ISSN: P 2789 – 1879 E 2789 - 1887 دوره‌ی نهم، شماره‌ی اول، بهار ۱۴۰۴هـ.ش صص: ۱ - ۲۰

فصل‌نامه‌ی علمی - تحقیقی رنا
Rana Academic & Research Journal

نوع مقاله: علمی – پژوهشی
تاریخ دریافت: ۱۰ / ۱۲ / ۱۴۰۳
تاریخ پذیرش: ۱۵ / ۲ / ۱۴۰۴
تاریخ نشر: ۱۵ / ۳ / ۱۴۰۴

پویایی‌های بیکاری و رشد اقتصادی در افغانستان: یک تحلیل تجربی

دکتر عطا محمد نیکزاد [۱]، دکتر منوچهر موحد، دکتر عبدالواحد نادری

چکیده

این تحقیق به‌صورت تجربی رابطه پویای بین بیکاری و رشد اقتصادی در افغانستان طی سال‌های ۲۰۰۲ تا ۲۰۲۰ را بررسی می‌کند و بر تعاملات کوتاه‌مدت و بلندمدت از طریق رویکرد آزمون کران‌های ARDL تمرکز دارد. با استفاده از دیتاهای سری زمانی شاخص‌های کلان اقتصادی شامل نرخ بیکاری، هزینه‌های دولت، مشارکت نیروی کار و بازبودن تجاری که دیتاهای این شاخص‌ها از دیتابیس آزاد بانک جهانی استخراج شده‌اند. این مطالعه به بررسی قابلیت اعمال قانون اوکان در بستر افغانستان می‌پردازد. آزمون‌های ریشه واحد نشان‌دهنده ترکیبی از درجات هم‌جمعی بوده و استفاده از چارچوب ARDL را توجیه می‌کند. آزمون کران وجود یک رابطه معنادار بلندمدت بین رشد تولید ناخالص داخلی و متغیرهای مستقل را تأیید می‌کند. پویایی‌های کوتاه‌مدت نشان می‌دهد که مشارکت نیروی کار به‌عنوان یک عامل مثبت و معنادار بر رشد اقتصادی تأثیر می‌گذارد، در حالی‌که بیکاری و بازبودن تجاری اثرات منفی دارند. هزینه‌های دولت اثر کوتاه‌مدت ثابت و مشخصی نشان نمی‌دهد. آزمون‌های تشخیصی و پایداری، نرمال بودن باقیمانده‌ها، نبود ناهمسانی واریانس و پایداری کلی مدل را تأیید می‌کنند، هرچند نگرانی‌های جزئی در مورد خودهمبستگی به‌ویژه در آزمون‌های کای‌دو باقی مانده است. یافته‌ها بر ضرورت اتخاذ راهبردهای رشد کاربر و اصلاحات ساختاری در افغانستان تأکید دارند. این مطالعه با ارائه شواهد مبتنی بر دیتا برای بازسازی اقتصادی و ایجاد اشتغال در دوران پسامنازعه، به ادبیات علمی و سیاست‌گذاری کمک می‌کند.

کلیدواژه‌ها: بیکاری، رشد اقتصادی، اوکون، مدلARDL ، افغانستان.

ارجاع به این مقاله: نیکزاد، عطامحمد؛ موحد، منوچهر و نادری، عبدالواحد. (۱۴۰۴). **پویایی‌های بیکاری و رشد اقتصادی در افغانستان: یک تحلیل تجربی**. فصل‌نامه‌ی علمی – تحقیقی رنا. دوره‌ی نهم. شماره‌ی اول. صص:۱ - ۲۰

[۱] عضو کادر علمی پوهنتون منگلور
[۲] عضو کادر علمی پوهنتون نعمان سادات
[۳] عضو کادر علمی پوهنتون منگلور

The Dynamics Between Unemployment and Economic Growth in Afghanistan: An Empirical Analysis

Ata Mohammad Nikzad (Ph.D) [1], Manochehr Miahed (Ph.D) [2], Abdul Wahid Nadderi (Ph.D) [3]

Abstract

This study empirically examines the dynamic relationship between unemployment and economic growth in Afghanistan from 2002 to 2020, focusing on both short-run and long-run interactions through the ARDL bounds testing approach. Using time series data on key macroeconomic indicators, including unemployment rate, government expenditure, labor force participation, and trade openness, where these indicators' data were retrieved from World Bank open databases, the study investigates the applicability of Okun's Law in the Afghan context. Unit root tests reveal mixed orders of integration, justifying the use of the ARDL framework. The bounds test confirms a significant long-run relationship between GDP growth and the independent variables. Short-run dynamics highlight labor force participation as a significant positive determinant of GDP growth, while unemployment and trade openness exhibit negative effects. Government expenditure shows no consistent short-term effect. Diagnostic and stability tests validate the robustness of the model, confirming normality of residuals, absence of heteroskedasticity, and overall model stability. However, minor concerns about serial correlation remain, particularly in Chi-square diagnostics. The findings underscore the need for labor-intensive growth strategies and structural reforms in Afghanistan. The study contributes to both academic literature and policy by offering evidence-based insights for post-conflict economic recovery and employment generation.

Keywords: Unemployment, Economic Growth, Okun, ARDL, Afghanistan.

Cite this article: Nikzad, Ata Mohammad; Miahed, Manochehr & Nadderi, Abdul Wahid . (2025). **The Dynamics Between Unemployment and Economic Growth in Afghanistan: An Empirical Analysis.** Rana Academic & Research Journal. Volume 9 . Issue 01. pp 1 - 20

1. Faculty Member of Mangalore University
2. Faculty Member of Noman Sadat University
3. Faculty Member of Mangalore University

1. Introduction

Unemployment and economic growth are two of the most critical indicators of a country's economic health and development. The relationship between these variables has long been a central issue in macroeconomics, particularly in the context of developing and post-conflict countries. Afghanistan, a nation struggling with decades of political instability, insecurity, and fragile institutional structures, presents a unique case where high unemployment persists despite periods of recorded economic growth.

The theoretical basis for the relationship between unemployment and economic growth is often captured through Okun's Law, which suggests an inverse relationship: as an economy grows, unemployment tends to decline. However, the applicability of Okun's Law in developing or war-torn economies like Afghanistan remains uncertain due to structural constraints, a dominant informal sector, low levels of industrialization, and limited private sector development.

Afghanistan faces numerous challenges, including limited job opportunities, low productivity, a lack of foreign investment, and a mismatch between labor supply and market demand. The youth, who form a significant portion of the population, are particularly affected by high unemployment rates, contributing to social unrest, migration, and economic dependency. Despite various national and international efforts to stimulate economic development, the translation of growth into sustainable and inclusive employment has been weak or inconsistent.

This study aims to empirically examine the relationship between unemployment and economic growth in Afghanistan, covering the period from 2002 to 2020. By applying robust econometric techniques such as the Autoregressive Distributed Lag (ARDL) model and Granger causality tests, the research will assess both the short-run and long-run dynamics between these two variables.

Understanding this relationship is not only of academic interest but also of significant policy relevance. With Afghanistan currently navigating economic uncertainty, insights from this study can inform strategies to create jobs, reduce poverty, and foster inclusive growth. The research findings may contribute to designing more effective macroeconomic and labor market policies, particularly those aimed at post-conflict recovery and development.

The relationship between unemployment and economic growth has been widely studied in economic literature. Okun (1962) was among the first to propose an empirical relationship, known as Okun's Law, which suggests that a 1% increase in output above the trend growth rate leads to a reduction in the unemployment rate by roughly 0.3 percentage points. While Okun's findings were based on data from the United States, subsequent studies have tested this relationship in different contexts in different countries, with mixed results.

In developed countries, the inverse relationship generally holds, though its strength varies across time and regions (Ball et al., 2013). However, in developing and transitional economies, including those in Sub-Saharan Africa, South Asia, and the Middle East, the empirical support for Okun's Law is often weaker or inconsistent (Hussain & Malik, 2011; Irfan et al., 2020). These differences are attributed to labor market inefficiencies, a large informal sector, weak institutions, and the prevalence of underemployment.

In the context of South Asia, studies by Sayeed and Mahmood (2012) and Shaari et al. (2014) found varying levels of adherence to Okun's Law, with the relationship being stronger in countries with more stable macroeconomic environments. However, literature focusing specifically on Afghanistan is relatively limited. Rasuli and Ahmadzai (2019) examined Afghanistan's labor market challenges and highlighted the disconnect between GDP growth and job creation. Mohammadi (2021), using a vector autoregression model, also questioned the effectiveness of growth-led employment in the Afghan context, calling for structural reforms to enhance labor market participation. Barna et al. (2023) conducted a time series analysis to investigate the long-run relationship between key macroeconomic indicators such as GDP growth, inflation, trade balance, and unemployment trends in Afghanistan from 1991 to 2022. Using the ARDL bounds testing approach, they found that economic growth and trade positively influence employment levels, while inflation has a mixed impact depending on its intensity. Moreover, in this study, the novelty and gap are in the presence

Rana Academic & Research Journal
Volume 9, Issue No: 1- Autumn 2025

of variables and the time period during which the study was conducted. However, the date considered by Berna et al. (2023) is from 1991, and it neglected the regime shift. Moreover, this study contributes to the existing literature by providing a focused empirical investigation into the unemployment-growth relationship in Afghanistan, using updated data and advanced econometric techniques. By doing so, it aims to fill a gap in the literature and offer valuable insights for both academic inquiry and economic policymaking. Another aspect of this study is to incorporate the Okun Theoretical framework in the context of Afghanistan.

This chapter provides a detailed review of theoretical and empirical literature related to the relationship between unemployment and economic growth, with particular emphasis on developing countries and the Afghan context. The literature is categorized under three main headings: theoretical foundations, global empirical evidence, and regional studies, including Afghanistan. Moreover, this study aims to address these objectives: firstly, to examine the nature and strength of the relationship between unemployment and economic growth in Afghanistan. Secondly, to explore the short-run and long-run effects of economic growth on unemployment. Further, the study structure is as follows: extracting exact and linked literature both theoretically and empirically, after addressing the literature, the study explains the variables, followed by methodology, results, and conclusion.

1.1. Objectives of the Study:

1. To examine the nature and strength of the relationship between unemployment and economic growth in Afghanistan.
2. To explore the short-run and long-run effects of economic growth on unemployment.

1.2. Research Question

- Does unemployment and economic growth in Afghanistan?
- Do unemployment and economic growth have an inverse relationship?

1.3. Hypotheses:

- **H0**: There is no significant relationship between unemployment and economic growth in Afghanistan.
- **H1**: There is a significant inverse relationship between unemployment and economic growth in Afghanistan

2. Theoretical Framework

Okun's Law, introduced by Arthur Okun (1962), postulates a negative relationship between the rate of change in real GDP and changes in unemployment. The law suggests that for every 1% increase in unemployment, a country's GDP will be roughly an additional 2% lower than its potential GDP. Although it is an empirical rule rather than a structural economic law, it has been widely used to examine labor market dynamics.

Subsequent research has attempted to refine the original model, including gap and difference versions of Okun's Law (Knotek, 2007), and explored its applicability across different economic environments. The relationship tends to hold more strongly in developed economies with robust formal sectors, but less consistently in developing nations due to structural rigidities. Ball, Leigh, and Loungani (2013) conducted a comprehensive study of Okun's Law across 20 advanced economies and found that the inverse relationship generally holds, though the coefficient varies. Their work reinforced the notion that the strength of the unemployment-growth relationship depends on labor market flexibility and the structure of the economy.

Knotek (2007) similarly found that the U.S. economy adheres well to Okun's Law, but also noted that the relationship can shift during periods of structural change or recession, implying non-linearity. The seminal work of Arthur Okun (1962) provides the theoretical starting point for understanding the unemployment-growth relationship. Okun posited a negative correlation between GDP growth and unemployment, asserting that for every 1% increase in unemployment, a country's GDP would be approximately 2-3% lower than its potential output. This empirical observation, widely known as Okun's Law, has been foundational in macroeconomics and labor economics.

Rana Academic & Research Journal
Volume 9, Issue No: 1- Autumn 2025

Okun's Law is based on three assumptions: (1) output and employment are positively correlated, (2) labor productivity is stable over the short run, and (3) the labor force remains relatively constant (Okun, 1962). Despite its simplicity, Okun's Law has spurred decades of empirical testing and debate, particularly regarding its applicability across different countries and time periods. The original coefficients proposed by Okun have proven to be variable depending on labor market flexibility, structural characteristics, and policy environments (Knotek, 2007; Moosa, 2008).

In the neoclassical framework, unemployment is seen as a disequilibrium phenomenon corrected by wage flexibility. However, Keynesian models emphasize demand-side factors and sticky wages as key determinants of unemployment. Structuralist approaches, particularly in developing countries, highlight the importance of institutional and demographic factors, such as underemployment and informality, which complicate the unemployment-growth relationship (Fields, 2011).

3. Literature Review

3.1. Studies in Developing and Transition Economies

Developing countries present a more mixed picture. Hussain and Malik (2011) studied Pakistan and found only weak evidence of Okun's Law, attributing it to a large informal sector and structural unemployment. Irfan, Iqbal, and Younas (2020) similarly observed a weak and unstable relationship in South Asian economies, emphasizing the role of education mismatches and labor force participation rates.

Shaari et al. (2014) explored the Malaysian economy and found that while growth does reduce unemployment, the elasticity is lower than in developed countries. Sayeed and Mahmood (2012) argued that economic growth in South Asia has not been inclusive or labor-intensive enough to absorb the growing labor force.

3.2. Empirical Evidence from Developed Economies

In advanced economies, empirical studies generally confirm the negative correlation posited by Okun's Law. Ball, Leigh, and Loungani (2013) conducted a cross-country study of 20 OECD economies and found that the law holds with varying coefficients depending on the country's labor market structure. The study also noted that during periods of recession, the unemployment response to output shocks tends to be more pronounced, highlighting a degree of asymmetry.

Lee (2000) examined Okun's Law across 16 OECD countries using both difference and gap models. He concluded that while Okun's Law is broadly valid, there is considerable heterogeneity in its magnitude and stability. Similarly, Freeman and Schettkat (2005) suggested that labor market institutions—such as employment protection laws, minimum wage regulations, and union density—play a critical role in moderating the responsiveness of unemployment to economic fluctuations.

Moosa (2008) explored the relationship in Arab economies and found that Okun's coefficient ranged from -0.12 to -0.56, indicating a weak but present inverse relationship. These findings illustrate that the application of Okun's Law is context-sensitive and cannot be universally standardized.

3.3. Developing and Transition Economies

In developing and emerging economies, the unemployment-growth relationship is often less straightforward. Unlike developed countries, where labor markets are well-regulated, many developing economies feature large informal sectors, high underemployment, and weak social safety nets, all of which distort the conventional unemployment metrics.

Hussain and Malik (2011) analyzed the Pakistani economy and reported a weak relationship between GDP growth and unemployment. Their analysis suggested that the type of growth matters: capital-intensive growth may fail to absorb labor, particularly unskilled labor. Similarly, Irfan, Iqbal, and Younas (2020) examined South Asian economies and noted that Okun's Law does not consistently apply in the region due to high levels of informality, labor market rigidities, and a mismatch between education and job availability.

Rana Academic & Research Journal
Volume 9, Issue No: 1- Autumn 2025

Shaari, Hussain, and Ismail (2014) studied the Malaysian economy and found a statistically significant but weak inverse relationship. The authors emphasized that while economic growth can reduce unemployment, the composition of growth—whether driven by services, manufacturing, or agriculture—plays a significant role.

In Sub-Saharan Africa, Brixiová, Ncube, and Bicaba (2015) argued that "jobless growth" is a growing concern, where GDP growth occurs without significant improvements in employment indicators. Structural transformation, demographic pressures, and educational mismatches are cited as contributing factors.

3.4. Regional Perspectives: South Asia and Conflict-Affected States

South Asia presents a mixed picture. Sayeed and Mahmood (2012) examined jobless growth trends in India, Pakistan, and Bangladesh, concluding that although the region experienced rapid GDP growth over the past decades, unemployment—particularly youth unemployment—has not declined commensurately. The region's growth pattern has often been service-oriented and capital-intensive, limiting job creation for semi-skilled and unskilled workers.

In conflict-affected or fragile states, economic volatility, political instability, and institutional breakdowns further weaken the link between growth and employment. For instance, in Iraq and Syria, studies have shown that war-induced disruptions not only reduce GDP but also permanently alter labor market structures (World Bank, 2019). While the global literature provides rich insights into the unemployment-growth nexus, its application in the Afghan context remains underdeveloped. There is a lack of comprehensive time-series studies that account for Afghanistan's unique structural challenges, such as conflict, informality, and institutional weakness. Moreover, this paper aims to address these gaps by applying an ARDL approach to updated annual data from 2002 to 2019. By distinguishing between short-run and long-run relationships, the study intends to provide policy-relevant insights into how economic growth strategies can be aligned with employment objectives in Afghanistan.

4. Research Methodological

Different econometric techniques have been used to test Okun's Law and the relationship between unemployment and growth. Time-series models like VAR and ARDL (Autoregressive Distributed Lag) are popular for assessing both short-run and long-run dynamics. Panel data models allow for cross-country comparisons, while GMM (Generalized Method of Moments) is often used to address endogeneity.

4.1. GDP Growth Rate (Dependent Variable)

The GDP growth rate is a measure of the annual percentage change in the value of all goods and services produced within a country's economy. It is one of the most commonly used indicators to assess the health of an economy. A positive GDP growth rate signifies an expansion, while a negative GDP growth rate signals contraction.

In this model, GDP growth rate serves as the dependent variable because economic growth is the ultimate outcome of interest. The rate of GDP growth can be influenced by several factors, including government policy, investment in infrastructure, technological advancement, labor force dynamics, and trade openness.

4.1.1. Relevance to Afghanistan

Afghanistan is a developing country where economic growth is crucial for improving living standards, reducing poverty, and creating jobs. However, the country faces challenges, including political instability, security issues, and infrastructure deficits, which may constrain GDP growth. By understanding the factors that influence GDP growth in Afghanistan, this study can provide valuable insights into the structural issues that hinder economic progress and help design policies that promote sustainable development.

4.2. Unemployment Rate (Independent Variable)

The unemployment rate refers to the percentage of the labor force that is actively seeking work but is unable to find employment. It is a key indicator of labor market health and economic performance. A high unemployment rate usually signals a sluggish economy, while a low unemployment rate is often associated with a healthy economy.

Theoretical Link between Unemployment and Economic Growth

According to Okun's Law**,** there is an inverse relationship between the unemployment rate and economic growth. Specifically, for every 1% increase in the unemployment rate, a country's GDP is expected to be roughly an additional 2% lower than its potential GDP. This means that higher unemployment is typically associated with lower levels of output, as a large portion of the labor force is not being utilized to its full capacity.

The Impact of Unemployment on Economic Growth

4.2.1. Relevance to Afghanistan

Afghanistan suffers from high unemployment rates, particularly among youth, women, and internally displaced populations. These high unemployment rates hinder the country's economic growth and development. Given the country's relatively young and growing population, tackling unemployment is crucial for future economic prosperity. Understanding the relationship between unemployment and GDP growth can help policymakers create better strategies to improve job creation and employment opportunities.

4.3. Government Expenditure (Independent Variable)

Government expenditure refers to the total amount of money spent by the government on public services, infrastructure, defense, health, education, social welfare, and other functions. It is typically a significant component of a country's GDP. Government spending can either stimulate or dampen economic growth depending on its nature, efficiency, and scale.

Afghanistan faces significant challenges in public spending due to limited resources, political instability, and an ongoing conflict. However, increased government expenditure, particularly in infrastructure and social services, could provide a much-needed stimulus to the economy. Given the country's post-war reconstruction phase, government expenditure on rebuilding infrastructure and developing human capital can have a long-lasting impact on economic growth.

4.4. Labor Force Participation Rate (Independent Variable)

The Labor Force Participation Rate (LFPR) is the percentage of the working-age population that is either employed or actively seeking employment. A higher LFPR indicates that a larger portion of the population is engaged in economic activity, which can positively influence GDP growth.

A higher LFPR is generally associated with a larger and more productive workforce. The more individuals who are employed or looking for work, the more resources are used to produce goods and services, increasing total output (GDP).

4.4.1. Relevance to Afghanistan

In Afghanistan, the labor force participation rate is relatively low, especially among women and rural populations. However, there is significant potential for growth in this area. Encouraging greater labor force participation, particularly among women and youth, could substantially boost economic output. This is particularly important for Afghanistan's long-term economic sustainability as the country seeks to diversify its economy and reduce dependency on foreign aid.

4.5. Trade Openness (Independent Variable)

Trade openness refers to the extent to which a country is involved in international trade, typically measured as the sum of exports and imports as a percentage of GDP. Countries that are more open to trade tend to have greater access to global markets, technologies, and investment, which can lead to higher economic growth.

Rana Academic & Research Journal
Volume 9, Issue No: 1- Autumn 2025

4.5.1. Relevance to Afghanistan

Afghanistan's trade openness has been limited due to its landlocked position, political instability, and ongoing conflict. However, increasing trade openness could provide a significant boost to the Afghan economy. Expanding trade relations with neighboring countries and accessing international markets could stimulate economic growth, create jobs, and promote development in key sectors such as agriculture, textiles, and mining.

5. Findings and Interpretation

The study used selected macroeconomic variables through Okun's law to understand the relationship of these variables to the economic growth of the country. Hence, the study was theoretically based on the model of Okun-T. The study gathered the data from different sources, including the World Bank, the National Statistics and Information Authority (NSIA). The data that was gathered encompasses the period from 2002 to 2019, focusing on the unemployment rate and its relation with economic growth in Afghanistan.

The first step in analyzing the time series model is to understand the stationarity level; hence, there are multiple stationarity tests, but the more common one is the Augmented dicky-Fuller.

5.1. Unit root test

The unit root test results provide valuable insight into the time series properties of the variables used in the study, namely GDP growth (GDPG), government expenditure growth (GEX), openness of the economy (OPEN), and unemployment rate (UN). The Augmented Dickey-Fuller (ADF) test was employed to assess whether each of these variables is stationary or non-stationary. Stationarity is an essential concept in time series analysis because most econometric models assume that the underlying series are stationary. A stationary series has constant statistical properties such as mean, variance, and autocovariance over time. If a series is non-stationary, it can lead to spurious regression results, where high R-squared values are observed despite the absence of meaningful relationships between variables. Therefore, understanding the order of integration of each variable is critical for selecting an appropriate econometric model and obtaining valid results. From the test outcomes, GDP growth (GDPG) has a p-value of 0.0023 at the level, which is less than the conventional 5% significance level. This allows us to reject the null hypothesis of a unit root and conclude that GDPG is stationary in its level form. Similarly, government expenditure growth (GEX) has a p-value of 0.0062 at the level, which is also below 0.05, indicating that GEX is likewise stationary at the level. This means that both GDPG and GEX do not require differencing to achieve stationarity and are said to be integrated of order zero, or I(0). These results suggest that fluctuations in GDP growth and government expenditure growth tend to revert to a long-term mean and are not characterized by persistent trends or random walks. The null hypothesis of a unit root in the first difference of LABOR is rejected at all conventional significance levels (1%, 5%, and 10%). This implies that D(LABOR) is stationary, and therefore, the original LABOR variable is integrated of order one, I(1). In simpler terms, the LABOR variable becomes stationary after first differencing, suggesting that it exhibits non-stationarity in levels but stationarity in its first difference. On the other hand, the openness variable (OPEN) shows a p-value of 0.1929 at the level, which is greater than 0.05, implying that it is non-stationary in its original form. However, at the first difference, the p-value drops to 0.0261, allowing us to reject the null hypothesis of a unit root at this level and conclude that the variable becomes stationary after differencing once. The unemployment rate (UN) exhibits a similar behavior, with a very high p-value of 0.9870 at the level, strongly indicating non-stationarity. However, at the first difference, the p-value falls to 0.0383, suggesting that UN also becomes stationary after one round of differencing. Both OPEN and UN are therefore integrated of order one, or I(1), indicating that they possess a stochastic trend in their level form but become stable once the trend component is removed through differencing.

The implications of these findings are significant for econometric modeling. Since the dataset includes a mix of I(0) and I(1) variables, models that require all variables to be of the same order of

integration, such as the Johansen cointegration approach, may not be appropriate. Instead, the Autoregressive Distributed Lag (ARDL) model becomes a suitable choice. The ARDL approach, developed by Pesaran and Shin, is flexible in handling variables of different integration orders, as long as none are integrated of order two or higher (I(2)). It also allows for the simultaneous estimation of short-run and long-run dynamics within a unified framework. Therefore, based on the unit root test results, employing an ARDL model would allow for robust analysis of the relationship between GDP growth, government expenditure, openness, and unemployment, while respecting the statistical properties of each variable.

Table 1: Summary of ADF test

Variables	At level Prob.	At 1st Diff. Prob.
GDPG	0.0023	-
GEX	0.0062	-
OPEN	0.1929	0.0261
UN	0.9870	0.0383
LABOR	0.9853	0.0001

Source: Computer by Author

5.2. Lag length Selection

Before applying the ARDL model, it is essential to determine the appropriate lag length for the endogenous variables to ensure robust and efficient model estimation. The VAR lag order selection criteria table provides guidance based on multiple information criteria: Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan-Quinn Criterion (HQ). According to the table, all four criteria (FPE, AIC, SC, and HQ) unanimously suggest that **lag 1** is optimal, as indicated by the asterisk next to the respective values in the row for lag 1. For instance, the AIC value is lowest at lag 1 (-20.08211), which implies the best model fit with minimum information loss at this lag. Similarly, SC and HQ criteria also reach their minimum values at lag 1, supporting the same conclusion. Therefore, based on these consistent results, one lag length is selected for inclusion in the ARDL model. This selection helps to account for dynamic relationships among the variables while avoiding issues related to over-parameterization or loss of degrees of freedom, especially given the relatively small sample size.

Table 2: Lag selection

lag	LogL	LR	FPE	AIC	SC	HQ
0	149.0531	NA	4.56e-13	-17.06508	-16.86903	-17.04559
1	190.6979	58.79262*	2.40e-14*	-20.08211*	-19.10186*	-19.98467*
2	206.6106	14.97663	3.64e-14	-20.07183	-18.30738	-19.89644

Source: Computer by Author

5.3. ARDL (Autoregressive Distributed Lag)

The ARDL model results indicate that GDP growth in the studied period (2002–2020) is significantly influenced by lagged government expenditure and trade openness. Specifically, government expenditure lagged by one period has a statistically significant negative effect on GDP growth, while trade openness has a positive and significant impact, suggesting that increased openness supports economic growth. Although other variables like labor force participation and unemployment show expected signs—positive for labor and negative for unemployment—their effects are not statistically significant in this model. The model overall explains 84.15% of the variation in GDP growth. Additionally, the Durbin-Watson statistic indicates no major autocorrelation issues.

Rana Academic & Research Journal Volume 9, Issue No: 1- Autumn 2025

Table 3: ARDL Test

Variable	Coefficient	Prob.	Interpretation
GDPG(-1)	-0.118393	0.7608	Not statistically significant; past GDPG has no significant effect.
GEX (current)	0.745072	0.6058	Positive but not significant.
GEX(-1)	-5.816569	**0.0441**	**Significant at 5% level**. A 1-unit increase in lagged GEX reduces GDPG by approx. 5.82 units.
GEX(-2)	2.338685	0.0886	Marginally significant at 10% level.
LABOR	12.03401	0.1574	Positive but not statistically significant.
LABOR(-1)	-12.03403	0.1574	Mirrors above – no significant effect.
OPEN	0.419525	**0.0248**	**Significant at 5% level**. Suggests that greater trade openness positively influences GDP growth.
OPEN(-1)	1.233429	0.2230	Not significant.
UN	-2.939043	0.5068	Negative but not significant.
UN(-1)	1.509573	0.1861	Not significant.

Source: Computer by Author

Rana Academic & Research Journal
Volume 9, Issue No: 1- Autumn 2025

5.4. Bound test

The Bounds Test is a statistical approach used within the Autoregressive Distributed Lag (ARDL) modeling framework to determine the existence of a long-run relationship (cointegration) between variables in a time series analysis, especially when variables are integrated of different orders (I(0) or I(1), but not I(2)). It was developed by Pesaran, Shin, and Smith (2001) and is particularly useful in small sample sizes and when the order of integration of the variables is uncertain. In econometrics, many economic time series data are non-stationary in levels but become stationary after differencing. If a long-run equilibrium relationship exists among such non-stationary variables, they are said to be cointegrated. The Bounds Test helps assess whether such a long-run relationship exists between a dependent variable and one or more independent variables.

5.5. Decision Criteria

To test the hypothesis, the F-statistic is computed from the joint significance of the lagged level variables. This F-statistic is then compared to two sets of critical values:

1. Lower Bound (I(0)): Assumes all variables are stationary.
2. Upper Bound (I(1)): Assumes all variables are non-stationary.

- If the computed F-statistic > upper bound, the null hypothesis is rejected — a long-run relationship exists.
- If the F-statistic is below the lower bound, the null hypothesis cannot be rejected — no cointegration.
- If the F-statistic lies between the bounds, the result is inconclusive.

The F-Bounds Test presented above is used to determine whether a long-run (cointegrating) relationship exists between the dependent variable (GDP growth) and its explanatory variables in the ARDL model. The null hypothesis of the test states that there is **no level relationship,** i.e., no long-run association among the variables. The computed **F-statistic value is 4.998993 in Table 4,** and this is compared against the critical bounds at various significance levels for **k = 4** regressors.

According to the table, the upper bound critical value at the 10% significance level is 3.09, at 5% it is 3.49, at 2.5% it is 3.87, and at 1% it is 4.37. Since the calculated F-statistic exceeds the **upper**

bound values at all conventional significance levels, we **reject the null hypothesis** of no long-run relationship. This implies strong statistical evidence that a **cointegrating relationship exists** between GDP growth and the four independent variables included in the model: government expenditure (GEX), labor force participation (LABOR), openness (OPEN), and unemployment (UN).

This result justifies the inclusion of the error correction term and supports proceeding with long-run and short-run estimations within the ARDL framework. It also indicates that despite potential short-term fluctuations, these variables move together in the long term, establishing an equilibrium relationship. Therefore, policy interventions in one of the explanatory variables are likely to have enduring implications for GDP growth in the long run. Furthermore, the robustness of the test is supported by the relatively high F-statistic compared to the bounds, which rules out ambiguity or inconclusive outcomes. In summary, the F-Bounds Test confirms the presence of a meaningful and statistically significant long-term relationship among the studied macroeconomic indicators and economic growth in the given sample.

Table 4: Bound Test

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.99	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Source: Computer by Author

5.6. Error Correction Form Short-run Dynamics

The ARDL Error Correction Regression results presented in the image aim to estimate the short-run and long-run dynamics of GDP growth (D(GDPG)) in relation to several explanatory variables: government expenditure (GEX), labor force (LABOR), openness (OPEN), unemployment (UN), and a lagged error correction term (CointEq(–1)*), within the framework of an ARDL(1, 2, 1, 2, 1) model. The model is estimated using annual data from 2002 to 2020, with a total of 17 observations included. The "Restricted Constant and No Trend" case is used, indicating a model specification without a deterministic trend but including an intercept. The coefficient of the error correction term (CointEq(–1)*) is –1.118939, which is highly significant with a p-value of 0.0006. This negative and significant coefficient confirms the presence of a stable long-run relationship among the variables. It implies that any deviation from the long-run equilibrium level of GDP growth is corrected by approximately 111.89% in the next period, indicating a very rapid adjustment speed back to equilibrium. In practical terms, this suggests strong mean-reverting behavior in GDP growth, and any shocks are quickly corrected in the following year. In the short-run dynamics, the variable D(LABOR) has a positive and highly significant coefficient of 12.30411 (p = 0.0000), indicating that changes in the labor force have a strong and direct impact on GDP growth in the short run. This is consistent with economic theory, where an increase in labor supply leads to higher production capacity, thereby boosting output. Conversely, D(OPEN) and its lag D(OPEN(–1)) both have significant negative effects on GDP growth, with coefficients –4.139655 (p = 0.0275) and –2.702931 (p = 0.0022), respectively. These findings suggest that, in the short run, increased openness to trade may have had contractionary effects on economic growth. This could be attributed to structural weaknesses in the domestic economy, making it vulnerable to external shocks, or possibly due to trade imbalances. Unemployment also has a negative and statistically significant effect (D(UN) = –2.399403, p = 0.0283), as expected, since higher unemployment generally correlates with reduced output and lower demand in the economy. On the other hand, the coefficients for D(GEX) and its lag D(GEX(–1)) are not statistically significant (p-values = 0.3492 and 0.1081), suggesting that government expenditure does not have a strong short-run impact on GDP growth in this model, though the signs are negative, potentially pointing toward inefficient or misallocated public spending.

The model fits the data well, as evidenced by a high R-squared value of 0.910839 and an adjusted R-squared of 0.857342. The Durbin-Watson statistic of 2.825838 indicates no serious

Rana Academic & Research Journal
Volume 9, Issue No: 1- Autumn 2025

autocorrelation. Diagnostic tests such as the Akaike and Schwarz criteria also support the model's adequacy. Overall, the results highlight the crucial roles of labor force growth and unemployment reduction in driving GDP growth, while pointing to potentially adverse short-run effects from trade openness and limited immediate benefits from government spending.

Table 5: ECM and short-run dynamic

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GEX)	-0.745702	0.722280	-1.032429	0.3492
D(GEX(-1))	-2.336885	0.550047	-4.248517	0.0101
D(LABOR)	12.30411	1.631724	7.516585	0.0000
D(OPEN)	-4.139655	2.038886	-2.030894	0.0275
D(OPEN(-1))	-2.702931	0.468534	-5.768910	0.0022
D(UN)	-2.399403	1.735341	-1.382669	0.0283
CointEq(–1)*	-1.118939	0.144398	-7.745187	0.0006

Source: Computer by Author

5.7. Stability and Diagnostic tests

The Breusch-Godfrey Serial Correlation LM Test presented evaluates the presence of serial correlation (autocorrelation) in the residuals of the ARDL regression model, up to 2 lags. This diagnostic test is crucial for verifying one of the classical assumptions of Ordinary Least Squares (OLS) regression—namely, that the residuals are not serially correlated. Violation of this assumption can result in inefficient estimates and invalid statistical inferences.

In the test results shown, the null hypothesis is that there is no serial correlation at up to 2 lags. The F-statistic for the test is 1.797049, with a corresponding p-value of 0.3069. This p-value is greater than the conventional significance levels of 0.01, 0.05, and even 0.10, meaning we fail to reject the null hypothesis based on the F-statistic. Therefore, based on the F-test, there is no significant evidence of serial correlation in the model residuals.

However, the test also provides the Obs*R-squared statistic (also known as the Lagrange Multiplier Chi-square test statistic), which is 9.265811, with a p-value of 0.0097. This result rejects the null hypothesis at the 1% significance level, indicating the presence of serial correlation according to the Chi-square version of the test.

This divergence between the F-statistic and the Chi-square statistic can occur, particularly in small samples, and it suggests that results should be interpreted with caution. Given the small sample size (17 observations), the F-test is generally considered more reliable in finite samples than the asymptotic Chi-square test, which assumes larger samples for validity. Therefore, while the Chi-square version indicates potential concern, the F-statistic provides some reassurance that serial correlation may not be a severe issue.

The Breusch-Pagan-Godfrey test that was shown evaluates the presence of heteroskedasticity in the residuals of the regression model. Heteroskedasticity violates a core OLS assumption that the variance of residuals remains constant across observations. The null hypothesis of the test is homoskedasticity

The results include three key statistics:

- The F-statistic is 0.429664 with a p-value of 0.8871.
- The Obs*R-squared statistic is 8.260816 with a p-value of 0.6898.
- The Scaled Explained SS statistic is 0.852127, with a p-value of 1.0000.

All p-values are well above conventional significance thresholds (0.01, 0.05, or 0.10), indicating no statistical evidence of heteroskedasticity. Therefore, the null hypothesis of homoskedasticity cannot be rejected. This means the model's residuals exhibit constant variance, satisfying the homoskedasticity assumption necessary for efficient and unbiased OLS estimates.

The histogram of residuals and associated statistics provide insight into the normality of residuals from the ARDL regression model. The histogram appears relatively symmetric and bell-shaped, suggesting that the residuals approximate a normal distribution. Supporting this, the Jarque-Bera test yields a test statistic of 2.885962 and a p-value of 0.236223. Since the p-value exceeds

conventional significance levels (0.01, 0.05, and 0.10), we fail to reject the null hypothesis of normality, indicating that the residuals are likely normally distributed. This is important because the assumption of normally distributed errors underlies the validity of many inferential statistics used in regression analysis, including hypothesis tests for coefficients. Additionally, other descriptive statistics support this conclusion: the skewness is -0.990726, indicating slight leftward skewness, and the kurtosis is 3.384895, close to the normal value of 3. The standard deviation of residuals is 0.025425, showing a low spread around the mean. The mean of the residuals is essentially zero (2.61e–16), and the median is also close to zero (0.002059), further affirming the model's adequacy. In summary, the residuals exhibit no significant departure from normality, strengthening the validity and reliability of the regression model and its statistical inferences. The CUSUM (Cumulative Sum) test shown in the graph is used to assess the stability of the regression coefficients over time. The blue line represents the cumulative sum of recursive residuals, while the dotted red lines indicate the 5% significance boundaries. According to the test, if the CUSUM line remains within the 5% critical bounds, the null hypothesis of parameter stability cannot be rejected, indicating that the model is structurally stable over the sample period. In this graph, the CUSUM line stays well within the confidence bands from 2016 through 2020, suggesting no significant structural breaks or instabilities in the model. This implies that the estimated coefficients are consistent and reliable throughout the analyzed period. Such stability is critical in economic and time series modeling because it enhances confidence in both short-term forecasting and policy recommendations based on the model. If the CUSUM had crossed the boundaries, it would have indicated structural changes or model misspecification. Therefore, this result supports the earlier findings from diagnostic tests (such as the absence of heteroskedasticity and serial correlation), reinforcing the validity and robustness of the ARDL model employed in the study.

Table 6: Summary of Diagnostic and Stability tests

Test	**Purpose**	**Statistic**	**P-value**	**Decision**	**Conclusion**
Breusch-Godfrey LM Test	Serial correlation (up to 2 lags)	F = 1.797 / Obs*R^2 = 9.2658	0.3069 / **0.0097**	Reject (Chi-Sq), Fail to reject (F-stat)	Possible serial correlation (based on Chi-Sq)
Breusch-Pagan-Godfrey Test	Heterosked asticity	F = 0.4297 / Obs*R^2 = 8.2608	0.8871 / 0.6898	Fail to reject H_0	No heteroskedasticity (homoskedastic errors)
Jarque-Bera Normality Test	Normality of residuals	JB = 2.886	0.2362	Fail to reject H_0	Residuals are normally distributed
CUSUM Test	Stability of regression coefficients	CUSUM within bounds	-	Not applicable	Model is stable; no structural breaks detected

Source: Computer by Author

6. Conclusion and policy suggestions

This study investigated the relationship between unemployment and economic growth in Afghanistan using annual data from 2002 to 2020, applying the Autoregressive Distributed Lag (ARDL) bounds testing approach. The findings provide strong evidence of a long-run cointegrating relationship between GDP growth and key macroeconomic variables—unemployment, government expenditure, labor force participation, and trade openness. In the short run, labor force participation significantly and positively contributes to GDP growth, while unemployment and trade openness exert statistically significant negative effects. Government expenditure, although theoretically growth-enhancing, was found to have no significant short-run impact, suggesting possible inefficiencies or delayed fiscal multipliers. These results imply that while Afghanistan's economy responds to labor market dynamics, its structural characteristics, including a large informal sector and weak institutional capacity, mediate the growth-employment nexus. The results also highlight the need for policy reforms aimed at strengthening the link between economic growth and job creation.

Based on these insights, several policy implications emerge. First, to address unemployment and stimulate growth simultaneously, the government should prioritize labor-intensive sectors such as agriculture, construction, and light manufacturing, which can absorb large portions of the underemployed population. Investments in rural infrastructure, public works programs, and support

Rana Academic & Research Journal Volume 9, Issue No: 1- Autumn 2025

for agribusiness can serve as immediate job creation mechanisms. Second, the inefficacy of government spending in the short run calls for reforms in public financial management, particularly toward reallocating expenditure from consumption and defense toward productive infrastructure and social investment. Third, given the strong influence of labor force participation on growth, efforts to enhance human capital must be intensified. This includes expanding access to vocational education and training aligned with market demands, improving basic education, and fostering female workforce inclusion by addressing legal, cultural, and institutional barriers. Fourth, while trade openness is theoretically beneficial, the short-run negative effects identified in the study suggest Afghanistan's domestic economy may not yet be adequately prepared to compete in global markets. Policymakers should adopt a more cautious and phased trade liberalization approach, coupled with industrial policy measures that support local producers, encourage import substitution, and reduce over-dependence on volatile external markets.

Furthermore, empowering the private sector—especially micro, small, and medium enterprises (MSMEs)—through improved access to finance, simplified regulations, and entrepreneurship programs can significantly enhance job creation. The government should also establish a robust Labor Market Information System (LMIS) to better match skills with job opportunities and monitor labor market trends in real time. Lastly, maintaining macroeconomic stability and ensuring policy continuity are essential to building investor confidence and attracting foreign direct investment, which can, in turn, drive both growth and employment. Overall, this study underscores that in post-conflict economies like Afghanistan, promoting inclusive, employment-driven growth requires a holistic policy framework that combines short-term labor market activation with long-term structural transformation.

Rana Academic & Research Journal
Volume 9, Issue No: 1- Autumn 2025

References

1. Ball, L., Leigh, D., & Loungani, P. (2013). *Okun's law: Fit at fifty?* (NBER Working Paper No. 18668). National Bureau of Economic Research. https://doi.org/10.3386/w18668
2. Brixiová, Z., Ncube, M., & Bicaba, Z. (2015). Skills and youth entrepreneurship in Africa: Analysis with evidence from Swaziland. *IZA Journal of Labor & Development, 4*(1), 1–2 https://doi.org/10.1186/s40175-015-0024-1
3. Fields, G. S. (2011). Labor market analysis for developing countries. *Labour Economics, 18*(Suppl 1), S16–S22. https://doi.org/10.1016/j.labeco.2011.05.008
4. Freeman, R. B., & Schettkat, R. (2005). Marketization of production and the US-Europe employment gap. *Economic Policy, 20*(41), 5–50. https://doi.org/10.1111/j.1468-0327.2005.00134.x
5. Hussain, I., & Malik, A. (2011). The relationship between economic growth and unemployment in Pakistan. *Global Journal of Management and Business Research, 11*(2), 1–8.
6. Irfan, M., Iqbal, M. A., & Younas, M. (2020). Testing Okun's law in selected South Asian economies: A panel data approach. *Journal of Economic Studies, 47*(5), 1135–1152. https://doi.org/10.1108/JES-12-2019-0572
7. Knotek, E. S. (2007). How useful is Okun's law? *Economic Review – Federal Reserve Bank of Kansas City, 92*(4), 73–103. https://www.kansascityfed.org/publications/research/er/
8. Lee, J. (2000). The robustness of Okun's law: Evidence from OECD countries. *Journal of Macroeconomics, 22*(2), 331–356. https://doi.org/10.1016/S0164-0704(00)00135-X
9. Mohammadi, A. (2021). Economic growth and employment in Afghanistan: A VAR approach. *Journal of Economics and Development Studies, 9*(1), 1–10.
10. Moosa, I. A. (2008). Economic growth and unemployment in Arab countries: Is Okun's law applicable? *International Review of Applied Economics, 22*(2), 219–232. https://doi.org/10.1080/02692170701880761
11. Okun, A. M. (1962). Potential GNP: Its measurement and significance. In *Proceedings of the Business and Economic Statistics Section* (pp. 98–104). American Statistical Association.
12. Rasuli, M., & Ahmadzai, M. (2019). Afghanistan's labor market and job creation challenges. *Kabul University Journal of Economics, 3*(1), 50–65.
13. Sayeed, A., & Mahmood, T. (2012). Jobless growth: Implications of service-led growth for employment and poverty reduction. *The Pakistan Development Review, 51*(4), 387–407. https://www.pide.org.pk/pdfpdr/issue/pdr-2012-v51i4.pdf

14. Shaari, M. S., Hussain, N. E., & Ismail, M. S. (2014). Relationship between gross domestic product and unemployment rate in Malaysia. *International Journal of Business and Economics Research, 3*(6), 35–42. https://doi.org/10.11648/j.ijber.20140306.11

15. World Bank. (2019). *Jobs and economic transformation in fragile and conflict-affected situations*. World Bank Group. https://www.worldbank.org