emptyset_t \qquad (4)$$

3.2.5. The Wald Test (F-statistics)

The Wald test is computed after regression analysis in equation 3 to distinguish the long-term association among variables. Wald test might be computed through impressive limitations on expected long term coefficients of poverty for 3rd Model as under:

Following is the null hypothesis

$H_0: \beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8$

(No long run- connection exist amid the variables)

Against the alternative hypothesis,

$H_1: \beta_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8$

(A long-term association occurs among the variables)

If the estimated price of the F-statistics is not exceeded then the value of lower bound, in the null hypothesis will not be discarded and it is determined that there is no existence of long term connection among total domestic investment and explanatory variables. In contrast, if the calculated F-statistics value is larger than the worth of upper bound value, the co-integration happens amongst total domestic investment and explanatory variables. Now, applying the Wald test on all explanatory lagged variables seems in the model (3). The null hypothesis shows that the lagged coefficients of explanatory and dependent variables are equal to zero or deficient from the model means that there are no long term interactions among the variables.

3.2.6. The Time Horizons

To observe the impact of explanatory variables on poverty for Pakistan mutually in the short and long run, the study guesstimated equation which is (3) with OLS technique and then normalizing the consequential values. The ARDL model for the long term coefficients Equ (3) is to conclude that the long run becomes the cause of poverty determinants on the poverty level in Pakistan.

$$POV_t = v_\circ + \sum_{i=0}^{p} v1i\,(LTI)_{t-i} + \sum_{i=0}^{p1} v2i\,(LGINI)_{t-i} + \sum_{i=0}^{p2} v3i\,(LCPI)_{t-i} + \sum_{i=0}^{p4} v4i\,(LPI)_{t-i} + \sum_{i=0}^{p5} v6i\,(LWR)_{t-i} + \sum_{i=0}^{p6} v7i\,(LFDI)_{t-i} + \varepsilon_t \qquad (5)$$

Now, with the usage of error correction terms, the short coefficients of the variables in the model will be ruled out. For this purpose, the short-run error correction estimates of the ARDL technique will be used. The difference which will exist among authentic and expected values of the model is measured as the ECM. The coefficient of the error correction term has to be significant and negative. The short term ECM of Model-(3) to find out the effect of poverty determinants on the poverty level in time regulating framework for attaining the long-run equilibrium level is as follows;

$$\Delta POV_t = \omega_\circ + \sum_{i=1}^{q} \omega1i\,\Delta(LTI)_{t-i} + \sum_{i=0}^{q1} \omega2i\,\Delta(LGINI)_{t-i} + \sum_{i=0}^{q3} \omega4i\,\Delta(LPI)_{t-i} + \sum_{i=0}^{q4} \omega5i\,\Delta(LTOP)_{t-i} + \sum_{i=0}^{q5} \omega6i\Delta(LWR)_{t-i} + \sum_{i=0}^{q6} \omega7i\,\Delta(LFDI)_{t-i} + \lambda(ECM)_{t-i} + \sigma_t \qquad (6)$$

The term ECMt-1 shows the ECM of the equation where the coefficient value of the error correction model (ECM) is λ, which is the rapidity of adjustment from the short run to the long-run equilibrium level.

3.2.7. The Error Correction Term $(ECM)_{t-1}$

The $(ECM)_{t-1}$ in the model, which is the tool of alteration speed in the active model for renovating the equilibrium level in the long run. The highly significant value of error correction terms the evidence continuation constant long term affiliation among variables in the model concluded by Banner (1998). The negative sign of ECM also gives the unify-direction contact of the variables in the equation.

4. Results of the Study and Discussions

After discussing the sources of data, this study analyzes the effects of poverty determinants on poverty on an empirical basis. For analyzing the issues deep insight has been given to the evidence of the experiential results of the study. The results are converse behind as they go behind.

4.1. Descriptive Analysis of the Study

The descriptive statistics of the cram are accessible in Table 3. The descriptive data includes measures use, to sum up, and explain the individuality of a series of data. The table demonstrates the average principles, standard deviations, probabilities, kurtosis, skewness, and J. Bera values of the preferred variables for the study.

Table 3: Descriptive Statistics of Dependent and Explanatory Variables

	POV	TI	GINI	CPI	PI	TOP	WR	FDI
Mean	27.95	666872.6	37.91	77.38	12353.92	33.59	172087.8	55673.69
Median	25.20	260902.0	37.42	49.78	4117.00	33.63	39887.42	7403.243
Maximum	45.75	2698756	51.50	260.89	35298.00	38.90	826458.8	424646.6
Minimum	20.71	6589.00	29.56	6.668	530.00	27.71	1226.720	-58.212
Std. Deviations	7.05	872097.3	5.81	71.47	13753.11	2.86	258816.1	103136.8
Skewness	0.92	1.33	0.86	1.22	0.747	-0.236	1.63	2.13
Kurtosis	2.76	3.256	3.31	3.60	1.69	2.51	4.15	6.61
Jarque Bera	6.068	12.54	5.35	2.48	6.89	0.8129	20.93	54.81
Probabilities	0.048	0.0018	0.068	11.19	0.6860	0.6660	0.00028	0.0000

4.2. ADF Test for the Stationarity of Variables

The table describes the abstract data of the ADF test for selected variables. The outcome ADF analysis designates there are several variables which inactive at 1st difference and others are stationary at

level. These results of the study offer the justification of the ARDL technique.

Table 4: Augmented Dickey Fuller (Unit Root Test)

Variables	Parameters	Calculated ADF	At 5%	Lag Values	Trend & Intercept	Conclusions
LPOV	-0.48	-2.69	-3.93	1	Trend	I (1)
LTI	-1.50	-4.75	-4.64	1	Trend & Intercept	I (0)
LGINI	-0.07	-3.20	-1.85	1	None	I (1)
LCPI	-0.51	-3.36	-1.85	1	None	I (0)
LPI	-1.008	-3.28	-2.85	1	Intercept	I (1)
LTOP	-0.36	-2.08	-2.84	1	Intercept	I (0)
LWR	-0.98	-3.17	-2.84	1	Intercept	I (1)
LFDI	-1.08	-5.15	-2.64	1	Trend & Intercept	I (0)

Note: The Results of the Table 2 are based on author's self-calculations

4.3. Bounds Testing Procedure for Co-integration

It is vital and necessary to find out the presence of the long-run affiliation among the reliant and descriptive variables for the model before approximation of the long-run coefficients and ECM. It is the first step in the ARDL technique to find out the presence of long-run association among the dependent and clarifying variables. It is conducted by using the OLS method to find out the F statistics value of the combined consequence of the coefficients of insulating levels of the variables in the model. Table 2 displays the results of Wald-Test (F-Statistics) in the long-run relationship among dependent and explanatory variables.

Table 5: Bound Testing Results for Co-integration

Model	F-statistics Calculated	Critical Bound		Conclusion
		Lower- Bound Value	Upper Bound Value	
LPOV/LTI,LGINI,LCPI, 33LTOP,LTWR, LFDI,LPI	8.21 (0.0003)	3.25 (99%)	4.34 (99%)	Co-integration exists

Note: The calculated value of F-statistic is 7.11 (Statistically significant at 1 % level). Critical Value at $k =9-1=8$ *is* coded from Pesaran et al. (1999), Table CI.V: unhampered Trend and interrupt. The afterthought value is the probability of F-statistics.

The values of the above table indicate that the deliberated F-statistics is greater than the superior value which indicates the occurrence of long term associations among variables of the model. The F-statistic value is based on the 'Wald test' that is presented in the

2nd column while the values of lower and upper bound are presented in the third column.

4.4. Long Run Estimates of Poverty Determinants and Poverty

The long-run estimation results of the model-1 are represented inside Table 2. The dependent variable is poverty and total investment, FDI, Gini Coefficient, CPI, per capita income, TOP, and WR are independent variables in the model.

Table 6: Long- Run Results of Poverty and Its Determinants

Dependent: Poverty (Head Count Ratio)
Period: 1972-2013
SBC (0,1,1,2,1,0,1,0,2)

Explanatory Variables	Coefficients	Standard Error	T-Ratio (Probabilities)
LTI	-10.77	4.56	- 3.267[0.042]
LGINI	0.45	0.1098	5.13[0.033]
LCPI	2.44	0.38	5.322 [0.002]
LPI	-4.78	1.52	-2.24 [0.005]
LTOP	-0.297	0.333	-0.78[0.489]
LWR	-12.29	2.12	-4.6703 [0.019]
LFDI	-3.24	1.08	-2.99[0.006]
C	8.078	1.892	4.267[0.000]
T	0.0950.085		1.11[0.277]

Note: Estimates are based on the researcher's calculation by examining Microfit 4.1

The examination shows estimates that the poverty elasticity of total investment is significant and negative which revealed the strong relationship between poverty and physical capital formation. The relationship between poverty and physical capital formation is the same as the results of (Fields 2007). The results of income inequality are also in line with the study (Salvatore, 2007). The poverty elasticity of inflation is positive which showed the same results as the study of (Fosu, 2010). The poverty elasticity of per capita income has the same result as the studies of (Ntsalaze and Ikhide 2017).

The regression coefficients variables in the short-run are presented in Table 3 which depicts that the poverty elasticity of physical capital formation is negative while the poverty elasticity of GINI is positive. These results in the short-run match using the study of (Montalv and Ravallion 2010). Similarly, the results of LFDI, LWR,

and per capita income elasticities of poverty are matched with the results of (Meng, Gregor,y and Wang 2005).

Table 7: Short-Run Effects of Poverty determinants on Poverty

Dependent: Poverty (Head Count Ratio

Period: 1972-2012

SBC (0,1,1,2,1,0,1,0,2)

Explanatory Variables	Coefficients	Standard Error	T-Ratio (Probabilities)
ΔLTI	-0.40597	0.078013	-5.2039[0.000]
ΔLOGIN	I0.81764	0.27314	2.9935[0.006]
ΔLCPI	-1.16217	0.87698	-1.8492[0.076]
ΔLPI	-0.13161	0.048468	-2.7153[0.012]
ΔLTOP	0.55191	0.15896	3.4720[0.002]
ΔLWR	-2.23509	0.92643	-2.5376[0.017]
ΔLFDI	-0.40044	0.13165	-3.0417[0.005]
ΔC	7.0671	1.7837	5.3667[0.000]
ΔT	0.084556	0.0767	1.2145[0.275]
ECM(-1)	-0.687	0.228	-5.002[0.0000]
R-Squared	0.83351	R-Bar-Squared	0.89799
DW-statistic	2.1464	F-stat F(12, 26)	29.2914[.000]

Note: Estimates are based on the Researcher's calculation by examining Microfit 4.1

4.5. Explanation of Error Correction Term (ECM_{t-1})

The value of error correction term (ECM_{t-1}) for the equation (-0.596) represents the short-run disequilibrium of the variables that will move toward the long-run equilibrium of the variables by 60% in one year. The statistically significant, negative values of the (ECM_{t-1}) represents the presence of co-integration among the variables in the model.

4.6. The Diagnostic Tests for the Model

In the analysis of dynamic time series the variety of dependent and explanatory variables for the selected equation is critical. Approximately all the individual time series variables which represent a trend, are considered to have specification problem and serial correlation in the model. When the time series variables are included in the model, researchers have to execute some diagnostic tests for the model of unrestricted and unconstrained error correction model. In the

table, the model represents that the specified unrestricted error correction model (UECM) covers all the diagnostic tests.
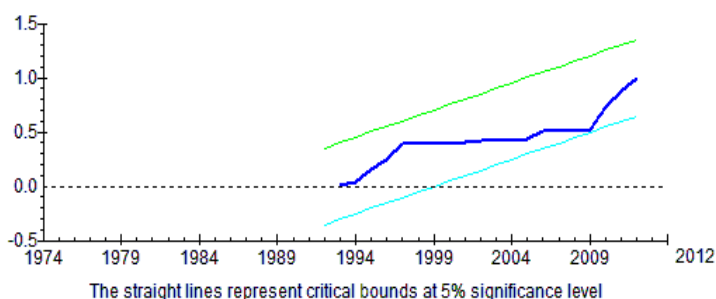
Table 8: The Diagnostic Test for the Model

Diagnosis	Test	Values	
		LM Version	F-Version
Serial Correlation Test	Lagrange multiplier	CHSQ(1)= 2.4693[.116]	F(1,20)= 1.3519[.259]
Functional Form Test	Ramsey's Reset	CHSQ(1)= 0.28293[.595]	F(1,20)= 0.14615[.706]
Normality Test	Skewness and Kurtosis of Residuals	CHSQ(2)= 1.0004[.606]	-
Test for Heteroscedasticity	Regression of Squared Residuals	CHSQ(1)= 0.30779[.579]	F(1,37)= 0.29433[.591]

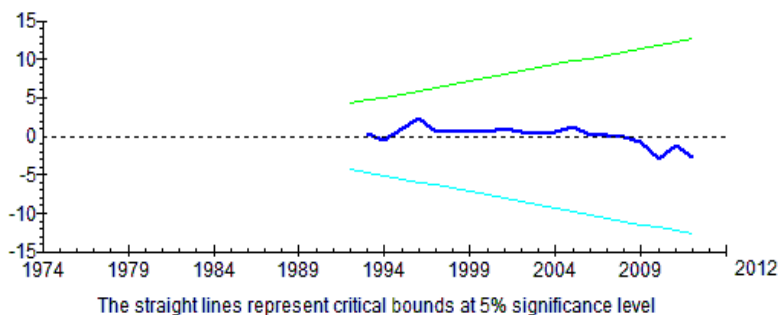**Note:** Estimates are based on the researcher's calculation by examining Microfit 4.1

4.7. Test of Stability

The stability of the estimated dependent and explanatory variables coefficients in the (ECM) should also be graphically examined by (Jalil and Mahmud 2009). So, to discover the solidity variables in the model of CUSCUM and CUSUM that are cumulative sum of recursive residuals and cumulative sum of recursive residuals squares respectively have conspired below. The results of coefficients of variables in the model are stable, represented on graphs because values of coefficients lie in the critical limits. Due to the deficiency of divergence in graphs of CUSUM and CUSUM, it verifies that the model short-run and long-run factors are steady.

Plot of Cumulative Sum of Squares of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

5. Conclusions and Policy Implication

The long-run outcome of the study revealed that the poverty elasticity of physical capital formation is negative and significant which suggests that the government should enhance the level of private and public investment in the country to alleviate poverty or to reduce the poverty level from the economy. Investment in different sectors especially in agriculture and industrial sectors improves economic activity and reduces the unemployment level from the economy. It is a good sign that government has taken an initiative and made different strategies and policies to boost up the level of investment in the economy. The fruits of these policies will go to the poor if these policies work well and according to the plan.

The poverty elasticity of Gini is positive and has a substantial connection with income disparity which shows that the government should launch such policies that reduce the income inequality from the economy because it enhances the level of poverty in the economy. Reduction in income inequality will support to make the fruits of economic growth reachable to the poor and vulnerable people of the economy. Inflation and poverty have a positive and significant relationship with each other which suggests that the government should control inflation in the economy because it enhances the rates of goods and services in the economy. The higher inflation rates deteriorate the condition of the people in the economy due to its bad effects on the real income of the people.

Per capita income elasticity of poverty is negative and significant which reveals that per capita income reduces the poverty in the economy, so the government should make such policies that enhance the per capita income of the people. The enhancement in per capita income has dual effects; first, it will increase the wellbeing and second reduce the poverty level in the economy. The poverty elasticity of trade openness is negative and significant which depicts that trade openness reduces the poverty level from the economy. So, for poverty reduction, the government should enhance trade activities with other nations.

Worker remittances and poverty have a negative and strong relationship with each other, so the government should make such policies that enhance the level of worker remittances. The policies to secure the benefits of people who live in foreign countries should be made. FDI has a negative and strong relationship with poverty which depicts that the government should come up with such friendly policies that secure the benefits of foreign investors in the domestic country to enhance the level of FDI in the country. The government should give relaxation in taxes and credit availability to foreign investors.

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