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## Abstract

This study aims to examine the impact of foreign resources on alleviating poverty and inequality within the context of Pakistan. Utilizing secondary data spanning from 1980 to 2022, the study employs the Autoregressive Distributed Lag Model (ARDL) to derive its findings. Two distinct models are employed to assess poverty and inequality. In the initial model, the headcount ratio serves as the dependent variable, with foreign direct investment, foreign remittances, foreign aid, external aid, gross fixed capital formation, and labor force participation rate acting as independent variables. Meanwhile, the second model employs the GINI coefficient as the dependent variable, while maintaining the same set of independent variables as the poverty model. The long-term findings of the first model reveal a negative and statistically significant relationship between remittances, foreign aid, gross fixed capital formation, labor force participation rate, and poverty. Although GDP displays a negative relationship with poverty, it lacks statistical significance, while foreign direct investment shows a positive relationship with poverty. Turning to the results of the second model, Foreign Direct Investment, remittances, foreign aid, GDP, gross fixed capital formation, and labor force participation rate are found to be significant and negatively associated with inequality. Conversely, external debt demonstrates a positive and significant relationship with poverty.

**Keywords:** Foreign Resources, Poverty, Inequality, ARDL

## 1. Introduction

Foreign resources play an important role in the development of any country. In developing countries, slow growth processes, high poverty, and inequality have been observed while rich countries like Japan, USA, UAE, Germany, France, Austria, etc. are enjoying higher living standards but only one-fourth of the world population living in these countries. While three-fourth portion of the world population is living in poverty in developing countries like Pakistan, India, Bangladesh, Africa, etc. In these countries poverty is high; illiteracy and malnourishment are quite common problems. All developing countries are trapped in the vicious circle of poverty. The issue faced by the underdeveloped country is to improve the living standard of their people that will be improved by providing them with employment opportunities and incomes. In other words, to achieve the development process and for the sake of poverty reduction both the people and country must be developed.

A smooth and regular flow of investment is necessary for a growth process. Steady-state growth guarantees technological advancement, generating employment opportunities and increasing human capital investment. Two factors are an obstacle in the growth process. The first one is that sometimes domestic resources are not enough to meet the necessary employment level, due to which developing countries have the issue of slow growth and poverty or inequality (Ali & Audi, 2016).

Another major issue of the slow growth process is insufficient capital stock, and there always exists a shortage of capital stock in developing economies. Developing countries have another issue which is low saving and low investment. Different types of foreign resources (foreign direct investment, worker's remittances, aid, loans, grants, portfolio investment, etc.) are encouraged by developing countries to fill this saving-investment gap. These foreign resources are necessary to stimulate the growth process and to reduce poverty and inequality (Chenery & Strout, 1966; Ali, 2018). The growth process is directly and indirectly obtained by the smooth and continuous flow of investment. Continuous investment guarantees growth through generating employment opportunities, transfer of modern technology, upgradation of human capital, increase in aggregate demand (AD), and so on. The extent of the impact of foreign resources depends upon the continuity of resources, allocation, and composition. Foreign resources affect the developing countries 1) by fastening the growth process 2) and by reducing poverty and inequality.

In this study, foreign resources are the combination of foreign direct investment, worker remittances, aid, and external debt. These resources play vital roles in the development, poverty, and inequality reduction of developing economies. These resources are not only important in the case of developing countries but rich nations also require foreign resources to maintain or manage their economies. Based on a country's requirements, the size and composition of these resources are formed. The need for foreign resources increases because of low capital, low savings, and investment ratios in developing countries. The reason for these deficiencies is the low level of household income due to which government income decreases that come in the form of taxes on household income. Low government income reduces government expenditures and slows down the growth process. As time passes, developing countries are becoming more dependent on foreign resources for their development. If all these foreign resources are wasted, the result of this complete independence causes a great loss of developing economies.

The most critical issue is the misallocation of these foreign resources. When foreign resources are not judiciously allocated, they may cause unfavorable effects on the growth process by increasing unemployment, poverty, and inequality. In the past few years, many studies have been conducted to see the effects of foreign resources on domestic saving, investment, gross domestic product, growth rate, poverty, and inequality. As our capital is the most important ingredient of the economy it is necessary to increase the production and productivity of the country. Unfortunately, this main ingredient is missing in the case of developing countries. Due to this developing countries face a low level of income that leads to low saving rates and results in low investment occurring.

Simultaneously another issue in the case of developing countries is that their exports remain lower as compared to imports. In this situation, underdeveloped countries must face low saving investment ratios and on the other hand face a deficit in the balance of Payment (BOP). The two-gap model suggests that to fill these two gaps developing countries must depend on foreign resources. In

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addition, government earnings of developing countries remain low that is earned from developing countries that are lower because of levels of household income. Developing countries must rely on foreign resources because of three types of deficits 1) saving deficit 2) fiscal deficit and 3) Balance of payment deficit.

Foreign resources also help in attaining the higher consumption level of households. The most important merit of these resources is that they introduce the economies to new technology, generate employment opportunities, and work for the training of labor. As we have already discussed foreign resources help fill the import-export gap, saving-investment gap, and introducing economies with modern technology (Ali et al., 2021; Sayvaya & Phommason, 2023; Abigail, 2023). But there are some demerits related to foreign resources like rapid monetary expansion, current account deficit, and appreciation of real exchange rate. Foreign resources also work as a substitute for domestic saving and investment. Foreign resources are creating problems for economic policies in the present age of globalization and the movement of capital. Literature on foreign resources on foreign resources shows that it has both positive and negative effects on developing countries. In this study literature also shows mixed results that may be either positive or negative. In the empirical literature, the relationship of foreign resources with gross domestic product, poverty, and inequality gets much attention in Pakistan. Pakistan is also coming on the list of developing countries. Pakistan also needed foreign resources to fill the saving-investment gap, speed up the growth process, and alleviate poverty and inequality. Pakistan faces problems like a lack of technology, political instability, and insufficient physical and human capital. These issues create a continuous need for foreign resources to support growth. Over the years, the types of foreign resources Pakistan receives have changed. From 1980 to 2008, the share of remittances decreased from 16.35% to 12.48%, while foreign direct investment rose from 0.26% to 9.96%. Foreign debt increased between 1985 and 2000, but then fell to 76.5% in 2008 from 93.91% in 2000. The impact of foreign resources on poverty and economic development is debated. Some studies show a positive effect, while others show a negative effect (Mohey-ud-din, 2006). This study examined how foreign resources affect poverty and inequality. Besides foreign direct investment and foreign portfolio investment, it also looked at remittances, foreign debt, and aid to understand their impact on growth, poverty, and inequality. So this study re-examines the relationship between foreign resources on poverty and inequality by using some additional variables like gross domestic product, capital, and labor. The result is estimated by using the ARDL technique. The study is organized as follows. Section 2 reviews the literature on the impact of foreign resources on poverty and inequality. Section 3 discusses the model, data, and methodology. In section 4, econometric estimations and their interpretation are given. Section 5 discusses the conclusion and also suggests some policy implications.

## 2. Literature Review

This section presents a review of many studies that examined how foreign resources influence poverty and inequality. Table 1 shows the summary of the studies.

**Table 1: Summary of Studies**

Reference(s)	Time Period	Country	Methodology	Results
<b>Studies on Foreign Direct Investment and Poverty</b>				
Gyamfi et al. (2022)	1990- 2019	BRICS Economies	Common Correlated Effects Mean Group (CCEMG),	Technological advancements and renewable energy help lower CO2 emissions, while industrial development and natural resources attract foreign investment.
Ilyas et al. (2022)	1990- 2021	Sub-Saharan African Countries.	ARDL	The findings revealed a negative long-run influence of foreign direct investment and GDP to poverty headcount ratio.
Ucal (2014)	1990 -2009	Developing Countries	Panel data analysis	Negative relationship between poverty and FDI
Shamim et al. (2014)	1973-2011	Pakistan	ARDL	Positive relationship between investment to GDP ratio, FD, ER, PS, openness, and FDI. There was a negative relationship between, FDI, FD, PI, and headcount ratio.
Nadeem et. al (2014)	1980-2011	SAARC countries	fixed effect Model	Foreign direct investment and CPI were negatively related to poverty and significance while GDP per capita and trade openness are positively related to inequality
Jamal et al. (2013)	1972-2008	Pakistan	Johansen cointegration	Trade openness, remittances, urban population, and real interest rate were positive, and inward foreign direct investment was negatively related to inequality
Sarisoy and Koc (2012)	1980-2008	Developed and Developing countries	ARDL	FDI affects the income groups in four ways: FDI increases the income of the richest group and decreases the income of the poor and middle group.
Mahmood and Chaudhary (2012)	1973 -2003		ARDL	FDI and government expenditures had a negative impact on poverty.
<b>Studies on Workers Remittances and Poverty</b>				

Azam et al. (2016)	1990-2014	Developing and Developed Countries	FMOLS		Foreign remittances have a positive impact on poverty reduction
Faridi and Mehmood (2014)	1972-2010	Pakistan	OLS method		Results showed that remittances are inversely related to poverty
Antwi et al. (2013)	1980-2010	Ghana	ARDL		Remittances had a positive and significant effect on human capital and investment
Chaudhry & Imran (2013)	1980-2010	Pakistan	Autoregressive (AR) model		The findings of the first model showed that openness, remittances, and foreign direct investment were negatively related to poverty
Javid et al. (2012)	1973-2010	Pakistan	ARDL		In the long run, remittances showed a positive relationship with growth and poverty reduction
Portes (2009)	1970-2000	46 countries	Panel OLS		Results showed that all remittances not only reduce poverty but also help in reducing inequality
Siddique and Kemal (2006)	1989-1990	Pakistan	CGE framework		Total effects showed that the negative impact of the decline in remittances dominates the positive impact of trade liberalization
Adams and Page (2005)		Developing countries	OLS method		Remittances and international migration have a strong and significant impact on reducing poverty
Studies on Foreign Aid and Poverty					
Woledekidan (2015)	1975-2010	Ethiopia	Maximum likelihood		Results showed that foreign aid played a positive role in reducing poverty
Larru & Gonzalez (2014)	1990-2008	Latin American countries	Panel technique	data	Results showed that aid is negatively related to inequality.
Ali and Ahmad (2013)	1972-2007	Pakistan	Johansen cointegration		Results showed that GDP reduced income inequality
Alvi and Senbeta (2012)	1981-2004		GMM		Financial development showed stronger effect of poverty reduction than the direct effect of foreign aid
Nunnenkamp & Herzer (2012)	1970-1995	21 recipient countries	Panel cointegration		Foreign aid positively affects inequality, which means more aid causes more poverty.
Oskooee and Oyolalo (2009)	1981-2002	developing countries	2SLS		found that inequality and growth have a strong impact on poverty reduction
Studies on External Debt and Poverty					
Sheikh and Alam (2013)	1985-2010	Pakistan	OLS method		Results showed a negative relationship between per capita GDP, wage rate, and poverty. Unemployment rate, external debt, and external debt servicing were positively related to poverty
Ogege et. al (2013)	1980-2010	Nigeria	Johansen integration	co	Results showed that external debt caused poverty in Nigeria. Debt income ratio, debt service ratio and inflation rate were negatively related to poverty reduction.
Loko et al. (2003)	1985-1999	Low-income countries	GMM		external indebtedness indicators have adverse but limited impact on non-income poverty indicators such as life expectancy, infant mortality, and enrolment rate

A comprehensive review of the different variables related to the role of foreign resources in reducing poverty and inequality is discussed. In this section, a review of foreign resources like foreign direct investment, worker remittances, foreign aid and external debt on poverty and inequality has been done separately. Different researchers gave different points of according to them resources either affect poverty and inequality positively or negatively. So mixed results are found in the literature

### 3. Model, Data and Methodology

#### 3.1. Model specification

The main purpose of this study is to estimate the impact of foreign resources on poverty and inequality. In this analysis, both the headcount ratio and the Gini coefficient are used as dependent variables. Thus we have specified the following two models.

Role of Foreign Resources in Poverty Alleviation

$$LHCR = f(LFDI, LREM, LEXD, LFAID, LGFCF, LLFPR, LGDPM) \quad (1)$$

The econometric form of the model is:

$$LHCR = \beta_0 + \beta_1 LFDI + \beta_2 LREM + \beta_3 LEXD + \beta_4 LFAID + \beta_5 LLFPR + \beta_6 LGDPM + \mu_t \quad (2)$$

Role of Foreign Resources in Reducing Inequality

$$LGINI=f(LFDI, LREM, LEXD, LFAID, LGFCF, LLFPR, LGDPM) \quad (3)$$

The econometric form of the model is:

$$LGINI=\beta_0 + \beta_1LFDI + \beta_2LREM + \beta_3LEXD + \beta_4LFAID + \beta_5LFPR + \beta_6LGDPM + \mu_t \quad (4)$$

The ARDL specification of the models is:

$$\begin{aligned} \Delta \ln(POV)_t = & \beta_0 + \sum_{i=0}^{a1} \beta_1 \Delta \ln(POV)_{t-i} + \sum_{i=1}^{a2} \beta_2 \Delta \ln(GDPM)_{t-i} + \sum_{i=1}^{a3} \beta_3 \Delta \ln(LFPR)_{t-i} + \sum_{i=1}^{a4} \beta_4 \Delta \ln(GFCF)_{t-i} \\ & + \sum_{i=1}^{a5} \beta_5 \Delta \ln(FDI)_{t-i} + \sum_{i=1}^{a6} \beta_6 \Delta \ln(REM)_{t-i} + \sum_{i=1}^{a7} \beta_7 \Delta \ln(FAID)_{t-i} + \sum_{i=1}^{a8} \beta_8 \Delta \ln(EXD)_{t-i} + \beta_9 \ln(POV)_{t-1} \\ & + \beta_{10} \ln(LFPR)_{t-1} + \beta_{11} \ln(GFCF)_{t-1} + \beta_{12} \ln(FDI)_{t-1} + \beta_{13} \ln(REM)_{t-1} + \beta_{14} \ln(EXD)_{t-1} \\ & + \beta_{15} \ln(GDPM)_{t-1} + \beta_{16} \ln(FAID)_{t-1} + \epsilon_t \end{aligned} \quad (5)$$

The second model that captures the effect of foreign resources in reducing inequality in Pakistan

$$\begin{aligned} \Delta \ln(INQ)_t = & \partial_0 + \sum_{i=0}^o \phi_0 \Delta \ln(INQ)_{t-i} + \sum_{i=1}^p \phi_1 \Delta \ln(GDPM)_{t-i} + \sum_{i=1}^q \phi_2 \Delta \ln(LFPR)_{t-i} + \sum_{i=1}^r \phi_3 \Delta \ln(GFCF)_{t-i} \\ & + \sum_{i=1}^s \phi_4 \Delta \ln(FDI)_{t-i} + \sum_{i=1}^t \phi_5 \Delta \ln(REM)_{t-i} + \sum_{i=1}^u \phi_6 \Delta \ln(FAID)_{t-i} + \sum_{i=1}^v \phi_7 \Delta \ln(EXD)_{t-i} + \gamma_1 \ln(INQ)_{t-1} \\ & + \gamma_2 \ln(LFPR)_{t-1} + \gamma_3 \ln(GFCF)_{t-1} + \gamma_4 \ln(FDI)_{t-1} + \gamma_5 \ln(REM)_{t-1} + \gamma_6 \ln(EXD)_{t-1} + \gamma_7 \ln(GDPM)_{t-1} \\ & + \gamma_8 \ln(FAID)_{t-1} + \mu_t \end{aligned} \quad (6)$$

### 3.2. Data Sources

To estimate the impact of foreign resources on poverty and inequality in the case of Pakistan, we have used time series data from 1980-2022. All the data are taken from various sources. Table 1 exhibits the description and sources of variables.

**Table 1: Variables: Description and Sources**

Variables	Description	Source of Data
HCR	Headcount ratio as a measure of poverty	WDI
GINI	Gini coefficient as a measure of inequality	WDI
WREM	Worker's remittances	Handbook of statistics on Pakistan Economy & Pakistan economic survey (various issues)
FDI	Foreign direct investment	(various issues)
FAID	Foreign aid	
EXD	External Debt	
GFCF	Gross fixed Capital Formation	
LFPR	Labor force participation rate	
GDPM	Gross domestic product at market price	

## 4. Results and Discussion

In this section, we are moving towards drawing some conclusions based on the results of the study.

### 4.1. Descriptive Statistics Analysis

Table 2 provides descriptive statistics for the main variables used in the study. Starting with External Debt (EXD), the mean value is approximately \$1,470,575, with a median of \$932,065.8. The maximum observed value is \$5,071,000, and the minimum is \$86,159.7. The standard deviation is quite high at \$1,543,393, indicating considerable variability in external debt levels across the observed period. The skewness value of 1.234 suggests a moderate right skewness, implying that the distribution of external debt is slightly skewed to the right. The kurtosis value of 3.4 indicates that the distribution of external debt is leptokurtic, meaning it has heavier tails and a sharper peak than a normal distribution. The Jarque-Bera test statistic is 9.11, with a p-value of 0.01, suggesting that the distribution of external debt is not normally distributed. Moving on to Foreign Aid (FAID), the mean is \$84,517.9, with a median of \$37,463.5. The maximum observed value is \$365,163.1, and the minimum is \$8,125.72. The standard deviation is \$92,685.65, indicating notable variability in foreign aid receipts. The skewness value is 1.482273, indicating a moderate right skewness. The kurtosis value of 4.33 suggests that the distribution of foreign aid is leptokurtic. The Jarque-Bera test statistic is 15.4, with a very low p-value of 0.0004, indicating non-normality in the distribution of foreign aid.

Foreign Direct Investment (FDI) has a mean value of \$101,302.2 and a median of \$23,378.85. The maximum observed value is \$1,366,937, while the minimum is \$277.2. The standard deviation is \$241,672.2, indicating considerable variability in foreign direct

investment levels. The skewness value is 4.336885, indicating a significant right skewness. The kurtosis value of 22.88 suggests that the distribution of FDI is highly leptokurtic. The Jarque-Bera test statistic is 685.9, with a p-value of 0, indicating non-normality. Gross Domestic Product (GDPM) has a mean of approximately \$4,151,274 and a median of \$2,428,312. The maximum observed value is \$14,668,428, and the minimum is \$234,179. The standard deviation is \$4,163,502, indicating considerable variability in GDP levels. The skewness value is 0.936283, indicating a slight right skewness. The kurtosis value of 2.66 suggests that the distribution of GDP is leptokurtic. The Jarque-Bera test statistic is 5.28, with a p-value of 0.07, indicating mild departure from normality.

Gross Fixed Capital Formation (GFCF) has a mean of \$639,537.3 and a median of \$368,424. The maximum observed value is \$2,210,921, and the minimum is \$39,375. The standard deviation is \$662,529.2, indicating considerable variability in GFCF levels. The skewness value is 1.062168, indicating a slight right skewness. The kurtosis value of 2.84 suggests that the distribution of GFCF is leptokurtic. The Jarque-Bera test statistic is 6.62, with a p-value of 0.04, indicating departure from normality.

**Table 2: Descriptive Statistics of Main Variables (1980-2022)**

	Mean	Median	Max.	Min.	St. Dev	Skewness	Kurtosis	J-Bera	Probability
EXD	1470575	932065.8	5071000	86159.7	1543393	1.234	3.4	9.11	0.01
FAID	84517.9	37463.5	365163.1	8125.72	92685.65	1.482273	4.33	15.4	0.0004
FDI	101302.2	23378.85	1366937	277.2	241672.2	4.336885	22.88	685.9	0
GDPM	4151274	2428312	14668428	234179	4163502	0.936283	2.66	5.28	0.07
GFCF	639537.3	368424	2210921	39375	662529.2	1.062168	2.84	6.62	0.04
GINI	31.54977	31.18	34.67	28.65	1.451322	0.188415	2.05	1.54	0.4
HCR	22.7203	22.3	32.78	12.12	4.9668	-0.2852	3.02	0.47	0.79
LFPR	30.03029	29.56	33.04	27.46	1.83795	0.52	1.94	3.19	0.2
WREM	271279.3	52748.24	1601192	17295.8	422021.8	1.98	5.78	34.04	0

The GINI coefficient (GINI) has a mean of 31.54977 and a median of 31.18. The maximum observed value is 34.67, and the minimum is 28.65. The standard deviation is 1.451322, indicating moderate variability in income inequality levels. The skewness value is 0.188415, indicating a slight right skewness. The kurtosis value of 2.05 suggests that the distribution of the GINI coefficient is moderately leptokurtic. The Jarque-Bera test statistic is 1.54, with a p-value of 0.4, suggesting approximate normality. The Headcount Ratio (HCR) has a mean of 22.7203 and a median of 22.3. The maximum observed value is 32.78, and the minimum is 12.12. The standard deviation is 4.9668, indicating moderate variability in poverty levels. The skewness value is -0.2852, indicating a slight left skewness. The kurtosis value of 3.02 suggests that the distribution of the headcount ratio is leptokurtic. The Jarque-Bera test statistic is 0.47, with a p-value of 0.79, suggesting normality. Labor Force Participation Rate (LFPR) has a mean of 30.03029 and a median of 29.56. The maximum observed value is 33.04, and the minimum is 27.46. The standard deviation is 1.83795, indicating moderate variability in LFPR levels. The skewness value is 0.52, indicating a slight right skewness. The kurtosis value of 1.94 suggests that the distribution of LFPR is mesokurtic. The Jarque-Bera test statistic is 3.19, with a p-value of 0.2, suggesting approximate normality. Finally, Worker Remittances (WREM) have a mean of \$271,279.3 and a median of \$52,748.24. The maximum observed value is \$1,601,192, and the minimum is \$17,295.8. The standard deviation is \$422,021.8, indicating considerable variability in remittance levels. The skewness value is 1.98, indicating moderate right skewness. The kurtosis value of 5.78 suggests that the distribution of worker remittances is leptokurtic. The Jarque-Bera test statistic is 34.04, with a p-value of 0, indicating non-normality.

#### 4.2. Correlation Analysis

Correlation analysis is used to measure the degree of association between selected variables. The results of the correlation matrix of variables are given in Table 3.

**Table 3: Correlation Matrix**

	EXD	FAID	FDI	GDPM	GFCF	GINI	HCR	LFPR	WREM
EXD	1								
FAID	0.94	1							
FDI	0.25	0.24	1						
GDPM	0.90	0.89	0.38	1					
GFCF	0.82	0.86	0.33	0.92	1				
GINI	-0.19	-0.10	-0.05	-0.21	-0.19	1			
HCR	-0.62	-0.57	0.03	-0.49	-0.41	0.05	1		
LFPR	0.79	0.78	0.33	0.84	0.76	-0.08	-0.47	1	
WREM	0.95	0.90	0.17	0.79	0.73	-0.08	-0.69	0.79	1

External Debt (EXD) exhibits strong positive correlations with Foreign Aid (FAID) and Gross Domestic Product (GDPM), with correlation coefficients of 0.94 and 0.90 respectively. This suggests that as external debt increases, so does foreign aid and GDP. This finding is intuitive as countries often rely on external borrowing to finance development projects and stimulate economic growth. Foreign Aid (FAID) also shows a strong positive correlation with Gross Domestic Product (GDPM) and Gross Fixed Capital

Formation (GFCF), indicating that higher levels of foreign aid are associated with increased economic output and investment in fixed assets. The correlation coefficients are 0.89 and 0.86 respectively. Foreign Direct Investment (FDI) exhibits a moderate positive correlation with GDPM and GFCF, with correlation coefficients of 0.38 and 0.33 respectively. This suggests that FDI inflows are associated with higher levels of economic output and investment in fixed assets. Gross Domestic Product (GDPM) and Gross Fixed Capital Formation (GFCF) display a strong positive correlation of 0.92, indicating that increases in GDP are accompanied by higher levels of investment in fixed assets, which in turn contribute to economic growth. The GINI coefficient, which measures income inequality, shows weak negative correlations with EXD, FAID, GDPM, GFCF, and HCR (Headcount Ratio), ranging from -0.21 to -0.05. This suggests that higher levels of external debt, foreign aid, GDP, and investment in fixed assets are associated with lower levels of income inequality and poverty. The Headcount Ratio (HCR), a measure of poverty, exhibits moderate negative correlations with EXD, FAID, GDPM, GFCF, and LFPR (Labor Force Participation Rate), ranging from -0.62 to -0.41. This indicates that higher levels of external debt, foreign aid, GDP, investment in fixed assets, and labor force participation are associated with lower levels of poverty. Labor Force Participation Rate (LFPR) shows a strong positive correlation with EXD, FAID, GDPM, GFCF, and WREM (Worker Remittances), indicating that higher levels of external debt, foreign aid, GDP, investment in fixed assets, and worker remittances are associated with higher labor force participation rates. Worker Remittances (WREM) exhibit strong positive correlations with EXD, FAID, GDPM, GFCF, and LFPR, indicating that higher levels of external debt, foreign aid, GDP, investment in fixed assets, and labor force participation are associated with higher worker remittances.

#### 4.3. Unit Root Test

The results of the ADF test are depicted in Table 4 which shows some variables are stationary at the level and some are stationary at first difference.

**Table 4: ADF test for Stationarity**

Variables	Critical Value	ADF Value	Lag Values	Trend/Intercept	Order of integration
EXD	-4.08	-3.64	0	Intercept	I(1)
WREM	-4.04	-3.64	0	Intercept	I(1)
FDI	-4.98	-3.63	0	Intercept	I(0)
FAID	-5.38	-3.64	0	Intercept	I(1)
GDPM	-5.59	-3.64	0	Intercept	I(1)
GFCF	-5.16	-4.25	0	Trend/intercept	I(0)
HCR	-4.45	-3.64	0	Intercept	I(1)
GINI	-6.61	-3.64	0	Intercept	I(1)
LFPR	-5.46	3.64	0	Intercept	I(1)

The results of Augmented Dickey-Fuller (ADF) test of model 1 and model 2 with intercept and trend/intercept states that the variables external debt (EXD), worker remittances (WREM), foreign aid (FAID), gross domestic product (GDP), Headcount ratio (HCR), Gini coefficient (GINI), labor force participation rate (LFPR) are stationary at first difference while foreign direct investment (FDI) and Gross fixed capital formation (GFCF) are stationary at level.

#### 4.4. Bounds Test for Co-integration

The bounds test is used to find the existence of the long-run relationship. Table 5 shows the findings of the Wald-test (F-Statistic) for long-run relationships.

**Table 5: ARDL Bounds Test**

Equations	F-statistic	Upper Bound Critical Value	Conclusion
HCR /FDI,WREM, FAID, EXD,GDPM,GFCF,LFPR	18.34 [0.0000]	3.9 (99%)	Co-integration exist
GINI/FDI,WREM, FAID, EXD,GDPM,GFCF,LFPR	3.86 [0.0093]	3.9 (99%)	Co-integration exist

The results of the bounds test show that long-run relationships exist in both models because the F-statistic is greater than the critical values of the upper bound.

#### 4.5. Long Run Estimates

##### 4.5.1. Long-run Estimates of the Effect of Foreign Resources on Poverty Alleviation

The long-run estimates of Model 1 are given in Table 6. The dependent variable is poverty which is proxied as headcount ratio (HCR), whereas FDI, WREM, EXD, FAID, GDPM, GFCF, and LFPR are independent variables.

The first explanatory variable is foreign direct investment (FDI). The value of the coefficient is positive and insignificant. There are various reasons for this positive impact of foreign direct investment on poverty. The first reason is that there may political instability in the country which is true in the case of Pakistan. The second reason is that foreign direct investment inflows may not be fully utilized. Agarwal and Arti (2015) concluded that (FDI) inflows only generate employment opportunities for highly skilled labor due to which poverty increases. The second explanatory variable is worker's remittances. The value of the coefficient is negative and significant. The reason for poverty reduction by increasing worker's remittances is that remittances directly increase the income of households due to which their consumption level increases. Our result is in line with various studies (Faridi & Mehmood, 2014, Javied et. Al, 2012, Azam et.al, 2015, Adams & Page, 2005). Faridi & Mehmood (2014) concluded that an increase in remittances

causes an increase in demand for locally produced goods that need an increase in supply which as a result reduces poverty by creating more jobs.

**Table 6: Long-run Estimates of Poverty**

Dependent variable: LHCR			
Regressors	Coefficients	S.E	T-Ratio[Prob]
LFDI	.021620	.024263	.89108[.389]
LREM	-1.0749	.13650	-7.8748[.000]
LFAID	-.75701	.10163	-7.4485[.000]
LEXD	-2.0660	.34660	-5.9609[.000]
LGDPM	-.35407	.20974	-1.6882[.115]
LGFCF	-.87594	.19009	-4.6080[.000]
LLFPR	-1.8568	.64529	-2.8775[.013]
Constant	27.3634	3.8025	7.1962[.000]
Trend	.25715	.036173	7.1089[.000]

The third explanatory variable is foreign aid. Foreign aid is very important to reduce poverty in the case of Pakistan. The value of the coefficient of foreign aid is negative and significant. This result is compatible with the study (Oskooee and Oyolola, 2009, Alvi & Senbeta, 2012). The fourth explanatory variable is external debt (EXD) which shows a negative and significant impact on poverty. The reason for this negative effect is that the loans taken from developed countries are fully utilized and converted into capital and other necessary inputs due to which development occurs. (Boyoee & Ojo, 2012) found the positive relationship between growth rate and external debt that supports our result in the sense that if it increases growth then due to growth in the economy poverty starts to decrease.

The fifth explanatory variable is GDP. GDP is an important indicator in alleviating poverty in the case of Pakistan. The value of the coefficient of GDP is negative and insignificant. The reasons are political stability, an increase in household income level, and the generation of more employment opportunities. Our result is in line with various studies (Bourguignon 2000, Cheema & sial 2012, Antwi et. al 2013). The sixth explanatory variable is gross fixed capital formation (GFCF). The value of the parameter is negative and significant. The reason is that productive activities may be stimulated by expanding infrastructure. Another reason is investment in human capital generates skilled and more productive labor. Our result stays in line with (Suryadarma & Suryahadi, 2007) who find a negative relationship between gross fixed capital formation and poverty.

The seventh explanatory variable is the labor force participation rate. The value of the parameter is negative and significant. This result is compatible with the study (Odhiambo & Manda, 2003).

**Table 7: Error Correction Estimates of Poverty**

Dependent Variable: dLHCR			
Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLHCR1	0.2656	0.1378	1.9277[.070]
dLFDI	0.0107	0.0123	.86737[.397]
dLREM	0.0302	0.0523	.57755[.571]
dLREM1	0.4203	0.0512	8.2043[.000]
dLFAID	-0.1206	0.0294	-4.0967[.001]
dLFAID1	0.1473	0.0259	5.6951[.000]
dLEXD	-0.5800	0.2084	-2.7825[.012]
dLGDPM	-0.4329	0.2076	-2.0850[.052]
dLGDPM1	-0.6560	0.1672	-3.9240[.001]
dLGFCF	0.0245	0.0297	.82239[.422]
dLGFCF1	0.2567	0.0430	5.9667[.000]
dLLFPR	-0.9164	0.3141	-2.9172[.009]
dC	13.5049	1.9530	6.9148[.000]
dT	0.1269	0.0181	7.0108[.000]
ECM(-1)	-0.4935	0.0652	-7.5725[.000]

$$ECM = LHCR - .021620 * LFDI + 1.0749 * LREM + .75701 * LFAID + 2.0660 * LEXD + .35407 * LGDPM + .87594 * LGFCF + 1.8568 * LLFPR - 27.3634 * C - .25715 * T$$

R-Squared	0.97780	R-Bar-Squared	.94536
DW-statistic	2.1816	F-stat. F(14, 18)	40.9022[.000]

The fact that there exists co-integration between variables provides support for the use of an error correction mechanism (ECM) that investigates the short-run dynamics. ECM examines the rate of adjustment to restore long-run equilibrium. Schwartz Bayesian Criteria is used for the estimation of results as it is done in the long run. The short-run result shows that  $R^2$  value is very high indicating that 97 percent variation in poverty is due to the variables included in the model. The overall model is significant as shown by probability value of F-statistic.

The value of  $Ecm(-1)$  is  $-0.49$  for model 1 which shows that the short-run variable approaches long-run variables approximately in half a year. More importantly, ECM has its expected negative sign and significance. Further proof of long-run and unidirectional relationship existence is provided by negative and significant signs of ECM.

**Table 8: Long-run Estimates of Inequality**

Dependent variable: GINI			
Regressor	Coefficient	S.E	T-Ratio[Prob]
LFDI	-.055942	.022953	-2.4372[.025]
LREM	-.11269	.039931	-2.8220[.011]
LFAID	-.15890	.060066	-2.6454[.016]
LEXD	.35620	.14118	2.5230[.021]
LGDPM	-.80525	.270479	-.9634[.052]
LGFCF	-.012183	.022939	-.53112[.601]
LLFPR	.68430	.45077	1.5181[.145]
Constant	-.59185	1.1018	-.53719[.597]
Trend	-.018573	.0087717	-2.1174[.048]

Foreign direct investment (FDI) plays an important role in a country's development. There has been a negative and significant relationship between foreign direct investment and the Gini coefficient. The link between FDI and inequality is affected by the government and business policies. Education, training, infrastructure trade, and investment promotion policies may be adopted by the government to improve the development impact of foreign direct investment in developing countries. Our result is compatible with the studies like (Mushtaq et al, 2014, Munir et al, 2013). The second explanatory variable is worker remittances. The value of the parameter is negative and significant. The reason is that due to the increase in remittances households' standard of living improved and people hadn't a shortage of money to spend on their basics and as a result, inequality started to decrease. Our result is in line with studies like Mugal et.al, 2010, Portes, 2009, Koechlin & Leon, 2007.

The third explanatory variable is foreign aid. The value of the parameter is negative and significant. The reason is that the decreasing impact of external aid may be because the aid flows might have been used more productively. Our result is compatible with the study (Gonzalez & Larru 2014). The fourth explanatory variable is external debt. The value of the parameter is significant and shows a positive relationship between external debt and income inequality. The reason may be that external debt swallows the government revenue and decreases the government's capacity to more on development projects. This finding is compatible with the study (Akram, 2013). The fifth explanatory variable is GDP. The value of the parameter shows a significant and negative relationship between GDP and inequality. The reason is that growth creates job opportunities, and increased growth in result increasing productivity in the low-wage sector rather than the high-wage sector. On the other hand, increased growth increases the aggregate income level, consumption, and savings of the economy. Consumption directly affects the aggregate demand that works as a stimuli for further growth. The increase in saving increases the investment level by increasing the capital stock of the economy. Our result is in line with various studies (Ali & Ahmad, 2013, Persson & Tabellini, 1991).

**Table 9: Error Correction Estimates of Inequality**

Dependent variable: dGINI			
Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLFDI	.04141	.01299	3.1860[.004]
dLREM	.0834	.02793	2.9866[.007]
dLFAID	.1767E-3	.02085	.00847[.993]
dLFAID1	.1232	.02534	4.8640[.000]
dLGDPM	-.0779	.04791	-1.6261[.118]
dLGFCF	-.0090	.01670	-.5400[.595]
dLLFPR	-.35102	.3566	-.9843[.336]
dC	-.43816	.7737	-.5662[.577]
dT	-.013750	.0056	-2.4459[.023]
ecm(-1)	-.74031	.1417	-5.2215[.000]
ecm = GINI $-.055942 * LFDI - .11269 * LREM + .15890 * LFAID - .35620 * LEXD + .10525 * LGDPM + .012183 * LGFCF - .68430 * LLFPR + .59185 * C + .018573 * T$			
R-Squared	0.78234	R-Bar-Squared	0.63342
F-stat. F( 10, 22)	6.8293[.000]	DW-statistic	2.5559

Gross Fixed Capital Formation (GFCF) is the sixth explanatory variable. The value of the parameter is negative and insignificant. Our result is in line with the study (Chaudhry & Imran, 2013). The seventh explanatory variable is the labor force participation rate. The value of the parameter shows the positive and insignificant relationship between inequality and labor force participation rate. The reason is the higher population that caused supply pressure in Pakistan's economy. Pakistan is an underdeveloped country and also facing the problem of capital deficit due to failure to do the required level of investment in health and education that produces poor quality labor. Poor quality labor means a low level of income and a lower level of household welfare. This finding is compatible with the studies (Ali & Ahmad, 2013).



The short-run results of the second model are given in Table 9. The results state that  $R^2$  value is 78 percent. This value shows a 78 percent variation in income inequality due to the variables that are used in the model. F-statistics probability shows that the overall model is significant. Foreign direct investment and remittances positively affect inequality and are significant.

Foreign aid is positively related to inequality and insignificant while the lag value of FAID is positive but significant. Gross domestic product, gross fixed capital formation, and labor force participation rate are negatively related to inequality and are insignificant. The value of the coefficient of ECM(-1) for model 2 is -0.74. This value shows that the short-run model approaches long-run variables in more than half a year at a 1% level of significance.

## 5. Conclusions and Policy Recommendations

The study addressed the role of foreign resources in alleviating poverty and inequality in Pakistan. According to the literature, various methods are used to measure poverty and inequality but most importantly headcount ratio and Gini coefficient are used that are also used in this study. Poverty and inequality are separately measured to examine the effects of foreign resources on poverty and inequality. In the first model headcount ratio, a proxy for poverty is used as the dependent variable while in the second model Gini coefficient, a proxy for the inequality is taken as the dependent variable and the independent variables are the same in both models. All variables are in log form except foreign resources some control variables are also included in the models like gross domestic product, gross fixed capital formation, and labor force participation rate. We have used both descriptive statistics and econometric techniques to draw the facts from the relationship mentioned in the title. Augmented-Dickey-Fuller unit root test is used to check the stationarity of data the results show that except for the foreign direct investment and gross fixed capital formation, all the variables are stationary at first difference. The study uses the ARDL cointegration technique and its error correction model to check the long-run and short-run results respectively. These models explain the alleviation of poverty and inequality with the help of inflows.

Each model was empirically estimated by using the time series data from 1980-2022. Empirical results show that the impact of foreign direct investment on poverty is positive and insignificant. Other foreign resources like remittances, aid, and debt are significant and negatively related to poverty, which means due to an increase in these resources poverty starts to decrease. Gross domestic product is insignificant in the long run but it has a negative impact on poverty, due to increasing in GDP poverty starts to decrease. Gross fixed capital formation proxy of capital and labor force participation rate both are significant and negatively related to poverty means increase in both of them causes poverty reduction. As already discussed in the literature capital is one of the important factor of growth and growth in turn reduce poverty. When we see the impact of foreign resources on inequality empirical results show that foreign direct investment, remittances, aid, gross domestic product, and gross fixed capital formation all are negatively related to poverty means an increase in all of them causes a decrease in inequality. Except for gross fixed capital formation, all the variables are significant. External debt and labor force participation rate positively affect the inequality which means an increase in them increases inequality and in the model, external debt is significant while labor force participation rate is insignificant. Based on the long-term results of both models, we can suggest the following policies.

1. Foreign direct investment plays a positive role in the development process and poverty reduction. Political stability is necessary to attract foreign direct investment. More employment opportunities are generated by attracting foreign direct investment in the country which fastens the growth process and reduces poverty and inequality. So policies should be made to politically stabilize the economy.
2. The results show that remittances also play a significant in reducing poverty and inequality. Steps should be taken to encourage migration and to attract more remittances.
3. Aid received from developed countries should be properly utilized and used for the development process.
4. The major portion of foreign resources consists of external debt that is a kind of burden on the economy. So policies should be made to avoid external borrowing, if necessary then go for domestic borrowing.
5. The government should provide different facilities to upgrade human capital by investing in the form of education and training to enhance their abilities, skills, and efficiency.
6. Policies should be made to increase domestic savings that further enhance capital formation.

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