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# Burgeoning Public Debt and Unemployment in Pakistan

**1. Nabeela Shaheen, 2. Dr. Moniba Sana, 3. Dr. Atif Ali Jaffri**

1. Lecturer, Govt. Associate College for Women, Guliana, Kharian, Gujrat, Pakistan

nabeela.shahhen08@gmail.com

2. Assistant Professor, Department of Economics, University of Chakwal, Chakwal, Punjab, Pakistan

moniba.sana@gmail.com **(Corresponding Author)**

3. Associate Professor, Department of Economics, University of Gujrat, Gujrat, Punjab, Pakistan

atif.ali@uog.edu.pk

## Abstract

Public Debt and Liabilities of Pakistan has approached 99.4 trillion rupees by the end of FY 2026 causing serious macroeconomic implications for the economy. More than half of annual revenues go to debt servicing, leaving scarce resources for development and employment creation. This study has empirically evaluated the impact of public debt on unemployment in Pakistan using the annual time series data from 1991 to 2025. Among the control variables, per capita income, workers remittances inflows and inflation rate were included. Along with estimating the relationship for total public debt, the study has also estimated impact of domestic and external public debt on unemployment in Pakistan. Based on stationarity tests applied on the variables included in the models, ARDL estimation technique was selected to test the hypotheses. The results showed that public debt has a significant and positive effect on unemployment in Pakistan during the data period of the study. Further, domestic and external debt separately incorporated as independent variables showed that domestic debt is worsening unemployment rate more than external debt in Pakistan. The control variables per capita income and workers' remittances showed the negative and significant effect on unemployment, whereas, the coefficient of inflation was found insignificant. To support the validity of

empirical findings the relevant diagnostic tests were performed. The policy recommendation of the study is that prudent debt management along with its developmental use for enhancing the efficiency of the economy through investing in human development and physical infrastructure is important for curtailing the unemployment rate in Pakistan. The workers remittances through formal channels need to be promoted along with its purposeful use for investment and job creation. Inflation has insignificant but real per capita income has significant and negative effect on unemployment which allows policy makers to bring balance between pro-growth and stabilization policies in Pakistan.

**Keywords:** Public Debt, Unemployment, ARDL, Cointegration, Error Correction Model

# 1. Introduction

For most of the developing countries, it is a challenge for the central government to fund the budget initiatives through insufficient resources collected by tax revenues. As a consequence, the governments in developing countries borrow from external and domestic sources in order to create job opportunities and reduce poverty through funding for development projects. As the budget captures sizeable expenditures on human development, infrastructure and consumption which outweigh tax revenues and cause a budget deficit. To fund escalating budget deficit, countries have to make cuts on expenditures, broaden their tax net and acquire domestic and external debt. Recent literature suggests that economic growth can be stimulated through borrowing but it depends on whether borrowing funds are utilized for productive activities or not. If borrowing funds are used to increase income-generating activities through investment in human development projects, infrastructure and other social welfare initiatives, the rippling effect will stimulate economic growth and promote employment in developing countries (Tang & Issahaku, 2024).

Before the COVID-19 pandemic, in many emerging and developing economies, debt to GDP ratio was 55% in 2019 and stood at 70% in 2024 which is the highest since 1970 (Global Economic Perspective, 2025). After the pandemic, Low and Middle Income Countries (LMICs) coped with high interest rates, high energy costs due to the war in Europe and Middle East. The developing countries consume a large portion of their export revenues in debt service payments (10 to 38 percent of export earnings on interest payments) which makes them fragile to the debt crisis (International Debt Report 2023). In 2024, global public debt has crossed US$100 trillion which was 94 percent of global GDP. Over 40 percent of the world's

population lives in countries that allocate more of their resources to the payment of debt interest than to health and education (UNCTAD, 2024).

Public debt is considered a prominent factor for developing countries like Pakistan, where a rapidly increasing debt burden has caused a major portion of tax revenues to be spent on debt servicing, the debt burden has compromised macroeconomic performance and worsened the unemployment rate (Igberi et al. 2016; Saraireh, 2020; Saani et al. 2024; Shuaibu et al. 2021). Due to a narrow tax base, Pakistan's economy has been facing a budget deficit for a number of decades, which forces the government to continuously depend upon external and internal borrowings to finance the budget deficit. The gross public debt of Pakistan was below 1 trillion rupees in 1991, escalated to 86.7 trillion rupees by June 2026, more than three times from 24.95 trillion rupees in June FY2018. According to SBP, Pakistan's gross public debt was recorded 86.7 trillion rupees equal to 68.3 percent of GDP by the end of FY2026. The government domestic debt 59.44 trillion rupees (46.9 percent of 126.87 trillion nominal GDP) was more than double of government external debt 27.27 trillion rupees. Total Public debt and liabilities of Pakistan has doubled in just four years from 44.6 trillion rupees by the end of FY2020 to 99.4 trillion rupees by the end of FY2026. In Pakistan, debt servicing has approached the equivalent to net federal annual tax collection and the country is run by additional domestic and external borrowings. More than half of the total planned expenditures are reserved for servicing debt interest which was Rs. 9.7 trillion in FY2024, whereas only 10 percent of total planned expenditures are assigned for development expenditures which accounted for Rs. 1.6 trillion in FY2024. The huge rise in domestic and external debt along with alarming level of debt servicing has made growth stagnant and job creation has been hurdled thus affecting overall and youth unemployment in Pakistan.

**Table 1:** Summary of Pakistan's Public Debt After Pandemic COVID19 (In billion rupees)

| | **June-2020** | **June-2021** | **June-2022** | **June-2023** | **June-2024** | **June 2025** | **June 2026** |
|---|---|---|---|---|---|---|---|
| Government Domestic Debt | 23,282 | 26,265 | 31,085 | 38,809 | 47,160 | 54,471 | 59,441 |
| Government External Debt | 11,824 | 12,433 | 16,747 | 22,030 | 21,753 | 26,045 | 27,273 |
| Gross Public Debt | 36,398 | 39,860 | 49,242 | 62,881 | 71,245 | 80,518 | 86,714 |
| Gross Public Debt to GDP ratio | 76.6 | 71.4 | 73.9 | 75.2 | 67.8 | 70.7 | 68.3 |

Source: By Author using SBP Data

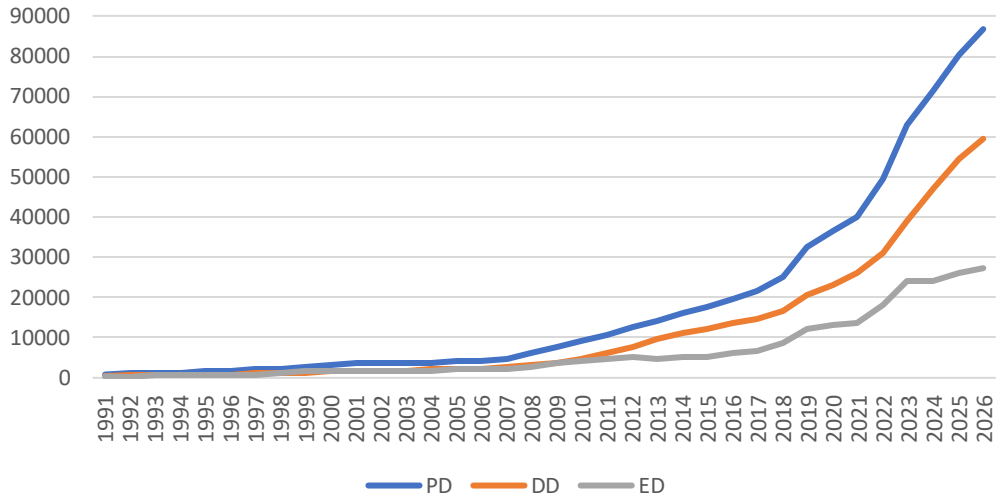



*Figure 1: Public Debt in Pakistan (billion rupees),*

Source: Pakistan Economic Survey (Various Issues)

Unemployment is one of the major macroeconomic problems facing Pakistan economy along with vulnerable growth performance and frequent **inflationary** episodes. The most recent available Pakistan Labour Force Survey (2024-25) reported that out of 179.6 million working age population 96.5 million were out of the labour force and 83.1 million labor force contained 5.9 million unemployed thus recording 6.9 percent unemployment rate. Out of 179.6 million

working age population, two third of population consisted of either illiterate or below matric education. The one fourth of working age population in 2025 contained youth (15- 24 years) counting 46.3 million. The youth unemployment rate 12.5 percent is highest among all age groups and youth labour force participation rate 45.5 percent was well above overall labour force participation rate 32.3 percent.

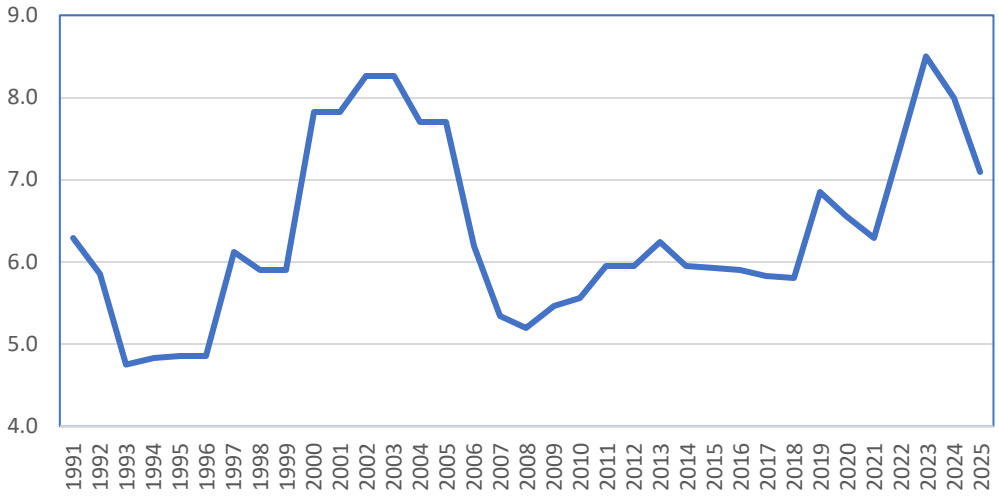



*Figure 2: Unemployement rate*
Source: Pakistan Economic Survey (Various Issues)

In the context of Pakistan, a number of studies have analyzed economic consequences of debt, however, less attention has been made to estimate the effects of debt on unemployment (Gul, 2008; Ayyoub et al. 2012; Hasan & Zaheer, 2022; Maqbool et al. 2013; Khan et al. 2024; Uddin & Inayat, 2018). There is a dire need to assess the macroeconomic consequences of the burgeoning burden of domestic and external debt in the case of Pakistan. The main objective of the current study is to estimate the impact of domestic, external and total public debt on unemployment in Pakistan for the period 1991- 2025 using the ARDL estimation technique. The current study contributes in the existing literature on the subject by estimating the impact of aggregate public debt on unemployment using the latest time series data. Further, the study has compared the impact of domestic and external borrowings on unemployment in Pakistan. In the context of Pakistan, an extensive range of studies are also available on examining the causes of unemployment and labor force participation rate (LFPR), however, scarce focus has been paid to study the impact of domestic and external public debt on unemployment. In this background, the current study also extends knowledge on determinants of unemployment by investigating the impact of domestic and external public debt on unemployment.

## 2. Literature Review

From a neoclassical perspective, public borrowings decrease the labor force, capital stock, and the level of employment. The neo-Keynesian school proposed that in the business sector, public debt can deter or boost the capital stock, which indicates that public debt might have a negligible impact on the growth of employment (SenGupta, Talukder, & Atal, 2024). Ricardian equivalence theory postulates that fiscal expenditures through public borrowing wouldn't stimulate economic growth because individuals anticipate that they have to save more to pay the expected future taxes. Therefore, people tend to save more and consume less which would result the aggregate demand remaining unchanged and it will tend to dampen the macroeconomic effects of increased government spending. Consequently, whether the government finances its spending through current taxes or future taxes, will have the same effect on the economy. Ricardian equivalence undermines the Keynesian notion that government spending backed by deficit financing can stimulate economic growth and employment opportunities (Barro, 1990).

As per the crowding out hypothesis, to meet the fiscal deficit, the government has to borrow from external and internal sources. Domestic borrowing pushes interest rate upward due to high demand for loanable funds by the government and making borrowing expensive for private investment. Consequently, crowding out of private investment occurs due to a low rate of return. However, external borrowing does not directly affect domestic interest rate and supply of loanable funds but crowds out private investment through prices and ER. Due to capital outflow, the real effective exchange rate (REER) appreciates which ultimately crowds out the domestic producers. Thus, the crowding out effect on one hand and decreased public sector investment on the other hand keep the overall investment at a very low level, which leads to slow economic growth and hampers employment level (Gul, 2008; Ebi et al. 2013). The debt burden/overhang hypothesis postulates that a large portion of the government's revenues goes into servicing the debt liabilities and fewer resources are left for government expenditures and investment which creates a budget deficit and thus, to finance the budget deficit government borrows more. Therefore, countries fall into a debt trap. Consequently, less resources are available for investment in infrastructure and the development of human capital which generates hindrance for investment and causes to sluggish economic growth (Krugman, 1988; Sach, 1988). Furthermore, in this situation, the government is unable to fulfill its external financial obligations within the given resources. Therefore, the substantial amount of revenues

that are generated by exports and foreign direct investment is paid to service the external debt liabilities (Borensztein, 1990).

The way public borrowing are used determines whether it will promote economic development and improve living standards by boosting job creation. If debts are used for consumption and not for productive purposes, it would not stimulate economic activities to generate employment. When debts are used for income-generating activities such as developmental projects, the rippling effect encourages employment (Asafo & Matuka, 2019; Kengdo et al. 2020). Further, the rapid increase in debt service obligations is a hindrance to the execution of new development-oriented schemes, consequently worsening the unemployment situation (Ogonna et al. 2016). Accumulated debt leads to a large share of revenues going to debt servicing, domestic investment and development expenditures left with lower capital and sequentially reducing the opportunities of job creation (Hasan & Zaheer, 2022).

In their study of the effects of increasing public debt on unemployment in Nigeria, Igberi et al. (2016) applied the autoregressive distributed lag model and Wald test on the Nigeria data between 1980 and 2015. The analysis revealed that public debts failed to yield the desired effects in Nigeria. A 1% rise in public debt will have an additional unemployment rate impact of 1.6%. An expansion of public debt for developmental expenditures, not for current expenditures and certainly not to crowd out and so induce unemployment, should be preferred to the external debt. Iwuoha, ( 2020) carried out a study to assess whether the growing public borrowing plays a part in reducing unemployment in Nigeria. The time series data ranging 1981 to 2019 were analysed using the VECM model. It was concluded that public debt can hardly have any meaningful impact in reducing unemployment in Nigeria. Shuaibu et al. (2021) studied the impact of public debt on unemployment and inflation in Nigeria. The autoregressive distributed lag model was applied for the period 1985-2020 in the study and it has been pointed out that there is a direct relationship between unemployment and public debt. It was also found that external debt has a greater relation with unemployment than domestic debt.

Tang & Issahaku (2024) conducted an analysis to gauge the impact of institutional quality on public borrowing and unemployment relationship in SSA region. The study using the System Generalized Method of Moments (SGMM) technique on panel data of 36 selected countries in SSA region using the time frame 1996 to 2020 indicates that in the absence of strong institutions, public debt does not play an effective role in creating jobs in the region.

Saani et al. (2024) came up with a study to assess the association between inflation, public debt and unemployment in Ghana. To estimate the variables, the time horizon was taken from 1990 to 2022 based on the ARDL framework and data set. The study indicated that the inflation rate is negatively related to public borrowing and fiscal borrowing is positively related to unemployment in both the short-run and the long-run.

In order to understand the linkage between debt and unemployment from a Keynesian, Neo-Keynesian and Neoclassical perspective, Sen Gupta et al. (2024) conducted a study to examine the relationship between the two across the globe. It was applied using a two-step system Generalized Method of Moments (GMM) approach with panel data of 162 countries for the period 1996-2022 and used a fixed and random effects model. The results revealed that fiscal borrowing is associated with a 2% increase in global unemployment for every 1% increase in the level of fiscal borrowing. The results of the dynamic estimation confirmed that public debt is an important factor in determining unemployment.

In the case of Pakistan, alarming surge in indebtedness and associated debt servicing have restricted developmental expenditures, acting as a drag on economic progress and employment potential. In this background, the existing empirical evidence on the impact of domestic and external debt on unemployment is scarce. A number of studies have analyzed macroeconomic consequence of surge in public debt. However, a few have estimated the relationship with unemployment. Hasan & Zaheer, (2022) attempts to determine the factors that are responsible for increasing unemployment in Pakistan. The macroeconomic variables that are used in the study are external debt, GDP growth, population growth and FDI. The results established that external debt is inversely correlated with unemployment in the short run, whereas, in the long run, external debt have positive relation with unemployment and all the other key economic indicators (Population Growth, FDI and Inflation) have an inverse relation with unemployment.

Maqbool et al. (2013) assessed how unemployment in Pakistan is influenced by key economic factors such as total population, FDI, Price level, GDP, and international borrowing. By employing the Autoregressive Distributed Lag (ARDL) methodology from 1976-2012, the study found that the economic variables have a significant effect on unemployment in the short and long run. Moreover, the analysis confirms the presence of the Phillips curve in both the short and long run.

Ayyoub et al. (2012) analyzed the debt's impact on Gross Domestic Product, manufacturing sector growth, and situation of unemployment in Pakistan for the period of 1989-90 to 2009-10 by applying the OLS technique on secondary data. The study revealed that debt servicing expenditures are actually responsible for low economic performance and high unemployment. While, the foreign borrowing and liabilities to GDP ratio is positively and significantly related to manufacturing sector growth and overall GDP levels of the economy. Therefore, productive use of external debt rather than debt servicing can improve the economic situation by reducing government deficit, population growth, and controlling hyperinflation.

Hasan & Zaheer, (2022) attempts to determine the factors that are responsible for increasing unemployment in Pakistan by using various econometric techniques for the time period of 1970-2019. The other macroeconomic variables that are used in the study are Population growth, foreign direct investment (FDI), GDP growth, External debt and FDI. The results established that all the key economic indicators (Population Growth, FDI and Inflation) have an inverse relation with unemployment. *Whereas, GDP growth has a positive relationship with unemployment, which proves that Okun's law doesn't hold in the case of Pakistan*.

Gul, (2008) studied how heavy reliance on public borrowing worsens macroeconomic challenges in Pakistan. Fiscal shortfall pushes the nation to borrow from external and internal sources. The key effects of a rising debt burden are stagnant economic performance, undermining development goals, economic instability, reduction in private sector borrowing, inflation, higher unemployment, worsening social conditions, and increasing poverty, triggering economic destabilization. In the case of Pakistan, the key factor for poor economic performance is a huge burden of both internal and foreign debt.

Khan et al. (2024) studied the variables influencing unemployment in Pakistan for the period of 1996-2021. The study conducted stationarity tests through ADF and PP techniques and the ARDL framework to examine cointegration dynamics in the short and long term. The study found out that FDI, Inflation and GDP affect unemployment negatively. Whereas population growth, governance index and external debt affect unemployment positively.

Uddin & Inayat, (2018) analyzed the effect of domestic financing on unemployment in Pakistan. Through employing multiple regression analysis on time series data obtained from the State Bank of Pakistan and the Asian Development Bank, covering the years 2005 to 2015, the study established that domestic borrowing exerts a direct and statistically significant

influence on unemployment, while GDP at a constant rate shows an inverse and significant relationship with the unemployment rate.

The review of empirical literature indicates that several studies examined the public debt's impact on unemployment in general as well as specifically in the case of Pakistan. But we found few studies on distinguishing the impact of domestic and external public debt on unemployment in general and specific to Pakistan.

# 3. Methodology

The study constructed an empirical model inspired by Tang & Issahaku (2024) to fulfill the aim of the study. In the following model, the unemployment rate ($U_t$) depends on Public Debt ($PD_t$) and control variables Inflation ($INF_t$), Per Capita income ($PCI_t$) and Workers Remittances Inflow (WRI). The model has been also estimated for domestic and external debt separately to compare the impact on unemployment.

$$UN_t = \beta_1 + \beta_2 LPD_t + B_3 LPCI_t + B_4 LINF_t + \beta_5 LWRI_t + \varepsilon_t \quad \text{---------- (Eq. 1)}$$

$$UN_t = \gamma_1 + \gamma_2 LDD_t + \gamma_3 LED_t + \gamma_4 LPCI_t + \gamma_5 LINF_t + \gamma_6 LWRI_t + \nu_t \quad \text{---------- (Eq. 2)}$$

Where,

- $UN_t$: unemployment rate
- $LPD_t$: natural log of Public Debt
- $LDD_t$: natural log of Domestic Public Debt
- $LED_t$: natural log of External Public Debt
- $LINF_t$: natural log of Inflation rate
- $LPCI_t$: natural log of Per Capita Income
- $LWRI_t$: natural log of Workers Remittances Inflow
- $\varepsilon_t$ , $\nu t$: stochastic error terms

The theoretical foundation of the first model is grounded in Okun's law and Phillips curve frameworks. Phillips (1958) postulated trade-off between unemployment and inflation while Okun (1962) provided the inverse relationship between output and unemployment. Whereas, second model is followed by KENYA (2024). In the following, channels of public debt and other explanatory variables affecting unemployment have been discussed.

Public Debt: To address the twin deficits, countries seek financial support from both domestic and international sources through borrowing. The public debt builds up gradually and exerts a growing pressure on the economy, as it consumes a significant portion of national resources to meet debt repayment obligations. This, in turn, reduces fiscal space for economic development programs, ultimately limiting the economy's ability to generate employment opportunities in the job market (Hasan & Zaheer, 2022).

External Debt: External borrowing does not exert a direct effect on the domestic interest rate and availability of loanable funds but crowds out private investment through prices and ER (Ebi et al., 2013). External debt servicing is correlated with unemployment as funds move outside of the economy due to debt repayment and debt servicing, which leads to decreased money supply in the economy. As a result, a shortage of available funds for private investment discourages job creation (KENYA, 2024; Abbas et al., 2024). The exchange rate fluctuates due to the payment of debt service on external borrowings from foreign reserves.

Domestic Debt: Domestic borrowing contributes to rising unemployment through the crowding-out effect. Government financing through domestic borrowings increases the demand for loanable funds compared to its supply, which exerts an upward pressure on interest rates and leads to a decrease in private investment and thus penalizes growth and employment opportunities in the economy (Beaugrand et al., 2002). Domestic borrowings affect an economic expansion negatively in the short and long run, which indicates that domestic debt is not being used to stimulate the economy's output capacity (LEONE, 2017). If borrowed funds are used for consumption purposes rather productive use, such as developing infrastructure, human and capital resources, it will increase unemployment and the future burden of debt servicing (Saraireh, 2020).

Workers' remittances Inflows: In developing countries, the largest source of foreign capital is remittances, even surpassing foreign direct investment (Okeke, 2021). Remittance inflows cause economic growth and reduce unemployment through stimulating economic activity and output. Foreign remittances lead to an increase the purchasing power by boosting income levels in the economy. Therefore, increase in production, consumption, and investment all contribute to economic growth and employment creation (Asad et al. 2016). In developing countries, remittances are used on human capital such as education and health facilities, and to increase household consumption and new business opportunities, which ultimately increase job creation (Pal et al. 2022).

Per Capita Income: The association between output and unemployment is a key principle in macroeconomics and is frequently interpreted through the lens of Okun's Law, which postulates an opposite association between economic output and the rate of unemployment (Okun, 1963). The study established that a 1 percent decline in economic growth would cause 2 to 3 percent increase in unemployment (Folawewo & Adeboje, 2017).

Inflation: As A. W. Phillips (1958) established that there is an opposite linkage between unemployment and inflation that is lowering unemployment could cause inflationary pressures, whereas curbing inflation may elevate unemployment levels. This relationship served as a basis for Keynesian economic thought, which emphasized demand-side policy as a means of achieving macroeconomic stability (Folawewo & Adeboje, 2017).

This study has uses annual time series data for the period 1991-2024. The main data source of the study is Pakistan Economic Survey (various issues). Unemployment rate and inflation rate are measures in percentage, whereas, total public debt, domestic and external public debt are measured in billion rupees. Per Capita income is measured in Pak rupees and workers remittances inflows are measured in million US$. The model has been estimated in Semi-log form (Lin-log form).

### 3.1. Estimation Technique

To empirically investigate the short-term and the long-term relationship, the ARDL Approach to cointegration proposed by Pesaran et al. (2001) has been used. The existence of a long-term association in the framework was examined using the Bounds test for Co-integration.

$$\Delta UN_t = \delta_0 + \sum_{i=1}^{p} \delta_{1i}\, \Delta UN_{t-i} + \sum_{i=0}^{q1} \delta_{2i}\, \Delta LPD_{t-i} + \sum_{i=0}^{q2} \delta_{3i}\, \Delta LPCI_{t-i} + \sum_{i=0}^{q3} \delta_{4i}\, \Delta LINF_{t-i} + \sum_{i=0}^{q4} \delta_{5i}\, \Delta LWRI_{t-i} + \delta_6 UN_{t-1} + \delta_7 LPD_{t-1} + \delta_8 LPCI_{t-1} + \delta_9 LINF_{t-1} + \delta_{10} LWRI_{t-1} + \mu_t \quad \text{.....(Eqn. 3)}$$

$$\Delta UN_t = \Theta_0 + \sum_{i=1}^{p} \Theta_{1i}\, \Delta UN_{t-i} + \sum_{i=0}^{q1} \Theta_{2i}\, \Delta LDD_{t-i} + \sum_{i=0}^{q2} \Theta_{3i}\, \Delta LED_{t-i} + \sum_{i=0}^{q3} \Theta_{4i}\, \Delta LPCI_{t-i} + \sum_{i=0}^{q4} \Theta_{5i}\, \Delta LINF_{t-i} + \sum_{i=0}^{q5} \Theta_{6i}\, \Delta LWRI_{t-i} + \Theta_7 UN_{t-1} + \Theta_8 LDD_{t-1} + \Theta_9 LED_{t-1} + \Theta_{10} LPCI_{t-1} + \Theta_{11} LINF_{t-1} + \Theta_{12} LWRI_{t-1} + +\mu_t \quad \text{..... (Eqn. 4)}$$

The null and alternative hypotheses under the Bounds test by Pesaran et al. (2001) to examine cointegration are as:

$H_0$: $\delta_6 = \delta_7 = \delta_8 = \delta_9 = \delta_{10} = 0$

$H_A$: At least one $\delta_i$ is different from zero

$H_0$: $\Theta_7 = \Theta_8 = \Theta_9 = \Theta_{10} = \Theta_{11} = \Theta_{12} = 0$

$H_A$: At least one $\Theta_i$ is different from zero

If the calculated F-value exceeds the critical upper benchmark provided by Pesaran et al. (2001) at a 5% significance criterion, then $H_0$ is statistically rejected, which indicates that cointegration exists.

In case cointegration exists, then we may run the following Error Correction Model (ECM) to estimate the short-run relationship and confirmation of convergence towards equilibrium.

The ECM model can be assessed through the following equation:

$$\Delta UN_t = \delta_0 + \sum_{i=1}^{p} \delta_{1i} \Delta UN_{t-i} + \sum_{i=0}^{q1} \delta_{2i} \Delta LPD_{t-i} + \sum_{i=0}^{q2} \delta_{3i} \Delta LPCI_{t-i} + \sum_{i=0}^{q3} \delta_{4i} \Delta LINF_{t-i} + \sum_{i=0}^{q4} \delta_{5i} \Delta LWRI_{t-i} + \delta_6 ecm_{t-1} \quad \text{(Eqn. 5)}$$

$$\Delta UN_t = \Theta_0 + \sum_{i=1}^{p} \Theta_{1i} \Delta UN_{t-i} + \sum_{i=0}^{q1} \Theta_{2i} \Delta LDD_{t-i} + \sum_{i=0}^{q2} \Theta_{3i} \Delta LED_{t-i} + \sum_{i=0}^{q3} \Theta_{4i} \Delta LPCI_{t-i} + \sum_{i=0}^{q4} \Theta_{5i} \Delta LINF_{t-i} + \sum_{i=0}^{q4} \Theta_{6i} \Delta LWRI_{t-i} + \Theta_7 ecm_{t-1} \quad \text{(Eqn. 6)}$$

The magnitude of $\delta_6$ and $\Theta_7$ in above equations indicate the adjustment speed from the short run to the long run equilibrium relationship. If $\delta_6$ and $\Theta_7$ are significant and negative ranging values between 0 and -1, then it reflects convergence towards equilibrium and holding the Error Correction Model.

## 4. Results and Discussion

Augmented Dickey Fuller (ADF) test has been conducted to check the stationarity of all the variables. The corresponding results are provided in the table below. The results indicated that variables are either I(1) or I(o) and no variable is I(2), therefore ARDL was considered suitable technique for estimation.

**Table 2:** ADF Test Results (t values)

| **Variables** | **At Level** | | **At first difference** | | |
|---|---|---|---|---|---|
| | With Intercept | With Intercept and Trend | With Intercept | With Intercept and Trend | Decision |
| UN | -1.796(0) | -1.965(0) | - -4.751(0)*** | -4.634(0)*** | I(1) |
| LPD | 0.622(0) | -1.970(1) | -3.732 (0)*** | -3.743(0)** | I(1) |
| LDD | 0.734(1) | -2.022(1) | -2.933(0)* | -3.081(0) | I(1) |
| LED | -0.271(0) | -1.841(0) | -4.388(0)*** | -4.317(0)*** | I(1) |
| LPCI | -0.286(0) | -4.517(5)*** | -4.560(0)*** | -4.516(0)*** | I(0) |
| LINF | -4.777(6)*** | -4.813(6)*** | | | I(0) |
| LWRI | -0.136(2) | -2.596(1) | -3.952(1)*** | -3.929(1)** | I(1) |

**Table 3:** Results of ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

Test Statistic Value K

F-statistic 9.6279 3

Critical Bound Values Pesaran et al. (2001)

| **Significance** | **I(0) Bound** | **I(1) Bound** |
|---|---|---|
| 10% | 2.460 | 3.460 |
| 5% | 2.947 | 4.088 |
| 1% | 4.093 | 5.532 |

As the estimated value of F-stat exceeds the upper bound F-value from the table Peseran et al. (2001) at 1% significance level. Hence, the null hypothesis of no long-term association among variables is rejected, which confirms the existence of long term association.

### 4.1. Long-Run and Short-run Estimates:

Dependent Variable (UN)

**Table 4:** ARDL Estimation Results

| **Variables** | **Coefficient** | **Std. Error** | **t-statistics** | **Prob.** |
|---|---|---|---|---|
| LPD | 4.1593 | 0.4669 | 8.9084 | 0.0000 |
| LPCI (-1) | -9.1868 | 4.0362 | -2.2761 | 0.0310 |
| LINF | 0.4532 | 0.2022 | 2.2417 | 0.0334 |
| LWRI (-1) | -2.9177 | 0.4091 | -7.1329 | 0.0000 |
| C | 100.4734 | 42.1084 | 2.3861 | 0.0243 |

### 4.2. Short-run Estimates

**Table 5:** ARDL Estimation Results

| Variable | Coefficient | Std. Error | t-statistics | Prob. |
|---|---|---|---|---|
| D(LPCI) | 5.1735 | 3.3286 | 1.5543 | 0.1327 |
| D (LPCI (-1) | 15.033 | 3.3340 | 4.5091 | 0.0001 |
| D (LPCI (-2) | 10.960 | 3.2447 | 3.3780 | 0.0024 |
| D(LWRI) | 0.0365 | 0.3122 | 0.1168 | 0.9079 |
| D(LWRI(-1) | 1.3225 | 0.4301 | 3.0751 | 0.0050 |
| D(LWRI(-2) | 1.6883 | 0.3563 | 4.7384 | 0.0001 |
| COINTEQ* | -0.8498 | 0.1000 | -8.4976 | 0.0000 |

The LPD coefficient has a direct and significant association with unemployment over the long run, which implies that a 1 percent rise in public debt causes the unemployment rate to increase by 4.15 percentage points. Igberi et al. (2016), Shuaibu et al. (2021), (Saani et al. 2024), (Iwuoha, 2020), (Obademi, 2012) provided the similar evidence that public debt is positively and strongly associated to unemployment and provides little or no assistance in reducing unemployment, as public borrowings are not used for developmental expenditures such as infrastructure and due to corruption, borrowings are not effectively utilized. A major hurdle in the implementation of development-oriented projects is the continuous increase in debt service obligations that deteriorate the situation of unemployment in an economy (Igberi et al. 2016).

Also, the results reveal that the Per Capita Income (LPCI) has a negative and significant whereas, LINF has a positive and significant relationship with unemployment. The LWRI coefficient has a negative sign and is statistically significant. It is found that a 1% increase in the LWRI will decrease the unemployment rate by 2.91 percentage points. These findings are in line with the work of (Saani et al. 2024), . (Asad et al. 2016) that remittances inflow has a negative relationship with unemployment in the long run. Foreign remittances lead to an

increase the purchasing power by boosting income levels in the economy. Therefore, an increase in production, consumption, and investment all support an economic expansion and job creation. In developing economies, remittances are used on human capital such as education and health facilities, and to increase household consumption and new business opportunities, which ultimately increase job creation.

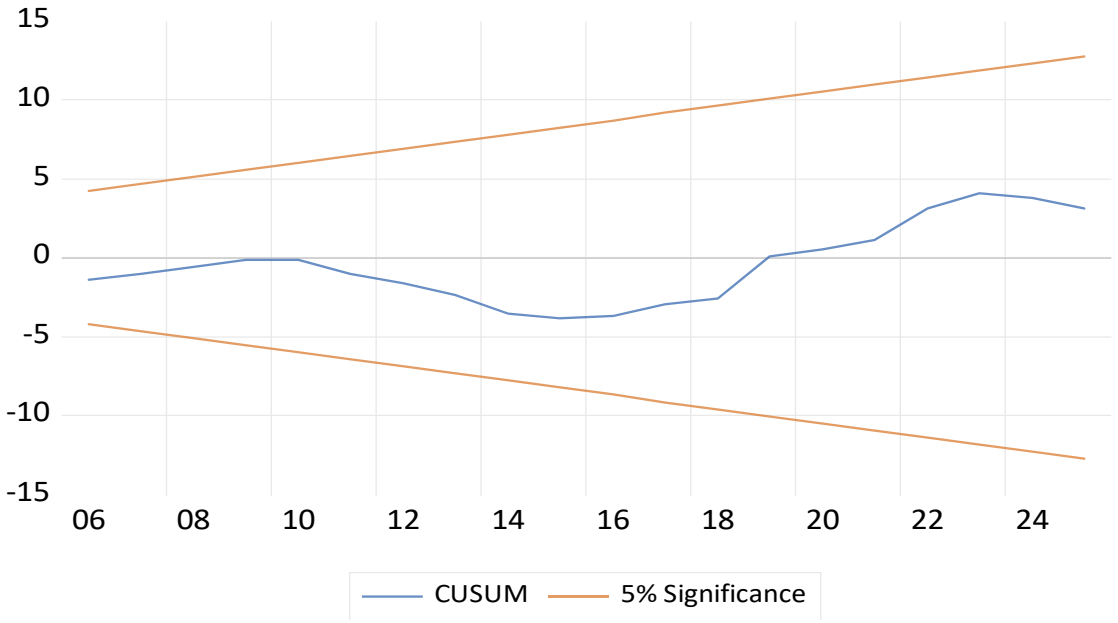
Table 6 represents the coefficients of the short-run model. The coefficient of Error Correction Mechanism (ECM (-1)) captures the speed of adjustment of the variables toward equilibrium. The result indicates that a significant coefficient term of the ECM(-1) with a negative sign indicates that in one year, 84% deviation of the short run from the long run is converged.

The diagnostic tests including Jarque Bera test, Breusch-pagan-Godfrey (BPG) test, LM test and CUSUM and CUSUM square tests were performed to examine the normality of residuals, no heteroscedasticity and serial correlation problems.

**Table 6:** Diagnostic Tests

| | |
|---|---|
| Breusch-Godfrey serial correlation LM Test (Prob.) | 0.0842(0.9588) |
| Heteroskedasticity Test Breusch-Pagan-Godfrey(prob) | 12.3582(0.3373) |
| Jarque-Bera Normality test (Prob.) | 0.2993 (0.8610) |
| CUSUM | Stable |
| CUSUM-SQ | Stable |

### 4.3. CUSUM Stability Test



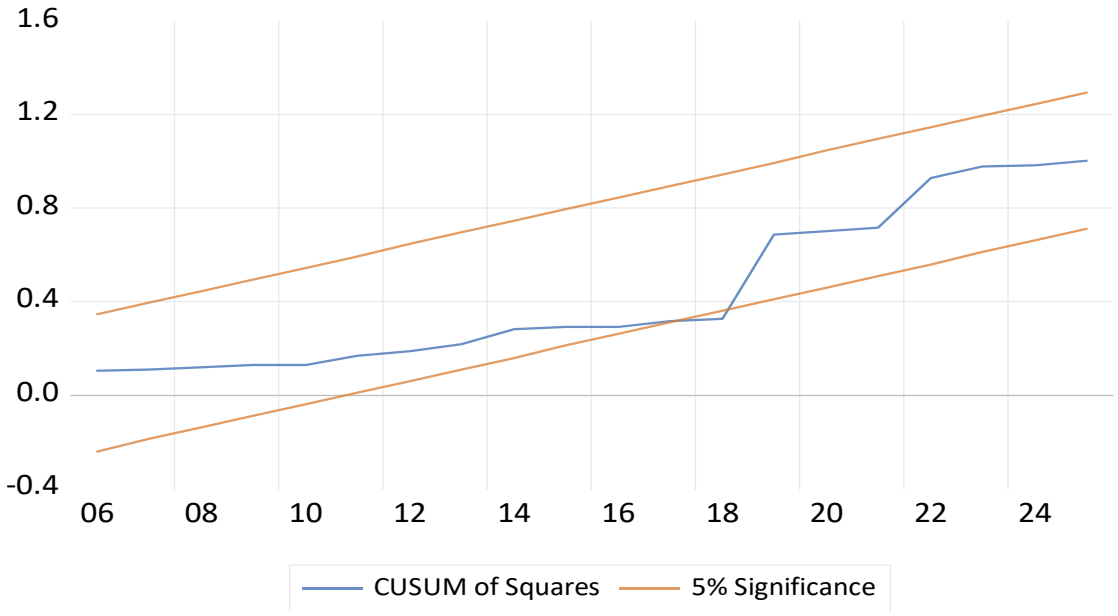




*Figure 3: CUSUM AND CUSUM-SQ*

**Table 7**: Results of ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

| Test Statistic | Value | K |
|---|---|---|
| F-statistic | 9.7307 | 2 |

Critical Bound Values Pesaran et al. (2001)

| **Significance** | **I(0) Bound** | **I(1) Bound** |
|---|---|---|
| 10% | 2.331 | 3.417 |
| 5% | 2.804 | 4.013 |
| 1% | 3.900 | 5.419 |

As the estimated value of F-stat exceeds the upper bound F-value from the table Peseran et al. (2001) at 1% significance level. Hence, the null hypothesis of no long-term association among variables is rejected, which confirms the existence of long-term association.

### 4.4. Long-Run and Short-run Estimates:

#### 4.4.1. Dependent Variable (UN)

**Table 8:** Method ARDL

| **Variables** | **Coefficient** | **Std. Error** | **t-statistics** | **Prob.** |
|---|---|---|---|---|
| LDD | 3.195759 | 1.179995 | 2.708282 | 0.0116 |
| LED | 1.561950 | 0.797191 | 1.959317 | 0.0605 |
| LPCI | -22.20382 | 5.551371 | -3.999701 | 0.0004 |
| LINF | 0.470333 | 0.324559 | 1.449146 | 0.1588 |
| LWRI | -1.442633 | 0.499118 | -2.890363 | 0.0075 |
| C | 240.2638 | 58.90071 | 4.079133 | 0.0004 |

### 4.3.2. Short-run Estimates

| Variable | Coefficient | Std. Error | t-statistics | Prob. |
|---|---|---|---|---|
| D (LDD) | 3.2895 | 1.1899 | 2.7645 | 0.0108 |
| D(LDD(-1) | -6.0907 | 1.1442 | -5.3232 | 0.0000 |
| D(LED) | 0.0849 | 0.5989 | 0.1417 | 0.8884 |
| D(LED(-1)) | 1.3423 | 0.5842 | 2.2978 | 0.0306 |
| D(LPCI) | -3.5146 | 2.5535 | -1.3764 | 0.1814 |
| D(LPCI(-1) | 13.3052 | 3.2157 | 4.1375 | 0.0004 |
| D(LINF) | 0.8522 | 0.1437 | 5.9324 | 0.0000 |
| D(LWRI) | 0.0634 | 0.2741 | 0.2313 | 0.8191 |
| COINTEQ* | -0.6627 | 0.0695 | -9.5299 | 0.0000 |

The LDD coefficient has a direct and strong effect on unemployment in long run. This implies that due to a 1 percent increase in domestic debt, the unemployment rate has increased by 3.22 percentage points. (Shuaibu et al. 2021), (Beaugrand et al. 2002) provided the same findings that domestic debt is positively and strongly linked to unemployment. Domestic debt leads to an increase in unemployment through the crowding-out effect. Government financing through domestic borrowings increases the demand for loanable funds compared to its supply, which exerts an upward pressure on interest rates and leads to a decrease in private investment and thus penalizes growth and employment opportunities in the economy . (El-Yaqub et al. 2024) found in their study that domestic debt impacts economic growth negatively, which further increases unemployment. Domestic borrowings affect economic growth negatively both in short and long run, implying that which indicates that domestic debt is not being used to stimulate the economy's output capacity (LEONE, 2017).

Also, the outcomes reveal that the External debt (LED) has a strong positive association with unemployment. This infers that due to a 1% rise in external debt, the unemployment rate has increased by 1.47 percentage points. These findings are align with the work of (Abbas et al. 2024; Siddiqa, 2021; Elekwa & Onyenama, 2022; Shuaibu et al. 2021; KENYA, 2024) which found in their study that external borrowings are directly and significantly correlated with unemployment as funds move outside of the economy due to debt repayment and debt servicing, which leads to decreased money supply in the economy. As a result, a shortage of available funds for private investment discourages job creation. (Wafure et al. 2025) found the same outcome that increased external debt impacts unemployment negatively, which indicates that this is due to widespread corruption in the country; therefore, a major portion of borrowed funds is stolen by the ruling class for personal benefits. With the increased external debt burden, a major portion of the GDP goes into debt servicing, leaving a little for public development programs, which leads to fewer job opportunities and, consequently, more unemployment (Abbas et al. 2024). External borrowings increase unemployment through the balance of payment deficit (Siddiqa, 2021).

The LPCI coefficient has a negative sign and is statistically significant. It is found that a 1% increase in the LPCI will decrease the unemployment rate by 22.22 percentage points, which indicates that Okun's law holds over long run. Hence, Unemployment decreases as more jobs are created with the growth of an economy (Tang & Issahaku, 2024; Folawewo & Adeboje, 2017; Abugamea, 2018). The coefficient of LINF is positive and statistically insignificant. The results show that the relationship between inflation and unemployment doesn't exist over long run. This outcome is aligned with the findings of (Anyiga, 2020). The coefficient of LWRI is negative and statistically significant, and the result demonstrates that a 1 percent rise in LWRI will lower unemployment by 1.42 percentage points.

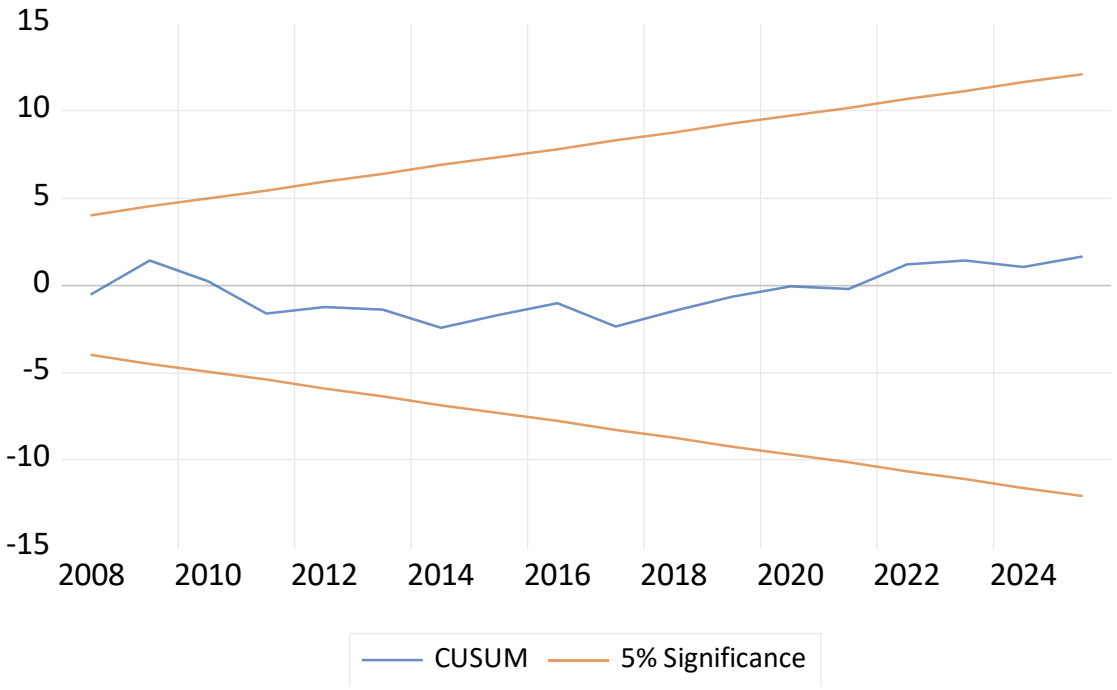
Table 4.10 represents the coefficients of the short-run model. The coefficient of Error Correction Mechanism (ECM (-1)) captures the speed of adjustment of the variables toward equilibrium. The result indicates that a significant coefficient term of the ECM with a negative sign indicates that in one year, 66% deviation of the short run from the long run is converged.

The standard diagnostic tests are performed to support the validity of the results. Among these tests, Jarque Bera test is used to test whether the disturbances are distributed normally or not. Other tests include Breusch-pagan-Godfrey (BPG) test, LM test and CUSUM and CUSUM

square tests to examine no heteroskedasticity, no serial correlation, and stability of the model, respectively.

**Table 9:** Diagnostic Tests

| | |
|---|---|
| Breusch-Godfrey serial correlation LM Test (Prob.) | 2.867504(0.11) |
| Heteroskedasticity Test Breusch-Pagan-Godfrey | 16.335569(0.2933) |
| Jarque-Bera Normality test (Prob.) | 1.301167(0.521741) |
| CUSUM | Stable |
| CUSUM-SQ | Stable |
| Source Authors' Estimations | |



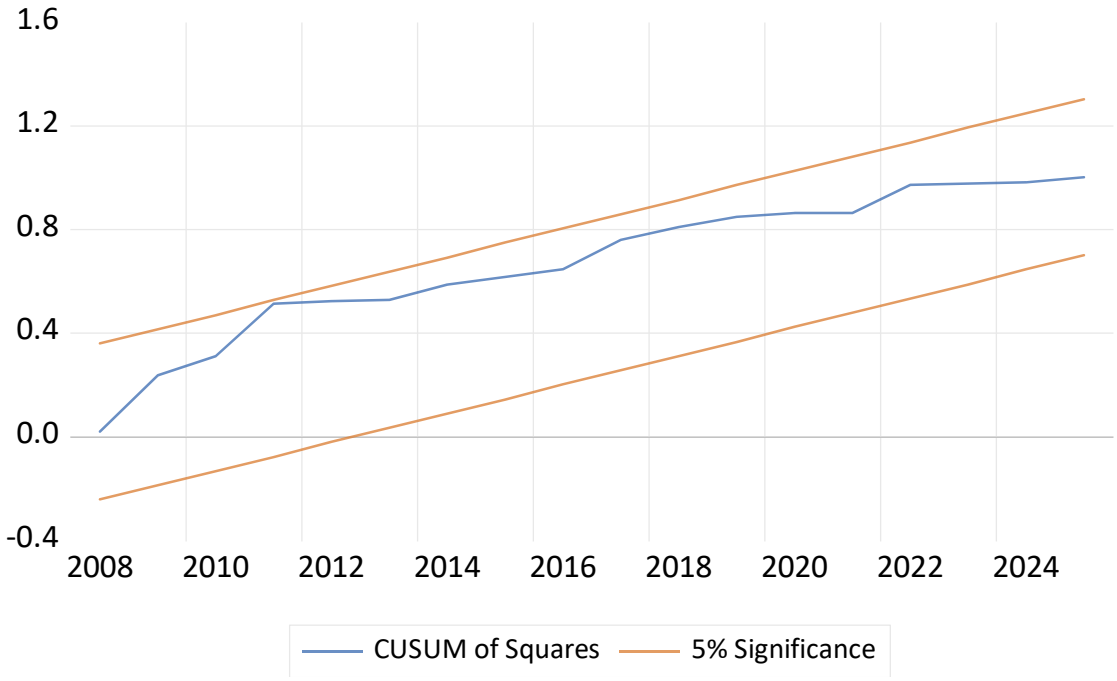




*Figure 4: CUSUM AND CUSUM-SQ*

## 5. Conclusion and Policy Recommendations

The study has found that the increase in public debt in the long run enhanced the unemployment rate in Pakistan during the data period of the study. The similar results were obtained by

regressing domestic and external debt public debt on Unemployment. However, domestic debt has stronger impact as compared to external debt due to its direct link with crowding-out effect on private investment. In order to finance the fiscal gap, the government relies heavily on domestic borrowing pushing interest rate upward making borrowing expensive for private investment. The study has also found that per capita income and workers remittances inflows in Pakistan help to reduce unemployment rate in Pakistan. Based on the empirical findings of the study, it is suggested that prudent policy of debt management by the government is important for job creation and borrowed funds must be used to increase the efficiency of the economy through investing in infrastructure, developmental projects and human capital. The workers remittances through formal channels need to be promoted along with its purposeful use for investment and job creation. In FY 2026, workers remittances inflows in Pakistan were recorded US$41.6 billion providing resilience and stability to external sector in presence of huge trade deficit US$39.2 billion. Inflation has insignificant but real per capita income has significant and negative effect on unemployment which allows policy makers to bring balance between pro-growth and stabilization policies in Pakistan.

# 6. Limitations of the Study

This study has covered data period from 1991-2025 having 35 annual observations although time span is very long. The reason for starting data period from 1991 is that the amount of public debt before 1991 was less than 1 trillion rupees which gradually approached to 86.7 trillion in FY2026.

Another limitation of the study is that data on unemployment in Pakistan is available with gaps as Labour Force Survey is not published each year by Pakistan Bureau of Statistics. Therefore, the study has used data series with filled gaps in the data.

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