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The Impact of Investment and Population Growth on Unemployment in Afghanistan (2002–2024)

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A B S T R A C T

This study investigates the influence of investment and population growth on unemployment in Afghanistan over the period 2002–2024 by employing annual time-series data. The research adopts a quantitative empirical approach and utilizes established econometric techniques to evaluate both long-run and short-run relationships among the selected variables. Stationarity is examined using the Augmented Dickey–Fuller (ADF) unit root test, while the Engle–Granger cointegration test and the ARDL Bounds testing approach are employed to determine the existence of long-run equilibrium. Short-run dynamics are estimated through the Autoregressive Distributed Lag (ARDL) model. The empirical findings reveal that all variables become stationary after first differencing, indicating integration of order one, I (1). the results provide no evidence of a long-run cointegrating relationship between unemployment, investment, and population growth. the ARDL estimates suggest that neither investment nor population growth exerts a statistically significant short-run influence on unemployment. Instead, the previous level of unemployment emerges as the most influential predictor of current unemployment, highlighting the persistence of labor market conditions in Afghanistan. Diagnostic and stability tests further confirm that the estimated model is statistically reliable and free from econometric problems, including serial correlation, heteroskedasticity, and model misspecification. Overall, the findings indicate that unemployment in Afghanistan is primarily driven by structural and institutional constraints rather than changes in investment or population growth alone. Consequently, comprehensive structural reforms and sector-specific employment policies are essential for achieving sustainable reductions in unemployment.

Keywords: Investment, Unemployment, Population Growth, Economic Growth, Afghanistan.

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1. INTRODUCTION

In modern economics, changes in the labor market are considered key indicators of a country's economic stability and social well-being, and unemployment is an important reflection of these changes. According to World Bank reports, in some developing countries, unemployment is closely linked to the interactions between economic growth, investment, and population changes (World Bank, 2023).

The international literature shows that the expansion of the productive sector, private investment, and the dynamics of the labor force can bring significant changes to unemployment trends (Todaro & Smith, 2020). Investment, particularly domestic and foreign private investment, is one of the main sources for increasing employment. Research indicates that higher investment raises production capacity, accelerates private sector development, and creates new job opportunities, which ultimately reduces unemployment (Blomström & Kokakos, 2003).

rapid population growth, especially in countries with weak economic foundations, increases pressure on employment and reduces the labor market's absorption capacity. According to ILO data, population growth expands the labor force, but if it is not accompanied by economic growth, unemployment rates

tend to rise. Empirical studies in countries such as Nigeria, Pakistan, and Bangladesh show that sustained population growth directly contributes to higher unemployment. However, some studies in developing countries suggest that investment and population growth do not have a statistically significant effect on unemployment (Ahmed & Kalim, 2017).

In Afghanistan, very few studies have examined the combined relationship between investment, population growth, and unemployment. While some research investigates general factors of unemployment, the joint effect of investment and population growth has not yet been analyzed using a systematic econometric model. Therefore, this study fills an important research gap by empirically examining the relationship among these three key economic variables based on time-series data from 2002 to 2024..

1.2. Research Questions

1. How does the level of investment affect changes in unemployment in Afghanistan?
2. What role does the rate of population growth play in increasing or decreasing unemployment?
3. Do investment and population growth jointly create a statistically significant impact on the long-term trends of unemployment?
4. Are the relationships among these three variables short-term or long-term?

2. LITERATURE REVIEW

2.1. Theoretical Framework

In economic literature, the relationship among investment, population growth, and unemployment has been interpreted through a number of well-established theoretical perspectives. According to Neoclassical economic theory, investment plays a central role in promoting economic growth by expanding productive capacity and increasing capital accumulation, which subsequently raises the demand for labor and reduces unemployment (Solow, 1956). The Solow growth model further emphasizes that firms require additional workers as investment enhances production capacity. Therefore, continuous investment contributes directly to employment creation and supports a decline in unemployment by stimulating labor demand (Todaro & Smith, 2020).

Conversely, the association between population growth and unemployment is explained mainly by Malthusian theory and Neoclassical labor market theory. These theoretical perspectives suggest that rapid population growth expands the size of the labor force; however, if economic production and job creation fail to increase at a comparable rate, an imbalance emerges between labor supply and labor demand. As a result, excess labor supply leads to higher unemployment rates (Malthus, 1798; ILO, 2021)

According to human capital theory, population growth can strengthen the labor force, but only if market absorption capacity, investment, and economic production grow proportionally. If these conditions are not met, rapid population growth, especially in developing countries, contributes to higher unemployment (Schultz, 1961).

Other fundamental theories on unemployment, such as Classical and Keynesian labor-market theories, view labor demand and business cycle fluctuations as primary determinants of unemployment. The Classical theory argues that wages and prices should adjust freely in the market to eliminate unemployment, whereas the Keynesian theory emphasizes that low investment and economic recessions reduce demand, which in turn raises unemployment from this perspective, investment is considered the main engine for stimulating economic activity and increasing employment opportunities (Keynes, 1936).

In light of these theories, it is expected that investment will reduce unemployment, while rapid population growth is likely to increase it, especially in situations where economic foundations are weak and labor market absorption capacity is limited. Accordingly, this theoretical framework predicts that in the context of Afghanistan, investment and population growth will have opposing effects on unemployment: investment will lower unemployment, whereas population growth will increase it. This perspective forms the basis for the study's hypotheses and the econometric model.

2.2. Review of Related Literature

Aziz (2021) investigated the macroeconomic factors influencing unemployment in Afghanistan by analyzing annual time-series data covering the period from 2002 to 2019. Applying the Autoregressive Distributed Lag (ARDL) methodology, the study found that inadequate investment, sluggish economic growth, and rapid population expansion are among the major contributors to rising unemployment. The empirical evidence further revealed that investment contributes to lowering unemployment over the long run, whereas population growth exerts a statistically significant positive effect on unemployment.

Blanchard and Summers (1986) developed the unemployment hysteresis hypothesis, arguing that unemployment is influenced not only by temporary economic shocks but also by its own historical behavior. Their analysis of European labor markets demonstrated that unemployment often persists because of structural labor-market rigidities, institutional barriers, and the declining employability of individuals experiencing prolonged unemployment. These findings indicate that previous unemployment levels strongly influence current labor-market outcomes, suggesting that unemployment is largely structural and path-dependent rather than merely the result of short-term business cycle fluctuations.

Okonkwo and Ugochukwu (2020) explored the relationship between population growth and unemployment in Nigeria using annual data spanning 1990–2019. Employing the Error Correction Model (ECM) together with cointegration analysis, the study concluded that rapid population growth reduces the economy's capacity to absorb labor, thereby increasing unemployment. The findings also emphasized that investment can effectively reduce unemployment only when supported by strong economic fundamentals and favorable macroeconomic conditions.

Ahmed and Kalim (2017) examined the effects of investment and economic growth on unemployment in Pakistan over the period 1980–2015 by applying the ARDL estimation technique. Their empirical results indicated that investment significantly lowers unemployment in the long run, while its short-run impact remains relatively limited. The study additionally found that rapid population growth intensifies labor-market pressures, contributing to higher unemployment levels by expanding the labor force beyond the economy's employment-generating capacity.

Fields (2011) argues that labor market dynamics in developing countries differ substantially from those observed in advanced economies. He explains that the relationship between macroeconomic variables—including investment, economic growth, and unemployment—is often weak or inconsistent because of the widespread presence of the informal sector. According to his analysis, higher investment does not automatically generate proportional employment opportunities, particularly when investment is concentrated in capital-intensive industries or sectors with limited labor absorption capacity. Furthermore, structural rigidities and labor market imperfections reduce the ability of conventional macroeconomic factors to influence unemployment. Consequently, investment may fail to produce a statistically significant reduction in unemployment within many developing economies.

Sadikova (2019) investigated the interaction among investment, economic growth, and unemployment in Kazakhstan using annual data covering the period from 2000 to 2018. The study employed the Augmented Dickey–Fuller (ADF) unit root test, Johansen cointegration analysis, and Ordinary Least Squares (OLS) estimation. The empirical findings demonstrated that investment has a significant negative effect on unemployment, indicating that higher investment contributes to employment generation. In contrast, population growth was found to increase unemployment, particularly in regions where industrial development and productive sector expansion remain relatively slow.

Empirical evidence reported by the African Development Bank (AfDB) and the International Labour Organization (ILO) indicates that unemployment in fragile and conflict-affected economies is influenced primarily by structural and institutional weaknesses rather than by demographic factors or investment levels. These studies emphasize that population growth alone does not necessarily result in higher unemployment, especially in economies characterized by informal labor markets, limited industrial development, and persistent political instability. Instead, unemployment is largely associated with weak

institutional capacity, low productivity, inadequate economic diversification, and restricted employment opportunities. The findings further suggest that traditional macroeconomic variables are often insufficient to explain labor market outcomes in such environments, highlighting the dominant role of structural constraints in shaping unemployment dynamics.

Blomström and Kokko (2003) empirically examined the impact of foreign direct investment (FDI) on employment across several developing countries. Their findings indicate that FDI promotes productive sector expansion, facilitates technological advancement and skill development, and generates additional employment opportunities. The study further concluded that investment contributes to reducing unemployment over the medium and long term. However, the employment benefits of investment are relatively limited in countries experiencing rapid population growth, where labor force expansion often exceeds the economy's capacity to create jobs.

The above studies reveal three clear findings:

1. Investment reduces unemployment: All studies (Afghanistan, Pakistan, Nigeria, Kazakhstan) confirm that investment:
    - Accelerates the expansion of the productive sector
    - Increases labor demand
    - Reduces unemployment in the long run
2. Rapid population growth has an adverse impact on labor market outcomes: The reviewed studies indicate that population growth:
    - Increases labor market pressure
    - Exceeds the absorption capacity of the productive sector

Their joint effect is important: Most studies emphasize that when investment is low and population grows rapidly, unemployment rises quickly. This finding is fully consistent with Afghanistan's economic reality.

3. METHODS AND MATERIALS

This study is conducted within the framework of time-series econometrics with the objective of empirically examining the long-run and short-run relationships among investment, population growth, and unemployment. The methodology is based on standard principles of empirical economics and includes all stages necessary for a reliable, statistical, and robust analysis.

The basic econometric model of the study is specified as:

$$\mathbf{UNEMPt} = \boldsymbol{\alpha 0} + \boldsymbol{\alpha 1 INVt} + \boldsymbol{\alpha 2 POPGt} + \boldsymbol{\epsilon t}$$

- UNEMP-t = Unemployment rate (dependent variable)
- INV-t = Investment (independent variable)
- POPG-t = Population growth (independent variable)
- ϵ-t = Error term

3.1. Research Design

The study follows a quantitative empirical framework based on annual time-series data for the period 2002–2024. Econometric techniques are employed to estimate and evaluate the statistical relationships among the variables. using various models. The study focuses on the relationship between three main economic variables.

- Dependent Variable**:** Unemployment Rate (UNEMP)
- Independent Variables: Investment (INV) and Population Growth (POPG)

1.3. Data Sources

- Reliable data obtained from internationally recognized organizations and official institutions were utilized to enhance the validity and credibility of the empirical analysis. The data used in this study were collected from:
- World Development Indicators (WDI), World Bank: Annual economic data
- National Statistics and Information Authority (NSIA), Afghanistan
- International Labour Organization (ILO): Unemployment statistics

3.3. Data Processing & Statistical Techniques

The study follows several steps to meet the reliability requirements of econometric analysis:

Stationarity Testing: Time-series data may be non-stationary. If variables are not stationary, the results can be misleading. Therefore, all variables are tested using.

Cointegration Analysis: To investigate the presence of a stable long-run equilibrium relationship among the selected variables.

Model Evaluation Criteria: To ensure the statistical reliability and validity of the model, several post-estimation diagnostic tests were carried out, including the following:

Serial Correlation LM Test: To check for autocorrelation

- Heteroskedasticity Test: To examine variance of errors
- Jarque–Bera Normality Test: To test the normal distribution of residuals
- Ramsey RESET Test: To verify model specification

The econometric analysis is performed using EViews software.

3.4. Ethical Considerations

- All data used in this study are collected from official and internationally recognized sources.
- No personal or confidential information is included in any part of the research.

The analytical methods applied in this study are consistent with internationally accepted academic and ethical standards

4. RESULTS

4.1. Unit Root Test Results (ADF Test)

To assess the time-series characteristics of the variables, the Augmented Dickey–Fuller (ADF) unit root test was conducted. This procedure was used to identify whether each variable was stationary and to determine its corresponding order of integration. Confirming stationarity is a fundamental requirement in time-series econometric analysis because regressions involving non-stationary variables may produce misleading or spurious estimates. Under the ADF framework, the null hypothesis assumes the presence of a unit root, indicating non-stationarity, whereas the alternative hypothesis suggests that the series is stationary. The empirical outcomes of the ADF test are summarized in. Table.1

Table.1: Augmented Dickey–Fuller (ADF) Unit Root Test Results

Variable	Level t-Statistic	(p-value)	Integration Order	Stationary at Level
Population growth	−4.6213	0.1031	I(1).	Nearly Stationary
Unemployment	−3.2599	0.0078	I(1).	Yes
Investment(GCF)	−6.7924	0.0001	I(1).	Yes

The findings presented in Table 1 reveal that all variables become stationary after first differencing, indicating that none of them suffers from a persistent unit root problem. Although the population growth variable records a probability value close to the 10% significance threshold, its calculated ADF statistic exceeds the critical value in absolute terms, supporting the rejection of the unit root hypothesis at the

first difference. Therefore, population growth, unemployment, and investment are all classified as integrated of order one, I (1), making them appropriate for subsequent time-series estimation.

4.2. Cointegration Test Results (Engle–Granger)

The Engle–Granger cointegration procedure was employed to examine whether unemployment, population growth, and investment share a stable long-run equilibrium relationship. Cointegration analysis is particularly important when variables exhibit the same order of integration because it determines whether they move together over time despite temporary short-run fluctuations. The null hypothesis assumes that no long-run cointegrating relationship exists among the variables, whereas the alternative hypothesis supports the existence of such a relationship. The estimated results are reported in Table 2.

Table.2: Engle–Granger Cointegration Test Results

Dependent Variable	Tau-Statistic	P-Value	Z-Statistic	P-Value	Cointegration
Investment(GCF)	-1.655	0.859	-4.160	0.922	No
Population growth	-3.349	0.184	-14.370	0.203	No
Unemployment	-1.131	0.955	-3.684	0.941	No

The empirical evidence reported in Table 2 indicates that the Engle–Granger test does not provide sufficient support for the existence of a long-run equilibrium relationship among unemployment (UR), gross capital formation (GCF), and population growth (PGR). Specifically, both the tau-statistic and z-statistic fail to exceed their respective critical values, while the associated probability values remain above the conventional 5% significance level. These findings suggest that the variables are not cointegrated. Consequently, estimating a simple OLS long-run model could generate unreliable and spurious results, making the ARDL framework a more appropriate econometric approach.

4.3. ARDL Short-Run Estimation Results

The Autoregressive Distributed Lag (ARDL) model was estimated to investigate the short-run interactions among the study variables. One of the principal advantages of the ARDL methodology is its flexibility in handling variables integrated at different orders, provided that none is integrated beyond I(1). The estimated short-run coefficients capture the immediate influence of investment and population growth on unemployment. The estimation outcomes are reported in Table 3.

Table. 3: ARDL Short-Run Results (Dependent Variable: Unemployment

Variable	Coefficient	Std. Error	t-statistic	p-value
UR Unemployment (-1)	0.882	0.071	12.418	0.000
Population growth	-0.365	0.241	-1.512	0.155
Investment(GCF)	0.002	0.212	0.007	0.994
GCF(-1)	-0.225	0.293	-0.766	0.457
GCF(-2)	0.069	0.294	0.236	0.817
GCF(-3)	0.295	0.225	1.313	0.212
Constant	2.106	1.120	1.880	0.083

The estimates presented in Table 3 demonstrate that the lagged unemployment variable [UR (-1)] has a statistically significant and positive influence on current unemployment, indicating strong persistence

in unemployment over time. Population growth exhibits a negative coefficient; however, its effect is statistically insignificant. Likewise, investment (GCF) does not exert a statistically significant influence on unemployment within the short-run period. Overall, these results imply that short-run changes in unemployment are driven primarily by its own historical dynamics rather than by contemporaneous movements in investment or population growth.

4.4. ARDL Bounds Test for Long-Run Relationship

To investigate whether a long-run equilibrium relationship exists among the variables, the ARDL Bounds testing approach proposed by Pesaran et al. (2001) was implemented. This procedure evaluates the calculated F-statistic against the corresponding lower and upper critical bounds. If the computed statistic exceeds the upper critical bound, the existence of cointegration is confirmed. Conversely, if it falls below the lower bound, the null hypothesis of no cointegration cannot be rejected. The detailed estimation results are presented in Table 4.

Table.4: ARDL Bounds Test Results

Test Statistic	Value	I(0) Lower Bound (5%)	I(1) Upper Bound (5%)	Decision
F-statistic	2.786	3.10	3.87	No Cointegration

As reported in Table 4, the calculated F-statistic from the ARDL Bounds test remains below both the lower and upper critical bound values at the 5% significance level. This outcome indicates that the null hypothesis of no cointegration cannot be rejected. Accordingly, the empirical findings do not support the presence of a stable long-run equilibrium relationship among the variables included in the model. Therefore, conclusions regarding long-run effects should be avoided, and any interpretation of long-run coefficients should be made with caution.

4.5.VAR Estimation Results

To investigate the dynamic interactions among unemployment, population growth, and investment, a Vector Autoregression (VAR) model was estimated. Unlike conventional single-equation regression models, the VAR framework treats every variable as endogenous, allowing each variable to be influenced not only by its own lagged values but also by the historical values of the remaining variables in the system. This approach provides a comprehensive representation of the interdependent relationships among the variables. The overall performance of each estimated equation is summarized in Table 5.

Table5: Summary of VAR Model Results

Equation	R^2	Adj. R^2	F-statistic	Interpretation
UR	0.948	0.925	42.24	Strong explanatory power
PGR	0.378	0.112	1.42	Weak explanatory power
GCF	0.832	0.760	11.58	Moderate explanatory power

Overall Findings

- All variables are integrated of order I (1).
- Cointegration among the variables is not confirmed.
- The use of OLS is therefore inappropriate.
- The ARDL approach emerges as the most suitable and methodologically sound choice.
- Unemployment is largely dependent on its own past behavior.

4.6. Diagnostic Tests for ARDL Model

To verify the validity and robustness of the estimated ARDL model, a series of diagnostic tests were conducted. These tests were designed to evaluate the model's overall performance by examining its explanatory capacity, statistical significance, and the existence of serial correlation in the residuals. An econometrically sound model is expected to demonstrate strong explanatory power, statistically significant results, and residuals that are free from autocorrelation. The outcomes of these diagnostic evaluations are reported in Table 6.

Table 6**:** Diagnostic Tests for ARDL Model

Diagnostic Test	Statistic	p-value	Decision
R-squared	0.959	–	Good model fit
Adjusted R-squared	0.940	–	High explanatory power
F-statistic	50.29	0.000	Model is statistically significant
Durbin–Watson	2.09	–	No autocorrelation

The diagnostic results reported in Table 6 demonstrate that the estimated ARDL model provides substantial explanatory power, with an adjusted R^2 of approximately 94%, indicating that a large proportion of the variation in the dependent variable is explained by the included regressors. Moreover, the high F-statistic together with its near-zero probability value confirms that the model is statistically significant as a whole. The Durbin–Watson statistic is also close to the benchmark value of two, suggesting that the residuals are free from first-order serial correlation. Collectively, these diagnostic outcomes confirm that the estimated ARDL model is robust, statistically reliable, and appropriate for empirical inference.

4.7. Diagnostic Tests for Long-Run ARDL Specification

The Error Correction Mechanism (ECM) was estimated to evaluate the rate at which deviations from the long-run equilibrium are corrected following short-run shocks. Within the ECM framework, a negative and statistically significant error correction coefficient indicates that the system converges toward its long-run equilibrium after temporary disturbances. Therefore, the sign and significance of the error correction term provide evidence regarding the stability of the long-run adjustment process. The estimated ECM results are presented in Table 7.

Table 7: Diagnostic Tests for Long-Run ARDL Specification

Indicator	Value	Interpretation
Error Correction Term (UR(-1))	-0.118	Correct sign (negative)
p-value of ECT	0.122	Not statistically significant
Bounds Test F-statistic	2.786	Below critical bounds
Long-run Cointegration	No	Long-run relationship not confirmed

4.8. Diagnostic Tests for VAR Model

To evaluate the independence of the model residuals, the Breusch–Godfrey Serial Correlation LM test was applied. The purpose of this diagnostic procedure is to identify the presence of autocorrelation, which, if detected, would violate the classical regression assumptions and potentially compromise the efficiency of the parameter estimates. The null hypothesis specifies that no serial correlation exists in the residuals. The results obtained from the test are reported in Table 8

Table 8: Diagnostic Tests for VAR Model

Equation	R^2	Adj. R^2	F-statistic	Interpretation
UR	0.948	0.925	42.24	Stable and well-specified
PGR	0.378	0.112	1.42	Weak explanatory power
GCF	0.832	0.760	11.58	Acceptable fit

4.9. Overall Model Adequacy Assessment

A diagnostic test for heteroskedasticity was employed to assess the consistency of the residual variance across all observations. Maintaining constant error variance is a fundamental requirement for obtaining reliable estimates under the classical regression framework. Accordingly, the null hypothesis proposes that the disturbance terms have constant variance, while the alternative hypothesis indicates that the variance changes across observations. The empirical findings of this test are presented in Table 9.

Table 9**:** Overall Model Adequacy Assessment

Criterion	ARDL	VAR
Stationarity condition	✓	✓
Autocorrelation	No	No
Model significance	✓	✓
Suitable for small sample	✓	✗
Preferred model	✓	–

4.10. Breusch–Godfrey Test (LM Test)

A Breusch–Godfrey LM test was conducted to investigate the independence of the model residuals over time. Testing for serial correlation is important because correlated residuals may indicate model misspecification and can adversely affect the precision of econometric estimates. The null hypothesis of the test states that no autocorrelation exists among the residuals, whereas rejection of the null would suggest the presence of serial dependence. The empirical findings of this diagnostic analysis are reported in Table 10.

Table 10: Breusch–Godfrey Serial Correlation LM Test Results

Statistical Indicator	Value	Probability (Prob.)
F-statistic	1.6487	0.2402
Obs R-squared	6.6186	0.0851
Chi-square degrees of freedom (df)	3	—

4.11. Heteroskedasticity Test

A heteroskedasticity test was applied to evaluate the stability of the error variance across all observations included in the model. Ensuring constant residual variance is a key requirement for the validity and efficiency of classical regression estimates. Under the null hypothesis, the residuals are assumed to have constant variance, while the alternative hypothesis indicates that the variance differs across observations. The outcomes of this diagnostic assessment are presented in Table 11.

Table 11: Heteroskedasticity Test Results

Statistical Indicator	Value	Probability (Prob.)
F-statistic	1.1048	0.4104
Obs*R-squared	6.7540	0.3442
Scaled explained SS	5.0428	0.5383

4.12. Ramsey RESET Test

To examine the correctness of the estimated model specification, the Ramsey RESET test was performed. This diagnostic test evaluates whether the selected functional form is appropriate and identifies possible specification problems, such as omitted explanatory variables or incorrect model formulation. The null hypothesis states that the estimated regression model is free from specification errors and is correctly specified. The empirical findings of the RESET test are reported in Table 12.

Table 12: Ramsey RESET Test Results

Statistical Indicator	Value	Probability (Prob.)
t-statistic	0.1641	0.8724
F-statistic	0.0269	0.8724
Likelihood Ratio	0.0448	0.8323

The overall diagnostic assessment confirms the adequacy and validity of the estimated ARDL model. The absence of residual autocorrelation is verified by the Breusch–Godfrey LM test, whereas the Breusch–Pagan–Godfrey test indicates that the model does not exhibit heteroskedasticity. In addition, the Ramsey RESET test suggests that the selected functional form is correctly specified, with no indication of omitted variable bias or specification error. Taken together, these findings support the statistical reliability and robustness of the estimated model, indicating that its empirical results provide a dependable basis for interpretation and subsequent policy analysis.

5. FINDINGS

1. Stationarity of Variables (ADF Test)

According to the Augmented Dickey–Fuller (ADF) test results, none of the study variables is stationary in its original level form. However, after first differencing, unemployment, investment, and population growth all exhibit stationarity, indicating that they are integrated of order one, I (1). Since no variable is integrated beyond the first order, the dataset fulfills the prerequisite conditions for estimating the ARDL model, making this econometric approach appropriate for the subsequent analysis.

2. Absence of Long-Run Relationship (Cointegration Tests)

The empirical evidence from the Engle–Granger and ARDL Bounds tests suggests the absence of a long-term equilibrium association among unemployment, investment, and population growth. In particular, the ARDL Bounds test reports an F-statistic of **2.786**, which is lower than the corresponding 5% lower critical bound. Since the calculated statistic does not exceed the required threshold, the null hypothesis of no cointegration is retained. These results indicate that the variables do not exhibit a stable long-run relationship over the study period.

3. Inappropriateness of the OLS Model

Given that no evidence of cointegration was found among the variables, the use of a standard OLS regression may yield biased and spurious inferences regarding their long-run association. Accordingly,

the ARDL approach is preferred because it provides a more robust and methodologically appropriate framework for modeling the relationships among the variables in this study.

4. Short-Run Results of the ARDL Model

The short-run estimates of the ARDL model indicate that:

- The empirical estimates reveal that the lagged unemployment variable [UR (-1)] has a positive and highly significant coefficient ($p < 0.01$), demonstrating that unemployment displays a high degree of persistence, as previous unemployment levels continue to shape current labor market conditions.

- The estimated coefficient for population growth is negative; however, the relationship lacks statistical significance, indicating insufficient evidence of a short-run effect on unemployment.

- Likewise, the coefficient of investment is statistically insignificant, suggesting that short-run changes in investment do not have a measurable impact on unemployment during the study period.

5. Non-confirmation of Long-Run Effects

The Error Correction Term (ECT) carries a negative sign but is not statistically significant. This suggests that although there is a tendency toward adjustment, no strong long-run adjustment mechanism among the variables is established.

6. Diagnostic Test Results

Overall, the diagnostic evaluation confirms that the estimated ARDL model meets the essential requirements for valid econometric analysis. The absence of serial correlation, the presence of homoskedastic residuals, and the correct functional specification of the model are verified by the Breusch Godfrey, Breusch Pagan Godfrey, and Ramsey RESET tests, respectively. Therefore, the estimated coefficients and statistical inferences can be regarded as robust, reliable, and appropriate for subsequent interpretation and policy formulation.

6. DISCUSSION

The results of the present study indicate that the persistence of unemployment in Afghanistan between 2002 and 2024 is mainly attributable to long-standing structural and institutional factors instead of temporary macroeconomic changes. According to the ARDL estimates, neither investment nor population growth demonstrates a statistically significant effect on unemployment, while previous unemployment levels remain the strongest predictor of current labor market conditions. This pattern provides empirical support for the hysteresis theory of unemployment advanced by Blanchard and Summers (1986), which emphasizes that unemployment tends to persist over time because of its dependence on historical labor market conditions. A comparable argument is presented by Fields (2011), who explains that investment frequently generates only limited employment opportunities in developing economies due to the prevalence of informal employment and weak labor absorption capacity. Moreover, reports published by the AfDB and the ILO highlight that structural rigidities, institutional weaknesses, and governance-related challenges exert a greater influence on unemployment in fragile states than demographic growth or investment dynamics. Consequently, the evidence from this study indicates that the unemployment problem in Afghanistan is fundamentally structural in nature, requiring institutional and labor market reforms rather than relying solely on short-term macroeconomic policies.

7. CONCLUSION

Based on the empirical evidence, this study concludes that fluctuations in investment and population growth did not exert a statistically significant influence on unemployment in Afghanistan during the 2002–2024 study period. Instead, unemployment was found to be highly persistent, with previous unemployment levels serving as the strongest predictor of current labor market outcomes. Moreover, the absence of cointegration indicates that unemployment does not maintain a stable long-run relationship with the selected macroeconomic variables. These findings suggest that the country's unemployment problem is fundamentally structural, reflecting institutional weaknesses, limited economic diversification, and the dominance of sectors with low labor productivity. The results are in

line with the unemployment hysteresis theory proposed by Blanchard and Summers (1986), the labor market analysis of Fields (2011), and the evidence presented in AfDB and ILO reports on fragile economies. Therefore, reducing unemployment in Afghanistan will require comprehensive structural reforms, stronger labor market institutions, and productivity-enhancing policies, while short-term investment expansion alone is unlikely to generate sustainable improvements in employment.

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