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#### Unemployment Dynamics in Pakistan: Evidence from Macroeconomic Determinants and Structural Break Analysis

<sup>1</sup>Dr. Mohammad Fayaz, <sup>2</sup>Dr. Farhana Gul, <sup>3</sup>Abbas Khan

	<b>Abstract</b>
<p><b>Dr. Mohammad Fayaz</b> Institute of Business and Management Sciences (IBMS), The University of Agriculture Peshawar, Pakistan Email: <a href="mailto:mfayaz@aup.edu.pk">mfayaz@aup.edu.pk</a></p> <p><b>Dr. Farhana Gul</b> Department of Economics, The University of Swabi, Pakistan. Email: <a href="mailto:farhana@uoswabi.edu.pk">farhana@uoswabi.edu.pk</a></p> <p><b>Abbas Khan</b> M.Sc(Hons), Department of Agricultural &amp; Applied Economics, The University of Agriculture Peshawar, Pakistan. Email: <a href="mailto:khan68618@gmail.com">khan68618@gmail.com</a></p>	<p>Unemployment remains one of the most persistent macroeconomic challenges in developing economies, including Pakistan. This study investigates the determinants of unemployment using annual time-series data from 1970 to 2014. A structural break identified through the CUSUMSQ test divided the sample into two periods: 1970–1984 and 1985–2014. The study employs the Autoregressive Distributed Lag (ARDL) approach to examine both short-run and long-run relationships between unemployment and key macroeconomic variables, including inflation, trade openness, real gross domestic product (GDP), urban population, and foreign direct investment (FDI). Unit root tests confirmed a mixed order of integration, justifying the use of the ARDL framework. The bounds testing approach confirmed the existence of long-run cointegration among the variables in both periods. The results reveal that inflation significantly reduces unemployment, supporting the Phillips curve hypothesis, while trade openness contributes positively to unemployment. Economic growth exhibits a negative relationship with unemployment, although its effect varies across periods. Urbanization emerged as a significant determinant in the post-1985 period, whereas FDI showed limited influence. The findings highlight the importance of sustained economic growth, employment-oriented trade policies, and productive urban development in addressing unemployment challenges in Pakistan.</p>
<b>Keywords</b>	Unemployment, Economic Growth, Inflation, Trade Openness, Urbanization, Foreign Direct Investment, ARDL, Pakistan



# Advance Journal of Econometrics and Finance

## Vol-3, Issue-4, 2025

### Introduction

Unemployment is one of the most persistent macroeconomic challenges facing both developed and developing countries. It represents the underutilization of labor resources and has far-reaching economic and social consequences, including poverty, income inequality, reduced productivity, and social instability (ILO, 2024; World Bank, 2024; UNDP, 2023). In developing economies such as Pakistan, where population growth and labor force participation continue to increase, generating sufficient employment opportunities remains a major policy concern.

Pakistan has experienced substantial economic and demographic changes over the last several decades. Despite periods of economic growth, unemployment continues to pose a significant challenge to sustainable development. Rapid population growth, urbanization, globalization, and changing trade patterns have altered the structure of the labor market, influencing employment opportunities and labor demand. According to the International Labour Organization (ILO, 2011), unemployment refers to individuals of working age who are available for work, actively seeking employment, but unable to find suitable jobs (Pakistan Economic Survey, 2023–24; ILO, 2024; World Bank, 2024). Economic theory suggests that unemployment is influenced by several macroeconomic factors. Okun (1962) argued that economic growth and unemployment are inversely related, implying that higher economic growth stimulates labor demand and reduces unemployment. Similarly, the Phillips Curve hypothesis suggests an inverse relationship between inflation and unemployment, where rising inflation is often associated with lower unemployment rates due to increased aggregate demand (Phillips, 1958). However, the magnitude and direction of these relationships vary across countries and time periods (Lv et al., 2025; Khattak et al., 2021).

Trade openness has emerged as another important determinant of labor market performance. While increased trade integration may create employment opportunities through export expansion and increased investment, it may also lead to job displacement in less competitive sectors. Likewise, foreign direct investment (FDI) can contribute to employment generation through technology transfer, capital accumulation, and industrial expansion. However, the employment effects of FDI depend largely on the sectoral distribution and absorptive capacity of the host economy (Shahbaz & Islam, 2011; Dutt et al., 2009; Khattak et al., 2021; Helpman & Itskhoki, 2010; Autor et al., 2013). Urbanization also plays a crucial role in shaping labor market outcomes. Rapid migration from rural to urban areas increases labor supply in urban centers, often exerting pressure on employment opportunities. Although urbanization can facilitate economic growth through industrialization and agglomeration effects, excessive population concentration may contribute to higher unemployment if job creation fails to keep pace with labor force growth (Haider, 2006; Henderson, 2010; United Nations, 2019; Khattak et al., 2016; Ali & Khan, 2022).

Several empirical studies have examined the determinants of unemployment in developing countries. Kalim (2003) found that economic growth reduces unemployment in Pakistan, while population growth contributes positively to unemployment. Schoeman et al. (2008) reported that investment negatively affects unemployment, whereas interest rates and labor market rigidities increase unemployment. Similarly, studies have shown that inflation, trade openness, and foreign investment exert varying effects on labor market performance depending on country-specific conditions and institutional arrangements (Alyousaf et al., 2026).

Although considerable research has been conducted on unemployment in Pakistan, limited studies have examined the combined effects of inflation, trade openness, economic growth, urbanization, and foreign direct investment within a unified econometric framework while accounting for structural changes in the economy e.g., Akhtar & Shahnaz, 2005; Khan et al., 2014; Shahid, 2014). Structural shifts resulting from economic reforms, globalization, and policy changes may alter the relationship between unemployment and its determinants over time. Ignoring such structural breaks may lead to biased estimates and misleading policy conclusions (James D. Hamilton, 1994; Bruce Hansen, 2001; Pierre Perron, 1989).

Therefore, this study investigates the determinants of unemployment in Pakistan using annual time-series data from 1970 to 2014. The study employs the Autoregressive Distributed Lag (ARDL) approach to estimate both short-run and long-run relationships among unemployment, inflation, trade openness, real GDP, urban population, and foreign direct investment (M. Hashem Pesaran, Yongcheol Shin, & Richard J. Smith, 2001). Furthermore, the study accounts for structural changes identified through stability tests by dividing the sample into two distinct periods. The findings are expected to provide useful insights for policymakers seeking to formulate effective employment-generation strategies and promote sustainable economic growth. Inflation, trade openness, real GDP, urban population, and foreign direct investment. Furthermore, the study accounts for structural changes identified through stability tests by dividing the sample into two distinct periods. The findings are expected to provide useful insights for policymakers seeking to formulate effective employment-generation strategies and promote sustainable economic growth.



# Advance Journal of Econometrics and Finance

## Vol-3, Issue-4, 2025

### Data and Methodology

#### Data Sources and Study Period

This study utilizes annual time-series data covering the period 1970–2014 for Pakistan. Secondary data were obtained from reliable national and international sources, including the World Development Indicators (WDI), State Bank of Pakistan (SBP), Pakistan Bureau of Statistics (PBS), and various issues of the Pakistan Economic Survey. The selected period provides sufficient observations to examine both short-run and long-run dynamics among unemployment and its determinants.

#### Variables and Model Specification

The unemployment rate was used as the dependent variable, while Consumer Price Index (CPI), Trade Openness (TRO), Real Gross Domestic Product (RGDP), Urban Population (UBP), and Foreign Direct Investment (FDI) were included as explanatory variables. The selection of variables was guided by economic theory and previous empirical studies examining labor market outcomes in developing economies.

The functional relationship can be expressed as:

$$UNEMP = f(CPI, TRO, RGDP, UBP, FDI)$$

where:

- UNEMP = Unemployment rate (%)
- CPI = Consumer Price Index (proxy for inflation)
- TRO = Trade openness
- RGDP = Real Gross Domestic Product
- UBP = Urban population
- FDI = Foreign Direct Investment

#### Econometric Framework

The analysis followed several sequential steps. First, the stationarity properties of the variables were examined using the Augmented Dickey-Fuller (ADF) unit root test proposed by Dickey and Fuller (1981). The ADF test determines whether a time-series variable is stationary or contains a unit root. Since non-stationary variables may produce spurious regression results, testing for stationarity is an essential prerequisite for time-series analysis.

Second, the optimal lag length was selected using the Akaike Information Criterion (AIC) through a Vector Autoregressive (VAR) framework. Appropriate lag selection is necessary to eliminate serial correlation and improve model specification.

Third, the Autoregressive Distributed Lag (ARDL) approach developed by Pesaran et al. (2001) was employed to investigate the long-run and short-run relationships among the variables. The ARDL technique is particularly suitable when variables are integrated at different orders,  $I(0)$  and  $I(1)$ , but none is integrated at  $I(2)$ . In addition, ARDL provides efficient estimates even with relatively small sample sizes.

#### ARDL Bounds Testing Approach

The existence of a long-run equilibrium relationship among the variables was examined using the ARDL Bounds Testing procedure. The null hypothesis of no cointegration was tested against the alternative hypothesis of a long-run relationship. If the calculated F-statistic exceeded the upper critical bound, cointegration was confirmed; otherwise, the null hypothesis could not be rejected.

#### Long-Run and Short-Run Estimation

Following confirmation of cointegration, long-run elasticities were estimated using the selected ARDL model. Subsequently, short-run dynamics were analyzed through the Error Correction Model (ECM). The ECM captures both short-run adjustments and the speed at which deviations from long-run equilibrium are corrected.

The error correction coefficient is expected to be negative and statistically significant, indicating convergence toward long-run equilibrium. A larger coefficient implies a faster adjustment process.

#### Diagnostic and Stability Tests

Several diagnostic tests were performed to evaluate the reliability of the estimated models. The Breusch-Godfrey LM test was used to detect serial correlation, while the Jarque-Bera test examined the normality of residuals. Model specification was assessed using the Ramsey RESET test.

To evaluate parameter stability and identify structural breaks, the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests were employed. The CUSUMSQ test identified a structural break around 1984; therefore, the sample was divided into two periods: 1970–1984 and 1985–2014. Separate ARDL models were estimated for each period to capture possible changes in the determinants of unemployment across different economic regimes.

### Results and Discussion

#### Descriptive Analysis

Table 1 presents the descriptive statistics of unemployment and its determinants in Pakistan for the period 1970–2014. The mean values of unemployment, trade openness, urban population, real GDP, foreign direct investment, and inflation were 1.661, 3.729, 3.466, 1.378, 5.314, and 2.041, respectively. The relatively higher mean value of foreign direct investment indicates substantial variation in investment inflows during the study period, while unemployment exhibited comparatively lower variation.

The descriptive analysis provides an overview of the behavior of unemployment and its potential determinants in Pakistan during the study period (1970–2014). Considerable variation was observed in unemployment, inflation, trade openness, real GDP, urban population, and foreign direct investment, reflecting the structural transformation of the economy over time. During the study period, Pakistan experienced phases of economic expansion, trade liberalization, rapid urbanization, and increased integration into global markets. These developments significantly influenced labor market outcomes and justified the inclusion of these variables in the unemployment model.

The increasing trend in urban population and trade openness indicates growing structural changes in the economy, while fluctuations in inflation and economic growth suggest changing macroeconomic conditions. Such variations provide a suitable basis for investigating the determinants of unemployment using time-series econometric techniques. The standard deviation values show that FDI (1.488) and RGDP (0.526) were the most volatile variables, whereas urban population displayed the least variation (0.129), reflecting its relatively stable growth pattern over time. The minimum and maximum values further confirm the existence of considerable fluctuations in economic growth, inflation, and investment during the study period.

The skewness values for all variables are negative, indicating a slight left-skewed distribution. Moreover, the kurtosis values are generally close to the benchmark value of three, suggesting that the variables do not deviate substantially from normality. The Jarque–Bera statistics also support the assumption of normal distribution, as none of the variables exhibits serious departures from normality. Therefore, the data are suitable for econometric analysis using the ARDL framework.

This evidence suggests that the selected variables adequately capture the macroeconomic and structural conditions affecting unemployment in Pakistan and provide a reliable basis for investigating both short-run and long-run relationships.

#### Unit Root Analysis

Prior to estimating the ARDL model, the stationarity properties of the variables were examined using the Augmented Dickey-Fuller (ADF) unit root test. The results indicated (see Table-2) that some variables were stationary at level, while others became stationary after first differencing. None of the variables was integrated of order two [I(2)].

The mixed order of integration among the variables justified the application of the ARDL approach proposed by Pesaran et al. (2001), which is suitable when variables are integrated at I(0) and I(1). The absence of I(2) variables ensured the validity of the ARDL Bounds Testing procedure.

These findings are consistent with previous studies on unemployment determinants in developing economies, where macroeconomic variables often exhibit different orders of integration (Shahbaz & Islam, 2011; Akram et al., 2014).

#### Structural Break Analysis

The stability of the estimated model was evaluated using the CUSUM and CUSUMSQ tests. The CUSUMSQ test identified a structural break at observation No. 15 which is the data of 1985 (see Figure-1), indicating a significant change in the relationship between unemployment and its determinants (Kemal, 2002; World Bank, 1995). The identified break coincides with major economic and policy changes in Pakistan, including trade liberalization, structural adjustment programs, and increased integration with global markets. Consequently, the sample was divided into two sub-periods: 1970–1984 and 1985–2014.

The comparison of the two periods reveals important shifts in the determinants of unemployment. Economic growth became more effective in reducing unemployment after 1984, while trade openness emerged as a stronger contributor to unemployment. Urbanization also became increasingly important as labor migration accelerated and urban labor markets faced greater pressure.

These findings highlight the importance of accounting for structural changes when analyzing labor market dynamics and formulating employment policies.

### Cointegration Analysis

The existence of a long-run relationship among unemployment, inflation, trade openness, economic growth, urban population, and foreign direct investment was examined using the ARDL Bounds Test.

The calculated F-statistics (see Table-3) exceeded the upper critical bound values, confirming the existence of cointegration among the variables. This result indicates that unemployment and its determinants move together in the long run despite short-run fluctuations. Therefore, changes in inflation, trade openness, economic growth, urbanization, and foreign direct investment have lasting effects on unemployment in Pakistan.

The existence of cointegration supports the argument that labor market outcomes are influenced by long-run macroeconomic and structural factors rather than temporary shocks alone. Similar evidence of cointegration between unemployment and macroeconomic variables has been reported by Pesaran et al. (2001), Shahbaz and Islam (2011), and Ahmed and Khan (2018).

### Long-Run Determinants of Unemployment

#### Period I (1970–1984)

The long-run estimates presented in Table 4 reveal that inflation significantly reduced unemployment. The coefficient of CPI (-0.54) suggests that an increase in inflation leads to a decline in unemployment, supporting the Phillips Curve hypothesis (Phillips, 1958; Ball & Mazumder, 2019). This finding implies that expansionary economic conditions stimulate aggregate demand and employment opportunities.

Trade openness exerted a positive but statistically insignificant effect on unemployment. Although trade liberalization can promote economic efficiency, the positive sign suggests that domestic industries may have faced competitive pressures that reduced employment opportunities.

Real GDP exhibited a negative relationship with unemployment, indicating that economic growth contributed to job creation. However, the coefficient was statistically insignificant, implying that growth during this period was not sufficiently employment-intensive.

Urban population had a large positive and statistically significant coefficient (12.00), indicating that rapid urbanization substantially increased unemployment. The migration of labor from rural to urban areas appears to have exceeded the capacity of urban labor markets to absorb new entrants.

Foreign direct investment significantly reduced unemployment. The negative coefficient suggests that foreign investment contributed to employment creation through increased production activities, technology transfer, and capital accumulation.

#### Period II (1985–2014)

The long-run results for the second period indicate notable structural changes. Inflation continued to reduce unemployment significantly, although the magnitude of its effect declined compared to the earlier period.

Table 5 shows trade openness became a significant determinant of unemployment, with a coefficient of 1.83. This result suggests that trade liberalization policies implemented after the mid-1980s may have exposed domestic industries to stronger international competition, leading to labor displacement in some sectors. Similar findings were reported by Dutt et al. (2009), who found that trade openness can increase unemployment in developing countries with weak industrial competitiveness.

Real GDP significantly reduced unemployment, supporting Okun's Law (Okun, 1962). The findings indicate that economic growth became more effective in generating employment opportunities during the post-liberalization period. Urban population remained a positive and significant determinant of unemployment, highlighting the increasing pressure on urban labor markets. Rapid population growth and migration continued to outpace employment creation.

Although FDI maintained a negative relationship with unemployment, the coefficient was statistically insignificant, suggesting limited employment effects of foreign investment during this period.

### Short-Run Dynamics

For the period 1970–1984 (see Table 6), inflation significantly reduced unemployment, whereas trade openness significantly increased unemployment. Economic growth, urban population, and FDI exhibited statistically insignificant effects in the short run.

For the period 1985–2014, inflation and economic growth continued to reduce unemployment significantly. Trade openness and urban population significantly increased unemployment, indicating that labor market adjustments to economic liberalization and urbanization occur relatively quickly.

The persistence of these relationships in both the short and long run suggests that unemployment in Pakistan is influenced by both immediate economic conditions and long-term structural factors. These findings are consistent with Kalim (2003) and Shahbaz and Islam (2011), who reported significant short-run interactions between macroeconomic variables and unemployment.

### **Error Correction Mechanism**

The Error Correction Model (ECM) provides information regarding the speed at which short-run disequilibrium adjusts toward long-run equilibrium (Robert F. Engle & Clive W. J. Granger, 1987; M. Hashem Pesaran, Yongcheol Shin, & Richard J. Smith, 2001).

For the period 1970–1984, the error correction coefficient was significant, indicating that approximately 46% of deviations from long-run equilibrium were corrected each year. This suggests a moderate speed of adjustment in the labor market.

For the period 1985–2014, the ECM coefficient (-0.54) was negative and statistically significant, implying that approximately 54% of short-run disequilibrium was corrected annually. The higher adjustment speed during the second period suggests greater responsiveness of the labor market to macroeconomic changes following economic reforms and liberalization.

The significance of the ECM coefficients confirms the stability of the estimated long-run relationships and validates the use of the ARDL framework (M. Hashem Pesaran et al., 2001; Peter C. B. Phillips & Bruce E. Hansen, 1990).

### **Discussion of Findings**

The findings provide strong evidence that unemployment in Pakistan is influenced by a combination of macroeconomic, demographic, and structural factors. The negative relationship between inflation and unemployment supports the Phillips Curve theory (Phillips, 1958) and aligns with the findings of Shahbaz and Islam (2011), who reported that inflation stimulates economic activity and reduces unemployment. The negative impact of economic growth on unemployment confirms Okun's Law (Okun, 1962) and suggests that growth remains an important mechanism for job creation. However, the stronger effect observed after 1984 indicates that economic reforms improved the employment-generating capacity of growth.

Trade openness consistently increased unemployment, particularly during the post-liberalization period. This finding supports the argument of Dutt et al. (2009) that trade liberalization may generate adjustment costs and labor displacement in economies with limited industrial competitiveness. Urban population emerged as a significant contributor to unemployment throughout the study period. Rapid urbanization has increased labor supply in urban areas without a corresponding expansion in employment opportunities, a finding consistent with Haider (2006).

Finally, foreign direct investment generally reduced unemployment, although its impact weakened over time. This suggests that while FDI contributes to economic development, its employment effects depend on the nature and sectoral distribution of investment.

Overall, the results indicate that sustainable reductions in unemployment require policies that promote labor-intensive economic growth, improve industrial competitiveness, encourage productive investment, and effectively manage urbanization pressures. Such integrated policy measures are essential for achieving long-term employment generation and inclusive economic development in Pakistan.

### **Conclusion**

This study examined the determinants of unemployment in Pakistan using annual time-series data from 1970 to 2014. The ARDL Bounds Testing approach confirmed the existence of a long-run relationship between unemployment and key macroeconomic variables, including inflation, trade openness, real GDP, urban population, and foreign direct investment. The results revealed that inflation and economic growth significantly reduced unemployment, supporting the Phillips Curve and Okun's Law hypotheses. In contrast, trade openness and urbanization increased unemployment, particularly during the post-1984 period. Foreign direct investment exhibited a negative but relatively weak effect on unemployment. The structural break analysis further indicated that the influence of these determinants changed over time due to economic reforms and increasing globalization. Overall, the findings suggest that unemployment in Pakistan is driven by a combination of macroeconomic performance, demographic pressures, and structural transformations.

### **Recommendations**

1. Promote labor-intensive economic growth to create more employment opportunities.
2. Improve the competitiveness of domestic industries to minimize unemployment arising from trade liberalization.



# Advance Journal of Econometrics and Finance

## Vol-3, Issue-4, 2025

3. Encourage employment-generating foreign direct investment in productive sectors.
4. Strengthen technical and vocational education to enhance workforce skills and employability.
5. Support small and medium enterprises (SMEs) as a key source of job creation.
6. Implement balanced regional development policies to reduce excessive urban migration and labor market pressures.
7. Formulate employment-oriented economic policies that align growth objectives with job creation.

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# Advance Journal of Econometrics and Finance

## Vol-3, Issue-4, 2025

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**Table 1:** *Descriptive Statistics of Variables (1970–2014)*

Statistics	UNEMP	TRO	UBP	RGDP	FDI	CPI
Mean	1.661	3.729	3.466	1.378	5.314	2.041
Median	1.723	3.791	3.486	1.518	5.317	2.124
Maximum	2.116	4.078	3.652	2.042	7.628	3.010
Minimum	1.131	3.266	3.148	0.014	2.421	1.070
Std. Dev.	0.292	0.301	0.129	0.526	1.488	0.495
Skewness	-0.498	-0.523	-0.664	-0.787	-0.157	-0.438
Kurtosis	2.396	1.813	3.173	2.975	1.990	2.428
Jarque-Bera	1.695	3.127	2.241	3.101	1.398	1.367

**Table 2:** *Summary of ADF Unit Root Results*

Variable	Level	First Difference	Order of Integration
UNEMP	Non-stationary	Stationary	I(1)
CPI	Stationary	-	I(0)
TRO	Non-stationary	Stationary	I(1)
RGDP	Non-stationary	Stationary	I(1)
UBP	Non-stationary	Stationary	I(1)
FDI	Stationary	-	I(0)

**Table 3:** *ARDL Bounds Test for Cointegration*

Overall Sample: 1970–2014)

Dependent Variable	F-statistic Value	Lower bound Value I (0)	Upper bound Value I (1)	Result
D(LnUNEM)	1.45	2.62	3.79	No Cointegration
D(LnRGDP)	23.97	2.62	3.79	Cointegration
D(LnCPI)	5.38	2.62	3.79	Cointegration
D(LnTRO)	37.92	2.62	3.79	Cointegration
D(LnUBP)	4.50	2.62	3.79	Cointegration
D(LnFDI)	5.38	2.62	3.79	Cointegration



# Advance Journal of Econometrics and Finance

## Vol-3, Issue-4, 2025

### *Period I (1970–1984)*

Test Statistic	Value
F-Statistic	5.85
Lower Bound I(0) (5%)	2.62
Upper Bound I(1) (5%)	3.79
Decision	Cointegration Exists

### *Period II (1985–2014)*

Test Statistic	Value
F-Statistic	6.74
Lower Bound I(0) (5%)	2.62
Upper Bound I(1) (5%)	3.79
Decision	Cointegration Exists

**Source:** Author's calculations based on ARDL Bounds Testing approach.

**Table 4:** *Long-Run ARDL Estimates (1970–1984)*

Variable	Coefficient	Significance
CPI	-0.54	Significant
TRO	0.76	Insignificant
RGDP	-1.16	Insignificant
UBP	12.00	Significant
FDI	-0.54	Significant

**Table 5:** *Long-Run ARDL Estimates (1985–2014)*

Variable	Coefficient	Significance
CPI	-0.21	Significant
TRO	1.83	Significant
RGDP	-0.36	Significant
UBP	0.39	Significant
FDI	-0.25	Insignificant

**Table 6:** *Short-Run ARDL Estimates (1970–1984)*

Variable	Coefficient	Significance
CPI	-9.60	Significant
TRO	0.44	Significant
RGDP	-1.36	Insignificant
UBP	-0.80	Insignificant
FDI	-0.15	Insignificant

**Table 7:** *Short-Run ARDL Estimates (1985–2014)*

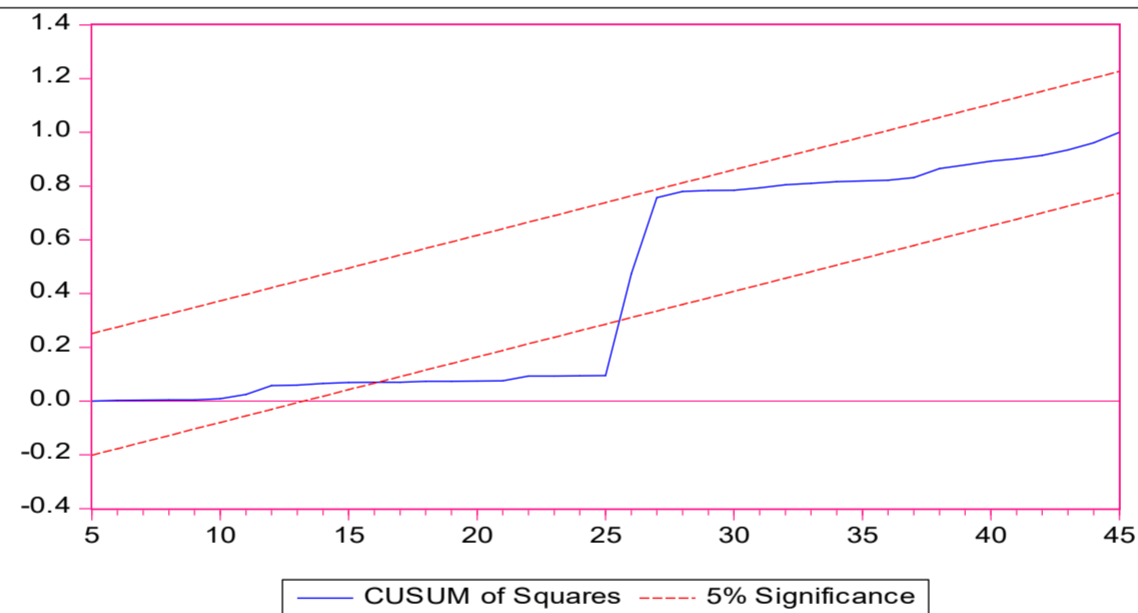
Variable	Coefficient	Significance
CPI	-0.42	Significant
TRO	0.84	Significant
RGDP	-0.19	Significant
UBP	1.12	Significant
FDI	-0.17	Insignificant

**Table 8:** *Error Correction Results*

Period	ECM Coefficient	Interpretation
1970–1984	-0.46	46% adjustment per year
1985–2014	-0.54	54% adjustment per year

**Table 9:** *Structural Break Analysis*

Test	Finding
CUSUM	Stable Parameters
CUSUMSQ	Structural Break in 1984



**Figure 1:** *Cumulative Sum of Squares of Recursive Residuals and (CUSUMSQ)*