



## Exploring the Asymmetric Effect of Internal and External Economic Factors on Poverty: A Fresh Insight from Nonlinear Autoregressive Distributive Lag Model

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### Abstract

**Objective:** This study examines the asymmetric impact of both internal (military, education, and health expenditures) and external (trade opening and foreign direct investment) factors that contribute to poverty reduction. **Methodology:** To find an asymmetric relationship between the proposed variables, we used a non-linear ARDL co-integration approach for the period ranging from 1981-2019. **Findings:** The findings of the study confirm the asymmetric impact of internal (education, military, health expenditures, quality of governance) and external (foreign direct investment, openness) factors on poverty. The finding confirms that ignoring nonlinear or asymmetric properties of macroeconomic variables may mislead inferences. This study has policy implications for government officials to reduce poverty. **Novelty:** the economic theory of poverty is studied from different perspectives by using internal and external factors that have direct and indirect effects on poverty. Furthermore, for in-depth analysis, a nonlinear approach is used to determine which factor has a strong contribution to eliminating poverty.

### Keywords:

Poverty; Health Expenditure;  
Globalization; Quality of Governance;  
Military Expenditures; NARDL.

### Article History:

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## 1- Introduction

Poverty is a global issue; even in the age of modernization, countries in the European Union are still struggling to combat poverty. According to Hofmarcher [1], in European states, nearly 30% of people considered themselves poor, with every seventh household living below the poverty line. According to the SDGs [2], over 800 million people worldwide live on less than US\$1.25 per day, with the majority lacking adequate food, sanitation, and safe drinking water. According to historical statistics, the economies are improving and millions of people have risen out of poverty, but some disagree. In terms of Pakistan, which is classified as a developing country, it is worth noting that Pakistan has also been fighting against poverty since independence, utilizing both internal and external factors. Therefore, the objective of this study is to investigate the impact of internal and external economic factors on poverty. In this regard,

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education, military, and health expenditures, as well as the quality of governance, are considered internal factors, whereas globalization and foreign direct investment are considered external factors. It stymies economic progress and other forms of economic and social development resulting from internal and external economic factors. It is estimated that there are almost 220.8 million people in Pakistan, which places it fifth in the world in population [3, 4].

According to Shaikh & Anis [5], to eliminate poverty, Pakistan collaborates with the development program of the United Nations and UNDP, Pakistan planning and development, and provisional planning and development. Moreover, Pakistan's government spent 1017.5 billion rupees on "Tracking the Pro-Poor Expenditure." Despite the fact that the Benazir Income Support Program (BISP) assists the poor, the number of houses in the fiscal year 2009 increased from 1.7 to 5.17 [6]. According to Zaghdoudi & Hakimi [7], poverty is one of the era's enduring problems because it has social and economic consequences and has a direct impact on the country's citizens. The World Bank defined poverty as the inability to meet one's basic needs. Education and skill development, for example, are insufficient to meet modern-day demands, as are a lack of healthcare facilities, poor governance, and community development. Furthermore, poverty is defined by Hill & Adrangi [8] as a chronic lack of basic human needs such as food, safe drinking water, cooking fuel, sanitation, adequate health care, and education. According to the Organization for Development, poverty is defined as the inability to meet the bare necessities of life over time [9].

This study attempts to contribute to the literature by utilizing both internal factors such as education, health, and military expenditures as well as external factors such as foreign direct investment and globalization. Individual factors associated with poverty have been discussed in the literature, including education [10–12], military expenditures [13, 14], and health expenditures [15–17]. Furthermore, foreign direct investment [18–20] and globalization [21, 22]. As a result, this study combined internal and external factors that had previously been ignored in the literature. Furthermore, there is a growing trend observed to eliminate poverty, and mostly studies are found where education and poverty [23], military expenditure and poverty [13, 14, 24], foreign direct investment and poverty [18–20, 25] show a direct link, but which is the strong factor influencing poverty is ignored. In this regard, corruption is also considered a sensitive factor that must be addressed with caution because it can also have an impact on poverty. According to Ndikumana [26], corruption and income inequalities even exacerbate poverty and encourage crime, so in this regard, the quality of governance must be considered when measuring poverty. Poverty alleviation can also make investment possible, raising the rank of the poor each year as investment rises. Foreign investors are the sources of capital formation [18]. Globalization also took into account the critical external factors that influence poverty through various channels such as government revenue, economic growth, and the labor market [27].

In the introductory part of this article, the brief background of the study and why poverty is still considered an important topic are presented. Furthermore, the literature part provides empirical support for the selection of the variables. The methodological part explains why nonlinear tests are for in-depth analysis and also provides the background for result analysis.

## **2- Review of Literature**

### ***2-1-Internal Factors***

#### ***2-1-1- Education and Poverty***

According to the Oxford Policy Management (2016) report, women's education empowers them and helps reduce poverty in developing countries. Education-related human capital investment leads to growth and innovation, intending to reduce poverty [28]. In this vein, Appleton [29] analyzed Uganda during the 1990s, which demonstrates how the rise in living standards and reduction in poverty during that period had a greater impact on households with higher levels of education. Verner [30] examined the case of Paraíba (Brazil) and demonstrated the critical role of education in poverty reduction. All levels of education (primary, secondary, and tertiary) are associated with a significant and negative likelihood of poverty. In contrast, Knight [31], conducted a study in rural China that linked education and poverty to the formation of a system. In comparison to most poor agricultural societies, the rural China scenario depicts a high population enrollment. Nonetheless, the variables of quality, quantity, and parental education were examined in this study. The main findings suggest that low education, both in terms of quality and duration, reduces the likelihood of being non-poor, resulting in poor health, low quality, and reduced welfare. According to Faux & Ntembe [32], reducing individuals' educational opportunities would reduce their earning potential. Primary education, these researchers discovered, does not affect poverty reduction. Niazi & Khan [33] conducted a prevalence investigation in Punjab (India) that demonstrates the significance of education in addressing the prevalence of multidimensional poverty. Their findings consistently show that multidimensional poverty is more prevalent in rural areas where education is valued. They also look at other regional and demographic factors that define poverty and show that there is an urgent need to address the poor's educational dimension, as human capital is critical to improving welfare and living conditions.

#### ***2-1-2- Health and Poverty***

A good, healthy environment is associated with mental, social, and physical health. In this regard, Gupta & Mitra [34] investigated the relationship between poverty and health and concluded that an individual's health status can also help reduce poverty. Furthermore, the researchers stated that poverty and health are inextricably linked. Das et al. [16]

described the relationship between poverty and health and how to measure poverty through lack of education, lack of clean water, and unemployment. Furthermore, income distribution has a direct impact on poor health; if income was distributed unequally, poverty could not be reduced [35]. Furthermore, Belle [36] also concluded that the study on health and poverty described a positive correlation and advised that poverty causes stress among individuals. Wicks-Lim and Arno [17] established a link between health and socioeconomic status, and the reason for including socioeconomic status is to develop effective policies for poverty reduction, as poverty is a component of socioeconomic status. Additionally, Abdel-Rahman & Abonazel [37] considered health expenditures to be a critical component of economic activities that alleviate poverty, and the research used out-of-pocket to quantify health expenditures. Sarti et al. [38] conducted a study on private health expenditures and poverty, concluding that decreasing private health expenditures increases the cost of health care for low-income households.

### ***2-1-3- Military Expenditure and Poverty***

According to the literature, there are two types of thoughts: first, expenditure on the military, positively associated with growth, and second, expenditure on the military is negatively associated with growth, but both types of relationships affect poverty. Additionally, ADB [39] expressed his perspective on growth and the impact of economic activities on poverty, concluding that growth is the country's most effective tool for poverty reduction. Kalim & Hassan [40] concluded that military expenditure and poverty have a positive relationship. Furthermore, in the context of Pakistan, Kalim & Hassan [41] public defense included an investigation of the association with poverty, and the study's findings indicated a significant short- and long-run relationship. Henderson [24] used the United States as a case study to investigate the positive relationship between military spending and poverty, as well as military spending in two different eras, war and peace timing. Poverty and military spending during wartime were discovered to have a positive relationship, whereas poverty and military spending during peacetime were discovered to have a negative relationship.

## ***2-2- External Factors***

### ***2-2-1- Globalization and Poverty***

The world has become a global village, with every nation putting their resources into reducing poverty; in this regard, neighboring countries and developed countries are also assisting poor nations to reduce their poverty. In this regard, trade policies are regarded as an important component of globalization. As a result, many subsequent studies assume that trade has a significant or broad impact on economic growth and alleviation. It is necessary to define the relationship between trade and growth, as well as growth and poverty [42, 43]. They have not, however, been resolved, resulting in numerous disagreements in the empirical literature. Previous research has consistently found that trade has a positive effect on growth [42, 44], which can reduce poverty. the study's conservative side, on the other hand. They believe that the relationship is conditional and difficult to generalize [45, 46], or that trade is not the only source of growth. Regardless, the link between growth and poverty has been established, and most people, including various international development agencies, believe that economic growth is the most effective way to improve the lives of the poor. However, there is some concern that if non-poor people capture more of the growth gain than poor people, the growth effect on poverty reduction may be diminished [47]. Furthermore, Shiva [48] stated that economic globalization is the seed for industries that increase job opportunities for individuals, resulting in higher leave standards. According to Bergh and Nilsson [49], globalization drives a nation's economic activities toward growth, which has a real impact on poverty.

### ***2-2-2- Foreign Direct Investment and Poverty***

Numerous studies have been conducted in context of FDI and economic growth; therefore, it is observed that FDI indirectly helps to reduce poverty. Gohou & Soumaré [25] investigated the relationship between FDI and growth by measuring poverty using welfare. Furthermore, researchers found that foreign direct investment promotes human capital and has the potential to reduce poverty. Saith [50] explained the relationship between agricultural product prices and rural poverty, indicating that an increase in agricultural product prices caused poverty to decrease. Fujii [51] investigated the effect of inflation (food prices) and poverty on non-agricultural and agricultural households. According to the findings, household agriculturalists have successfully eliminated poverty. Despite the fact that some of them become the poorest of the poor, food inflation has a significant impact on both non-agriculturalists and agriculturalists. Azid et al. [52] investigated food price increases and their impact on poverty, which helped social scientists and policymakers improve social welfare to eradicate poverty.

### ***2-2-3- Governance and Poverty***

Governance is a broad term; Bevir [53] defined government as "hybrid and multijurisdictional, with multiple stakeholders collaborating in networks". The researcher also described four governance characteristics: administrative governance, non-profit organizations, and market mechanisms. Then there's the transnational element and the multijurisdictional approach. Thirdly, there is a growing diversity and plurality of stakeholders, which is the final step. Hyden [54] investigated the governance mechanisms underlying poverty reduction in Africa and discovered a positive

correlation between governance and poverty reduction. Gupta et al. [55] discovered a positive and statistically significant relationship between poverty and governance quality [56, 57]. According to Acemoglu et al. [58], poverty and inequality are identified by determining that governance quality is inadequate. Furthermore, the unequal distribution of factors demonstrates the quality of governance [59]. Easterly and Levine [60] used the term institutions to define the positive relationship between governance and poverty quality.

### 3- Research Methodology

This section provides information about the data and variables. Annual data from Pakistan from 1981 to 2019 is collected to meet the objective. Quality of governance (QoG), education spending, health expenditure, military expenditure, globalization, and influencing factors all have an impact on poverty. A further description is given in Table 1.

**Table 1. Description of the variables**

| Variable | Description               | Units                            | Sources |
|----------|---------------------------|----------------------------------|---------|
| Poverty  | Poverty                   | GINI                             | WDI     |
| QOG      | Quality of governance     | Index                            | ICRG    |
| EDU      | Education expenditure     | Expenditure on education         | WDI     |
| Hexp     | Health expenditure        | Government expenditure on health | WDI     |
| MExp     | Military expenditure      | Total expenditure on defense     | WDI     |
| FDI      | Foreign Direct Investment | Inflow                           | WDI     |
| Glo      | Globalization             | Import and export                | WDI     |

To look into the long-run relationship between poverty, internal factors (education, health, and military expenditure), and external factors (foreign direct investment and globalization), Equation 1 is used:

$$Poverty_t = \beta_0 + \beta_1 QOG_t + \beta_2 Edu_t + \beta_3 hexp_t + \beta_4 mexp_t + \beta_5 FDI_t + \beta_6 GLO_t + U_t \quad (1)$$

According to the above equation, the dependent variable is poverty; the term QOG is used for quality of governance; Edu is used for education expenditure; Hexp is used for health expenditure; Mexp is used for military expenditure; GLO is used for globalization; and FDI is used for foreign direct investment. According to the authors' best knowledge of poverty modeling, all research on poverty modeling is conducted in a linear system. Supporting NARDL, Meo et al. [61] used the nonlinear ARDL approach to check the long- and short-run co-integration between unemployment and poverty. In this regard, this study has a methodological gap because NARDL is considered a unique methodology to examine the external and internal causes of poverty. Furthermore, Romilly et al. [62] pointed out the advantages of the NARDL approach as compared with other classical cointegration methods, and firstly, in a small sample, NARDL provided effective results. Secondly, the NARDL approach can be applied without checking stationarity [63].

$$\Delta poverty_t = \delta_0 + \sum_{s=1}^m \delta_{1s} \Delta goq_{t-s} + \sum_{s=1}^m \delta_{2s} \Delta edu_{t-s} + \sum_{s=1}^m \delta_{3s} \Delta hexp_{t-s} + \sum_{s=1}^m \delta_{4s} \Delta mexp_{t-s} + \sum_{s=1}^m \delta_{5s} \Delta fdi_{t-s} + \sum_{s=1}^m \delta_{6s} \Delta glo_{t-s} + \alpha_1 poverty_{t-1} + \alpha_2 goq_{t-1} + \alpha_3 edu_{t-1} + \alpha_4 hexp_{t-1} + \alpha_5 mexp_{t-1} + \alpha_6 fdi_{t-1} + \alpha_7 glo_{t-1} + \varepsilon_t \quad (2)$$

The long-run effect is shown in Equation 1, but the short-run relationship with the error correction arrangement is shown in Equation 2, by following the footsteps of Engle and Granger [64]. After the minor modification of the lag of the error term, both long-term and short-term parameters are symmetrically estimated in the above Equation 2.

$$Poverty_t = \beta_0 + \beta_1 qog_t^+ + \beta_1 qog_t^- + \beta_2 edu_t^+ + \beta_2 edu_t^- + \beta_3 hexp_t^+ + \beta_3 hexp_t^- + \beta_4 mexp_t^+ + \beta_4 mexp_t^- + \beta_5 fdi_t^+ + \beta_5 fdi_t^- + \beta_6 glo_t^+ + \beta_6 glo_t^- + U_t \quad (3)$$

The long-run parameters are mentioned in the above equation as  $\beta_i$  and the negative and positive changes are shown. As the long run is discussed in Equation 1, it is also necessary to discuss the short-run association in Equation 2. The above Equation 3 investigated the short-run association, which was investigated using the error correction model. Furthermore, this study has centrally concerned asymmetric relations in Equation 3 and symmetric relationships checked. As a result, an asymmetric relationship is shown as  $\alpha_t = \beta^+ b_t^+ + \beta^- b_t^- + \varepsilon_t$  where beta represents the long-run alimnet and  $b_t$  regression vector as  $b_t = b_0 + b_t^+ + b_t^-$ , where  $b^+$  and  $b^-$  are the negative and positive changes, in this regard following equations from Equations 4 to 17 are showing the negative and positive changes in variables:

$$poverty^+ = \sum_{j=1}^k \Delta poverty_j^+ + \sum_{j=1}^k mx(\Delta poverty_i, 0) \quad (4)$$

$$poverty^- = \sum_{j=1}^k \Delta poverty_j^- + \sum_{j=1}^k mi(\Delta poverty_i, 0) \quad (5)$$

$$qog^+ = \sum_{j=1}^k \Delta qog_j^+ + \sum_{j=1}^k mx(\Delta qog_i, 0) \tag{6}$$

$$qog^+ = \sum_{j=1}^k \Delta qog_j^+ + \sum_{j=1}^k mi(\Delta qog_i, 0) \tag{7}$$

$$edu^+ = \sum_{j=1}^k \Delta edu_j^+ + \sum_{j=1}^k mx(\Delta edu_i, 0) \tag{8}$$

$$edu^+ = \sum_{j=1}^k \Delta edu_j^+ + \sum_{j=1}^k mi(\Delta edu_i, 0) \tag{9}$$

$$hexp^+ = \sum_{j=1}^k \Delta hexp_j^+ + \sum_{j=1}^k mx(\Delta hexp_i, 0) \tag{10}$$

$$hexp^+ = \sum_{j=1}^k \Delta hexp_j^+ + \sum_{j=1}^k mi(\Delta hexp_i, 0) \tag{11}$$

$$mexp^+ = \sum_{j=1}^k \Delta mexp_j^+ + \sum_{j=1}^k mx(\Delta mexp_i, 0) \tag{12}$$

$$mexp^+ = \sum_{j=1}^k \Delta mexp_j^+ + \sum_{j=1}^k mi(\Delta mexp_i, 0) \tag{13}$$

$$glo^+ = \sum_{j=1}^k \Delta glo_j^+ + \sum_{j=1}^k mx(\Delta glo_i, 0) \tag{14}$$

$$glo^+ = \sum_{j=1}^k \Delta glo_j^+ + \sum_{j=1}^k mi(\Delta glo_i, 0) \tag{15}$$

$$fdi^+ = \sum_{j=1}^k \Delta fdi_j^+ + \sum_{j=1}^k mx(\Delta fdi_i, 0) \tag{16}$$

$$fdi^+ = \sum_{j=1}^k \Delta fdi_j^+ + \sum_{j=1}^k mi(\Delta fdi_i, 0) \tag{17}$$

In the following, we replace Op, E, and I in the above-mentioned equation; each variable has a positive and negative effect, and these are in the subsequent stage. So, according to the above-mentioned equation, the following equation is derived for nonlinear ARDL:

$$\Delta poverty_t = \sigma_o + \sum_{s=1}^m \sigma_{1s} \Delta goq_{t-s} + \sum_{s=1}^m \sigma_{2s} \Delta edu_{t-s} + \sum_{s=1}^m \sigma_{3s} \Delta hexp_{t-s} + \sum_{s=1}^m \sigma_{4s} \Delta mexp_{t-s} + \sum_{s=1}^m \sigma_{5s} \Delta fdi_{t-s} + \sum_{s=1}^m \sigma_{6s} \Delta glo_{t-s} + \vartheta_1 poverty_{t-1} + \vartheta_2 goq_{t-1} + \vartheta_3 edu_{t-1} + \vartheta_4 hexp_{t-1} + \vartheta_5 mexp_{t-1} + \vartheta_6 fdi_{t-1} + \vartheta_7 glo_{t-1} + \varepsilon_t \tag{18}$$

Estimation of the above equation for NARDL, bounds test approach used [65] for the above model (18). A flowchart illustrating the preliminary tests needed before using the autoregressive distributed lag (ARDL) model on the dataset shows how the model is implemented. The Schwarz information criterion (SIC) and the order of integration (d) are both expressed mathematically (Figure 1) [66].

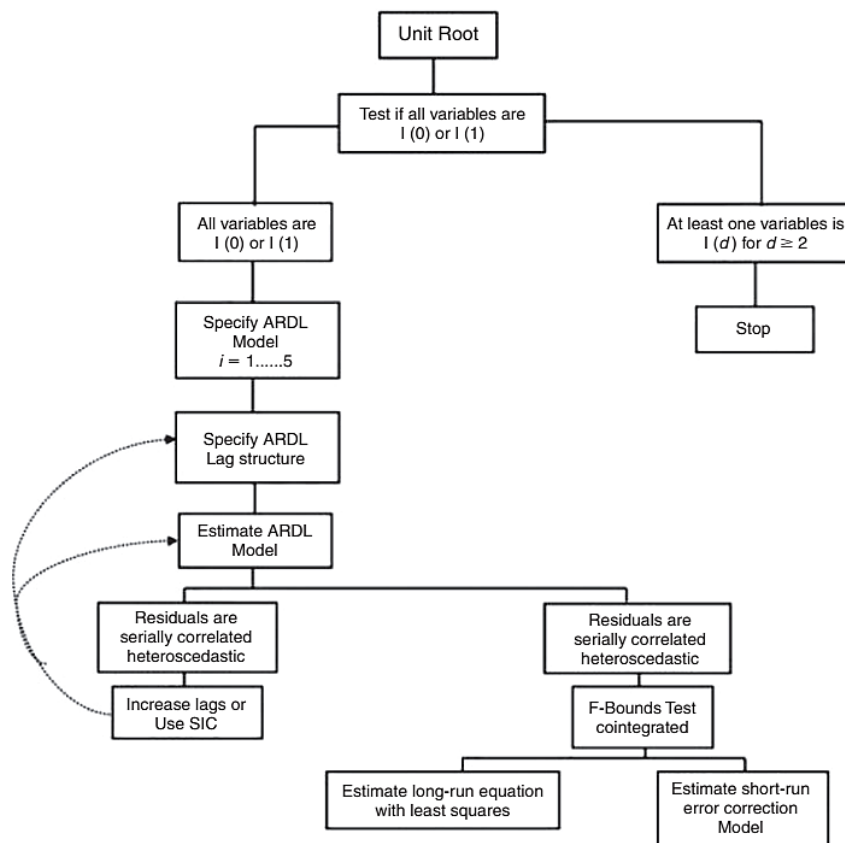


Figure 1. The ARDL model is implemented by performing preliminary tests before using it on the dataset: presented by Shabbir et al. (2019) [66]

#### 4- Empirical Outcomes

Table 2, showing the results of the unit root, shows that it is important to identify the appropriate techniques to fulfill the objective of the study. Furthermore, if variables are integrated at the 2<sup>nd</sup> difference, ARDL is not applicable because the value of F-statistics, cointegration is considered worthless [61, 67]. Furthermore, Ibrahim [63] pointed out that ARDL is considered a flexible econometric technique that is appropriate for the model that is integrated at level and the first difference, even if the model has a mixture of integration means at both level and first difference.

**Table 2. Time series unit root**

|            | Level        |         | First difference |         | Decision |
|------------|--------------|---------|------------------|---------|----------|
|            | T-statistics | P-value | T-statistics     | P-value |          |
| Poverty    | -1.710       | 0.4174  | -2.131           | 0.0210  | I(1)     |
| QoG        | -3.067       | 0.038   |                  |         | I(0)     |
| EDU        | -4.820       | 0.004   |                  |         | I(0)     |
| Health     | -1.870       | 0.340   | -3.922           | 0.006   | I(1)     |
| M. Exp     | 0.890        | 0.994   | -4.878           | 0.000   | I(1)     |
| FDI        | -4.283       | 0.001   |                  |         | I(0)     |
| Trade Open | -2.396       | 0.149   | -6.738           | 0.000   | I(1)     |

Table 3 presents the results of the bound test of the linear and nonlinear ARDL. According to the result, the value of f-statistics is less than the lower and upper bounds, which indicates that there is no linear cointegration in the model. As far as nonlinear or asymmetric ARDL is concerned, the value of F-statistics is greater than the upper and lower limits at the 5% level of significance, which indicates that there is cointegration between poverty and internal and external factors. The main reason to present the bound test is that there is no cointegration while the ARDL test is employed. Therefore, a nonlinear ARDL test was employed, which indicated that a long-run relationship exists in the data.

**Table 3. Bound test nonlinear cointegration**

| Sr.         | F-Statistics | LB   | UB   | Decision         |
|-------------|--------------|------|------|------------------|
| Linear ARDL | 0.795        | 2.62 | 3.79 | No Cointegration |
| Asy ARDL    | 12.33        | 2.14 | 3.34 | Cointegration    |

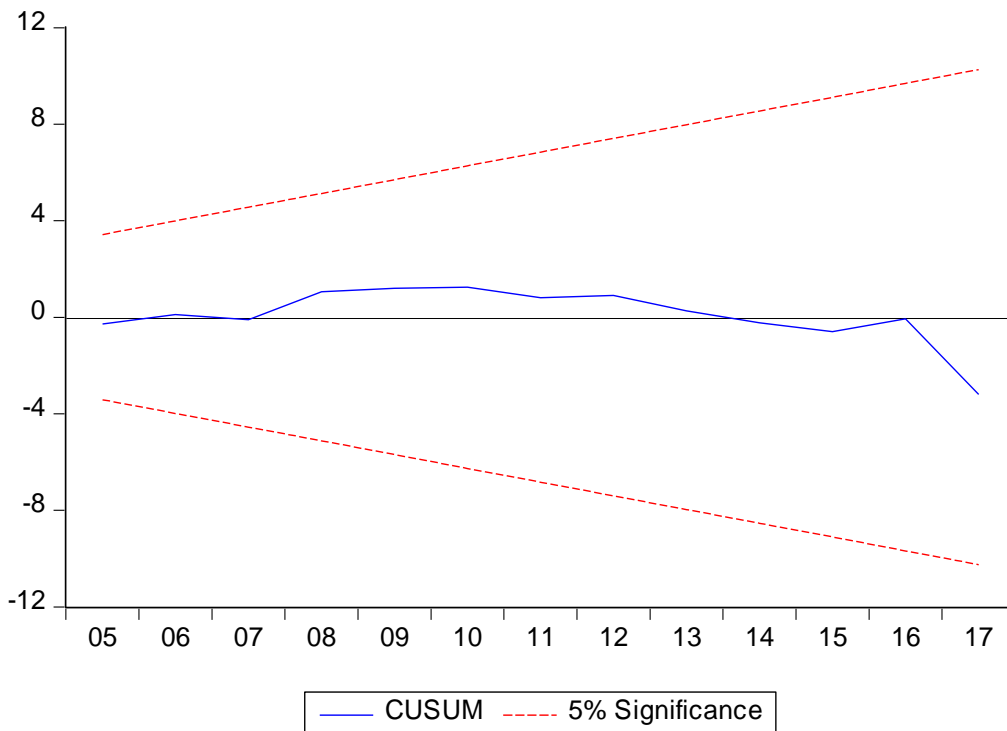
To define the model, we estimate the equation using the general to specific method. However, for the required specification,  $\max p = \max q = 2$  was used, and all nonsignificant predictors were removed from the model. The outcomes are provided in Table 4. The reason for lowering was to account for minor delays, which may result in incorrect analysis and noise in dynamic multipliers [68].

Table 4 shows the results of nonlinear ARDL, where negative and positive effects are shown to examine the long-term co-integration among the variables. Furthermore, long-term as well as asymmetric relationships are also presented. As far as long-term relationships are concerned, quality of governance, education, military, and health expenditures have long-term relationships. An increase in governmental expenditure on what they are using as luxuries has an inverse impact on poverty [69]. Furthermore, education has a positive impact on poverty also supported [70, 71]. On the other hand, military expenditure has an inverse relationship with poverty [40].

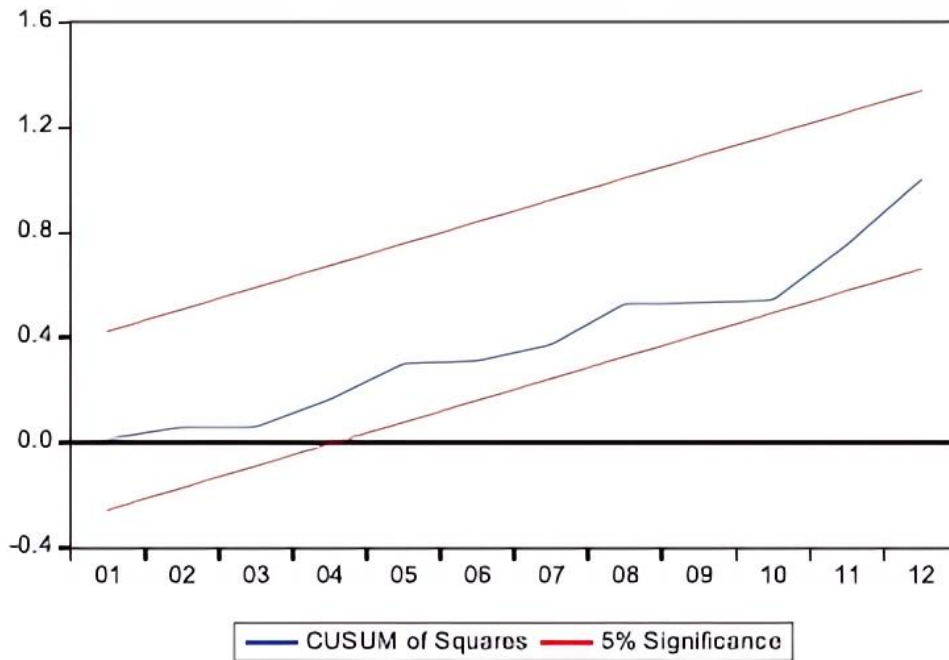
Furthermore, before concluding, the appropriateness of dynamic specifications was assessed using different diagnostic tests and/or statistics, as depicted in Figure 2 and Table 5. The Breusch–Pagan–Godfrey, Durbin–Watson, and Jarque–Bera tests have been used to investigate the problems of normality in data residuals, heteroscedasticity, and serial correlation.

**Table 4. Nonlinear ARDL**

| Variable       | Coefficient | Std. Error | Prob.*       |
|----------------|-------------|------------|--------------|
| POVERTY(-1)    | -0.0101     | 0.2963     | 0.9733       |
| QOG_NEG        | 0.0000      | 0.0000     | 0.6318       |
| QOG_NEG(-1)    | 0.0001      | 0.0000     | 0.0001       |
| QOG_POS        | -0.0001     | 0.0000     | 0.0585       |
| EDU_NEG        | 0.0125      | 0.0146     | 0.4086       |
| EDU_POS        | 0.0584      | 0.0198     | 0.0112       |
| EDU_POS(-1)    | 0.0476      | 0.0233     | 0.0616       |
| HEXP_NEG       | -0.4197     | 0.1148     | 0.0029       |
| HEXP_NEG(-1)   | -0.5876     | 0.1208     | 0.0003       |
| HEXP_POS       | -0.0268     | 0.0841     | 0.7550       |
| HEXP_POS(-1)   | -0.0936     | 0.0887     | 0.3105       |
| MEXP_NEG       | 0.3724      | 0.0971     | 0.0021       |
| MEXP_POS       | -0.4083     | 0.1913     | 0.0524       |
| FDI_NEG        | -1.5504     | 0.5827     | 0.0196       |
| FDI_POS        | 0.9266      | 0.4236     | 0.0476       |
| FDI_NEG(-1)    | 0.7975      | 0.5725     | 0.1870       |
| OPPEN_NEG      | -0.0100     | 0.0117     | 0.4058       |
| OPPEN_NEG(-1)  | 0.0438      | 0.0121     | 0.0030       |
| OPPEN_POS      | -0.0010     | 0.0127     | 0.9374       |
| OPPEN_POS(-1)  | 0.0159      | 0.0104     | 0.1494       |
| C              | -0.0780     | 0.0744     | 0.3141       |
| R-squared      | 0.965735    | Chow test  | 29.145[0.00] |
| F-statistic    | 18.31976    |            |              |
| Log-likelihood | 75.43121    |            |              |



(a)



(b)

**Figure 2. CUSUM and CUSUM of Squares****Table 5. Diagnostic test statistics**

| Selected Model: ARDL ECM Regression |             |                        |             |          |
|-------------------------------------|-------------|------------------------|-------------|----------|
| Variable                            | Coefficient | Std. Error             | t-Statistic | Prob.    |
| D(QOG_NEG)                          | 0.0000      | 0.0000                 | -1.2240     | 0.2427   |
| D(EDU_POS)                          | 0.0584      | 0.0081                 | 7.1730      | 0.0000   |
| D(HEXP_NEG)                         | -0.4197     | 0.0584                 | -7.1885     | 0.0000   |
| D(HEXP_POS)                         | -0.0268     | 0.0404                 | -0.6634     | 0.5187   |
| D(FDL_POS)                          | 0.9266      | 0.2006                 | 4.6195      | 0.0005   |
| D(GLO_NEG)                          | -0.0100     | 0.0041                 | -2.4697     | 0.0282   |
| D(GLO_POS)                          | -0.0010     | 0.0047                 | -0.2170     | 0.8316   |
| CointEq(-1)*                        | -1.0101     | 0.0659                 | -15.3370    | 0.0000   |
| R-squared                           | 0.905577    | Mean dependent var     |             | 0        |
| Log-likelihood                      | 75.43121    | Hannan-Quinn criteria. |             | -3.84406 |
| Durbin-Watson stat                  | 2.146631    |                        |             |          |

We estimate Equation 12 via the general-specific approach to defining the final model. However,  $\max p = \max q =$  two was used for the desired specification, and all predictors that were not relevant were taken out of the model. The decrease's source was insignificant delays, which could lead to inaccurate analysis and generate noise in dynamic multipliers [68]. Besides, complex requirements' appropriateness was measured based on diagnostic tests and statistics before conclusions were drawn. In the error term or residual problems, the serial correlation and heteroscedasticity tests were used to evaluate Jarque – Bera, Durbin – Watson, and Breusch – Pagan – Godfrey.

## 5- Conclusion, Discussion and Policy Implications

This study examines the impact of internal and external economic factors on poverty in Pakistan from 1981 to 2019. To investigate the negative and positive shocks, a nonlinear autoregressive distribution lag model was used. The nonlinear ARDL approach was chosen because it investigated both short- and long-run relationships as well as positive and negative shocks. According to the results of this study, it was concluded that education is considered an important factor that has a strong impact on poverty. Military expenditure inversely effects poverty, but currently, military expenditures are necessary for the survival of the country. As far as external factors are concerned, openness plays a significant role in reducing poverty. Internal and external factors, as well as long- and short-run associations with poverty. Under the lens of the economic theory of poverty, monetary as well as government stances are important to reduce poverty. Therefore, further research is need to conduct on the role of monetary as well as fiscal policy on poverty



or wellbeing. Furthermore, Pakistan, like other countries, has been fighting poverty since its independence, employing both internal and external factors. It stifles economic progress as well as other forms of economic and social development caused by internal and external economic factors. According to the findings of this study, external factors such as foreign direct investment have a positive impact on poverty. Globalization is also considered an external factor that has an inverse relationship with poverty. In terms of internal factors, governance has a significant and inverse relationship with poverty, and health expenditure also plays a significant role in poverty reduction. The question now is why military expenditure has both positive and negative effects on poverty. According to the previous literature, military expenditure reduces poverty during a war or during a period of uncertainty. According to the author's best knowledge, internal factors are more important in reducing poverty and playing a significant role in the economy's viability.

Concerning, education and health, increasing expenditure on education and health leads to a reduction in poverty, as Pakistan is fundamentally a farming country where the agricultural sector contributes significantly to employment levels. In this regard, the contribution of the agricultural sector should be studied in the future to gain a better understanding of poverty. This positive contribution to the labor market is the cause of poverty's demise. The analysis also reveals that gross primary education has a significant negative impact on long-term poverty. Based on this finding, it is possible to conclude that education helps reduce poverty and improve the socioeconomic status of individuals and societies. By educating more people around the world, the world's poor population can be reduced. Similarly, the study concludes that domestic interest-free loans to the private sector will have a significant negative impact on poverty in the future. In Pakistan, the private sector is critical to describing the country's jobs. Because an increase in employment inevitably reduces poverty, there is a negative relationship between poverty and private sector credit. The findings of this study show that FDI has a significant negative impact on poverty in Pakistan.

Employment, new technology acquisition, human capital growth, increasing domestic investment, increased tax revenues, and incorporation of host countries' foreign trade are all benefits of FDI. All of these FDI benefits are the root causes of poverty. According to this study, defense spending in Pakistan has a significant positive effect on poverty. In the end, these reductions raise the country's poverty rate. The following policy guidelines are recommended based on the results of this study: To ensure that education drives social stability and resilience, it must be administered equally and efficiently throughout Pakistan. Through successful policy implications and budget allocation, the Pakistani government should make greater efforts to ensure education quality and coverage. As a result, the standard of education will be spared the scourge of poverty. Because of the critical and negative impact of FDI on Pakistan's poverty, it is clear that labor-intensive industries will help to eradicate poverty even further.

Furthermore, Pakistan has a competitive advantage in labor-intensive manufacturing when compared to other developing countries, allowing the Pakistani government to attract more FDI inflows into labor-intensive industries. Tax breaks for foreign investors, investment-friendly policies, and law and order management should all be part of the strategy. Agriculture, on the other hand, contributes only 21% of GDP and employs 42% of the workforce. These agricultural contributions are minor in comparison to the population and labor force. In this regard, the Pakistani government should place a greater emphasis on agriculture while increasing productivity by providing capital inputs that can accelerate transformation. This research also has some limitations, such as the fact that this study is conducted using time series data collected from Pakistan. For in-depth analysis, we need to use cross-sectional data, which is further categorized by different regions.

## **6- Declarations**

### ***6-1-Author Contributions***

Conceptualization, S.A.; methodology, J.M.M.; software, S.A.; formal analysis, R.M.D.; resources, M.R.; writing—original draft preparation, R.M.D., M.N.M., and A.A.; writing—review and editing, S.A., Ş.C.G., M.R., J.M.M., A.A. and M.N.M.; project administration, M.N.M. All authors have read and agreed to the published version of the manuscript.

### ***6-2-Data Availability Statement***

Data is contained within the article or supplementary material: The data presented in this study are available in the article.

### ***6-3-Funding and Acknowledgements***

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### ***6-4-Institutional Review Board Statement***

Not applicable.

### ***6-5-Informed Consent Statement***

Not applicable.

## 6-6- Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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