

Econometric Analysis of the Impact of Unemployment on Burundi Economic Growth

Carmel Niyongabo¹, Tenglong Zhong²

¹China Academy of Public Finance and Public Policy, Central University of Finance and Economics, Beijing, China

²School of International Trade and Economics, Central University of Finance and Economics, Beijing, China

Email: niycarmel@gmail.com, tenglong_zhong@126.com

How to cite this paper: Niyongabo, C., & Zhong, T. L. (2023). Econometric Analysis of the Impact of Unemployment on Burundi Economic Growth. *Journal of Service Science and Management*, 16, 711-724. <https://doi.org/10.4236/jssm.2023.166038>

Received: July 21, 2023

Accepted: December 26, 2023

Published: December 29, 2023

Copyright © 2023 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Unemployment is one of the major macroeconomic issues confronting developed countries, particularly developing countries. Unemployment is one of the macroeconomic issues that Burundi is dealing with. Unemployment is a major issue that puts young people at risk of exploitation. Using world bank time series data from 1990 to 2021, this paper investigates the impact of unemployment on economic growth in Burundi. The dependent variable is GDP, while the independent variables are unemployment, inflation, FDI, and gross capital formation. A stationarity test was performed using the Augmented Dickey-Fuller (ADF) and Phillips-Perron tests, which revealed that some variables became stationary at the level and others after first differencing. According to the ARDL model results, unemployment has both short-run and long-run causal effects on GDP. According to the study, industrialization is highly encouraged in order to reduce unemployment and promote economic growth in the country. To foster youth employment by collaborating with the Burundian Diaspora as trainers and distance mentors. Allow diaspora members to participate in projects in Burundi that promote youth employment. Adapt entrepreneurship and employment training strategies for adolescents and youth.

Keywords

Unemployment, Economic Growth, ARDL, Burundi

1. Introduction

Unemployment is one of the macroeconomic issues confronting Burundi. Burundi's government is attempting to deal with it in order to reduce poverty in this landlocked country.

Unemployment is both an economic and a social issue. Unemployment is an

economic problem in the sense that unemployed people will only be consumers rather than producers. Unemployment doubles the cost of maintenance and reduces output. Unemployment is a social problem in the sense that it causes enormous suffering to unemployed workers due to their low or no income.

Unemployment continues to rise, causing many people to feel uneasy and uncomfortable. Unemployment is becoming an increasingly serious issue and a major challenge for governments and citizens in many countries.

Unemployment refers to a person who is capable of working but is not employed. Unemployment, on the other hand, is defined as a person being unemployed if he is willing and able to work for remuneration, has the action to obtain a job, but fails to find one.

The market value of all final goods and services produced by an economy in a given time period is referred to as gross domestic product.

The GDP and unemployment rate are linked in two ways, and both are macroeconomic indicators used to assess the state of the economy. Rising GDP is important when studying a country's macroeconomic trends. The same can be said about rising or falling unemployment. GDP and the unemployment rate typically fall together because a decline in GDP is mirrored in a decline in employment.

Okun's law describes one of the most well-known empirical relationships in macroeconomic theory between output (GDP) and unemployment, and thus has been found to be valid for several developed countries. However, due to the significant relationship between economic growth and unemployment, economic growth alone cannot overcome all other unknown important variables that cause unemployment and poverty.

This paper offers an empirical examination of the contentious relationship between GDP and unemployment. Following a review of recent studies in this field, we employ 32 years of Burundi data to empirically investigate the relationship between the unemployment rate, inflation, FDI, and gross capital formation in relation to GDP.

The following is how the article is organized: The following section provides the problem statement of this study we discussed the reason why we conducted this study, following a comprehensive review of the literature performed to identify established implementations, followed by the methodology used in this study. Then, the results section illustrates our findings of the analysis followed by econometric diagnostics tests to measure that our results are true and can be taken into consideration by policymakers and scholars. Afterward, we provide some further recommendations according to the study results.

2. Problem Statement

A low unemployment rate is generally regarded as a positive indicator, implying that Burundi is creating a large number of jobs. However, this is not the case for formal employment. Instead, the majority of workers are in precarious positions:

The country's primary source of income is subsistence agriculture.

The rate of urbanization is increasing, driven by a rapidly growing population and the decreasing viability of farming to support a family, forcing many young people to relocate to urban areas in search of work. With few formal jobs available, many urban young Burundians seek to improve their employment prospects through higher education. However, in a market flooded with graduates, a university degree alone is frequently insufficient. It supports the notion that unemployment in Bujumbura is linked to educational attainment.

Since the unemployment rate is used to determine whether countries meet the SDG target of full and productive employment and decent work, it appears that Burundi is on track. This was the impetus for conducting this study, which aimed to fill a gap in empirical data by evaluating the hypothesis of lowering the unemployment rate in Burundi.

The major purpose of this study is to investigate the impact of unemployment on economic growth in Burundi.

To achieve the overall goal, specific targets were measured:

Determine the relationship between unemployment and economic growth; check the short-run and long-run effects of unemployment on economic growth.

1) The findings are meant to contribute to the current literature by scholars and researchers on the impact of unemployment on the economy as a whole.

2) The findings of the study will advise the government on how to change policies to increase employment for Burundian youth and reduce unemployment in Burundi.

3) This work will also be useful to scholars conducting additional research on similar trade issues.

3. Review of Literature

[Abdul \(2007\)](#) investigated the relationship between output and unemployment in Malaysia from 1970 to 2004. Their study conducted a basic econometric analysis of testing stationery using ADF and the Phillip-Perron test. The findings confirmed an inverse relationship between unemployment and economic growth. Furthermore, they established a two-way causal relationship between unemployment and GDP in the Malaysian economy.

In Iran, [Meidani \(2015\)](#) investigated the dynamic effect of unemployment on GDP. Their research, which used auto-regressive distribution lag (ARDL), lasted from 1971 to 2006. The unemployment rate is statistically significant in determining GDP in the long run, according to the results of the ARDL long run coefficients. The short- and long-run results show that unemployment is positively related to GDP.

Using the inflation rate and investment as intermittent variables, [Stephen \(2012\)](#) investigated the relationship between the urban unemployment crisis and Nigerian economic growth. Estimates show a negative relationship between urban unemployment and economic growth.

Furthermore, [Soylu et al. \(2018\)](#) used Okun's law (which reflects the link be-

tween unemployment and economic growth) to examine the relationship between unemployment and GDP growth in Eastern European countries from 1992 to 2014, and discovered cointegration (a negative relationship) between unemployment and GDP growth.

From 1994 to 2012, [Banda \(2016\)](#) investigated the relationship between unemployment and economic growth in South Africa. Johansen cointegration results revealed that the variables have a long run relationship.

[Makaringe and Khobai \(2018\)](#) study the relationship between unemployment and economic growth in South Africa. Using data from the previous quarter, the ARDL bound testing method was used to show the long-term relationship between the variables. They found a negative relationship between unemployment and economic growth in both the short and long run. [Okun's \(1962\)](#) law, which established the link between unemployment and economic growth, is also supported. In order to reduce unemployment, they urged the government to implement an effective macroeconomic policy, necessary structural changes in the economy, stabilization of growth and flexible labor market policy.

4. Data and Methodology

To investigate the relationship between unemployment and GDP in Burundi. The study analyzed annual time series data from the World Bank database from 1990 to 2021. The augmented Dickey-Fuller Test, Phillips-Perron Test, optimal lag order selection criteria, ARDL model, The cointegration test determines the long-run relationship between variables were used in the analysis. All variables in this study are expressed in terms of their true values. The same order of integration in the data set is required when applying econometric modeling. To obtain consistent estimates, we transform the data set into a log linear specification.

The following hypotheses will be tested in order to achieve the previously stated objectives.

H0: Unemployment has a negative impact on economic growth.

H1: Unemployment correlates positively with economic growth.

4.1. Model Specification and Formulation

The model is made up of one equation, which is given below:

$$GDP_t = \beta_0 + \beta_1 UNMPL + \beta_2 INFL + \beta_3 GFC + \beta_4 FDI + \dots + e_t$$

GDP (Dependent Variable) = Gross Domestic Product

UNMPL stands for Unemployment Rate.

Foreign direct investment is abbreviated as FDI.

GFC stands for Gross Fixed Capital Formation.

INFL: Inflation (the model's independent variables are UNMPL, FDI, GFC, and INFL).

5. Results and Discussion

Unit root testing is critical for determining whether the time series should be

differenced and, if so, how many times such differences should be taken. Many unit root testing procedures for empirical time series with independent or weakly dependent errors have been developed.

$$\Delta y_t = \alpha + \beta_t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \dots + \delta_p \Delta y_{t-p} + \varepsilon_t$$

Among them, Y_t represents the observed value at time t , ΔY_t represents the difference between the observed value and the previous moment, α , β , γ , δ_1 , ..., δ_p are constants or coefficients, and ε_t is an error term.

To avoid the error problem, an Augmented Dickey-Fuller test and a Phillips-Perron test were used as a first step in the analysis to confirm that all of the variables used in the model are stationary.

The unit root test results in **Table 1** show that variables (in logarithm) are stationary at various levels. The variables FDI and inflation are stationary at the level at a 1% significance level, whereas GDP, unemployment, and gross capital formation are stationary in the first difference. This stationarity test allows the ARDL regression model estimation to proceed.

Table 1. Augmented Dickey-Fuller and Phillips-Perron unit root test results.

	Augmented Dickey-Fuller (ADF) unit root tests results			Phillips-Perron unit root tests results		
	t-Statistic	critical value	Prob.*	t-Statistic	critical value	Prob.*
LFDI (I_0)	-5.172096	-3.661661	0.0002***	-5.192525	-3.661661	0.0002***
LGDP (I_1)	-3.939084	-3.67017	0.0052**	-4.033823	-3.67017	0.0041**
LINFL (I_0)	-5.046805	-3.661661	0.0003***	-5.037402	-3.661661	0.0003***
LGFC (I_1)	-4.639279	-3.67017	0.0009**	-4.687014	-3.67017	0.0008**
LUNMPL (I_1)	-3.983595	-3.679322	0.0048**	-3.032231	-2.644302	0.0037**

The Prob.* column shows the p-value of the test. A p-value less than 0.05 (indicated by ***) means that the null hypothesis of a unit root (i.e., non-stationarity) can be rejected. *** indicates 1% level of significance: The variables FDI and inflation are stationary at the level at a 1% of significance level. ** indicates 5% level of significance, whereas GDP, unemployment, and gross capital formation are stationary in the first difference at 5% level of significance. Source: Author's estimates in EViews 10 based on World Bank.

5.1. ARDL (Auto-Regressive Distributed Lag)

Before determining the long- and short-run relationships that exist between variables, the ARDL bound test proposed by Pesaran et al. (2001) should be used to confirm cointegration.

The results of the ARDL model in **Table 2** show that in the short run, unemployment has a statistically significant negative impact on GDP due to the F statistic, which has a probability of 0.00000 and is less than 0.05. This result proves that the regression model is correct. Another factor to consider is R-squared. R-squared measures the goodness of fit of the regression model and explains how well the model fits the data.

Table 2. Short run, unemployment.

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP (-1)	0.444140	0.128577	3.454277	0.0024
GFC	0.003506	0.001554	2.255222	0.0349
INFL	-0.000837	0.001195	-0.700200	0.4915
INFL (-1)	-0.001379	0.001078	-1.279917	0.2145
UNMPL	-0.005526	0.001836	-3.009782	0.0067
UNMPL (-1)	0.004262	0.002422	1.759547	0.0930
UNMPL (-2)	-0.004377	0.001724	-2.538823	0.0191
FDI	0.000406	0.000209	1.944375	0.0654
C	0.518620	0.126757	4.091435	0.0005
R-squared	0.986958	Mean dependent var		0.961700
Adjusted R-squared	0.981989	S.D. dependent var		0.010154
S.E. of regression	0.001363	Akaike info criterion		-10.11525
Sum squared resid	3.90E-05	Schwarz criterion		-9.694886
Log likelihood	160.7287	Hannan-Quinn criter.		-9.980769
F-statistic	198.6403	Durbin-Watson stat		2.395218
Prob(F-statistic)	0.000000			

Source: Author's estimates in EViews 10 based on World Bank data.

5.2. ARDL Bounds Test Result for Co-Integration

Estimates of the equation test for whether there is a long-term relationship between the variables include an F-test for the joint significance of the coefficients at the lagged levels of the variables, that is:

* $H_0 = \alpha_{1i} = \alpha_{2i} = 0$, we acknowledge that there is no long-run relationship. $H_0 : \alpha_{1i} \neq 0; \alpha_{2i} \neq 0$ and $i = 1, 2$; We acknowledge that there is a long-run relationship.

Prior to running this test, the lags in the model were determined using the VAR Lag order selection criteria method. The results of the VAR lag order selection criteria show that the number of lags chosen is two (**Table 3**) (AIC: Akaike Information Criterion). Source: Author's estimates in EViews 10 based on World Bank data.

Table 3. The results of the lag order selection criteria are displayed.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	62.89885	NA	1.45e-08	-3.859924	-3.626391	-3.785214
1	146.9217	134.4365	2.91e-10	-7.794779	-6.393582*	-7.346524
2	180.4355	42.45088*	1.92e-10*	-8.362369*	-5.793507	-7.540568*

The below **Table 4** clearly shows a long run relationship between the va-

riables. This implies that the null hypothesis (H0) of no co-integration between the variables is not accepted. We can see that unemployment has a negative impact on GDP in the long run. In other words, In the long run Unemployment has a causal relationship with GDP.

Table 4. A long run relationship between the variables.

Variable	Conditional Error Correction Regression			
	Coefficient	Std. Error	t-Statistic	Prob.
C	0.518620	0.126757	4.091435	0.0005
GDP (-1)*	-0.555860	0.128577	-4.323171	0.0003
GFC**	0.003506	0.001554	2.255222	0.0349
INFL (-1)	-0.002216	0.001765	-1.255642	0.2230
UNMPL (-1)	-0.005641	0.001643	-3.434010	0.0025
FDI**	0.000406	0.000209	1.944375	0.0654
D (INFL)	-0.000837	0.001195	-0.700200	0.4915
D (UNMPL)	-0.005526	0.001836	-3.009782	0.0067
D (UNMPL (-1))	0.004377	0.001724	2.538823	0.0191

Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GFC	0.006307	0.002961	2.130047	0.0452
INFL	-0.003986	0.002790	-1.428853	0.1678
UNMPL	-0.010149	0.001276	-7.956164	0.0000
FDI	0.000730	0.000405	1.801186	0.0861

EC = GDP - (0.0063 * GFC - 0.0040 * INFL - 0.0101 * UNMPL + 0.0007 * FDI)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I (0)	I (1)
Asymptotic: n = 1000				
F-statistic	5.972706	10%	2.45	3.52
k	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06
Finite Sample: n = 30				
Actual Sample Size	30	10%	2.752	3.994
		5%	3.354	4.774
		1%	4.768	6.67

Continued

t-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I (0)	I (1)
t-statistic	-4.323171	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26
		1%	-3.43	-4.6

5.2.1. Error Correlation Model (ECM)

We can see from these results (Table 5) that the coefficient of error is negative (-0.555860) and significant, which is positive and supports the long term relationship. The adjustment period of -0.555860 indicates that the reversion to long run equilibrium is at a speed of 55.5%.

Table 5. The results from ECM.

ECM Regression				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.518620	0.086906	5.967601	0.0000
D (INFL)	-0.000837	0.000671	-1.247021	0.2261
D (UNMPL)	-0.005526	0.001272	-4.343791	0.0003
D (UNMPL (-1))	0.004377	0.001425	3.072117	0.0058
CointEq (-1)*	-0.555860	0.093225	-5.962535	0.0000
R-squared	0.660763	Mean dependent var		0.000633
Adjusted R-squared	0.606485	S.D. dependent var		0.001991
S.E. of regression	0.001249	Akaike info criterion		-10.38191
Sum squared resid	3.90E-05	Schwarz criterion		-10.14838
Log likelihood	160.7287	Hannan-Quinn criter.		-10.30720
F-statistic	12.17370	Durbin-Watson stat		2.395218
Prob (F-statistic)	0.000013			

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I (0)	I (1)
F-statistic	5.972706	10%	2.45	3.52
		5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

Continued

t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I (0)	I (1)
t-statistic	-5.962535	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26
		1%	-3.43	-4.6

Source: Author's estimates in EViews 10 based on World Bank data.

5.2.2. Pairwise Granger Causality Test Results

From the results we can see that UNMPL does not Granger Cause GDP: The p -value is 0.1916, which is greater than 0.05 (Table 6). We fail to reject the null hypothesis. We do not have enough evidence to say that changes in UNMPL can predict changes in GDP. GDP does not Granger Cause UNMPL: The p -value is 0.0059, which is less than 0.05. We reject the null hypothesis and conclude that changes in GDP can predict changes in UNMPL. The relationship between UNMPL (unemployment) and GDP is unidirectional.

Table 6. UNMPL does not Granger Cause GDP.

Null Hypothesis:	Obs	F-Statistic	Prob.
FDI does not Granger Cause GDP	30	0.34759	0.7097
GDP does not Granger Cause FDI		2.63158	0.0918
GFC does not Granger Cause GDP	30	3.33540	0.0520
GDP does not Granger Cause GFC		4.56378	0.0204
INFL does not Granger Cause GDP	30	0.16429	0.8494
GDP does not Granger Cause INFL		2.16387	0.1359
UNMPL does not Granger Cause GDP	30	1.76675	0.1916
GDP does not Granger Cause UNMPL		6.34766	0.0059
GFC does not Granger Cause FDI	30	2.27715	0.1235
FDI does not Granger Cause GFC		5.92301	0.0078
INFL does not Granger Cause FDI	30	0.57178	0.5717
FDI does not Granger Cause INFL		0.04782	0.9534
UNMPL does not Granger Cause FDI	30	1.27458	0.2971
FDI does not Granger Cause UNMPL		0.84019	0.4435
INFL does not Granger Cause GFC	30	0.98599	0.3871
GFC does not Granger Cause INFL		0.92112	0.4112
UNMPL does not Granger Cause GFC	30	0.65103	0.5301
GFC does not Granger Cause UNMPL		4.27072	0.0254
UNMPL does not Granger Cause INFL	30	1.28462	0.2944
INFL does not Granger Cause UNMPL		0.57770	0.5685

Source: Author's estimates in EViews 10 based on World Bank data.

6. Diagnostic Tests

The autocorrelation analysis using the Correlogram-Q-statistics (**Table 7**), According to the test results, concluded that there is no autocorrelation in the model because the probability is greater than the critical value of 5% up to the 16th lag, as shown in **Table 7**.

Table 7. Correlogram q-statistics test results.

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.** .	.** .	1	-0.230	-0.230	1.7450	0.187
. .	.* .	2	-0.034	-0.091	1.7844	0.410
. .	. .	3	0.032	0.003	1.8204	0.610
.* .	.* .	4	-0.110	-0.111	2.2680	0.687
. .	. .	5	0.056	0.006	2.3894	0.793
.* .	.* .	6	-0.105	-0.111	2.8267	0.830
.* .	.* .	7	-0.095	-0.153	3.2073	0.865
. .	.* .	8	-0.051	-0.155	3.3222	0.913
.* .	.** .	9	-0.133	-0.229	4.1265	0.903
. ** .	. * .	10	0.303	0.191	8.5426	0.576
. .	. .	11	-0.022	0.066	8.5681	0.662
.* .	.* .	12	-0.093	-0.090	9.0261	0.701
. * .	. .	13	0.103	-0.001	9.6294	0.724
.* .	.* .	14	-0.076	-0.066	9.9799	0.764
. * .	. * .	15	0.145	0.080	11.318	0.730
. .	. * .	16	0.059	0.133	11.553	0.774

Source: Author's estimates in EViews 10 based on World Bank data.

The autocorrelation analysis using the Correlogram residuals squared (**Table 8**). According to the test results, concluded that there is no autocorrelation in the model because the probability is greater than the critical value of 5% up to the 16th lag, as shown in **Table 8**.

Table 8. Correlogram of residuals squared test results.

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. * .	. * .	1	0.160	0.160	0.8500	0.357
.* .	.* .	2	-0.168	-0.199	1.8200	0.403
. ** .	. ** .	3	0.259	0.345	4.2049	0.240
. * .	.* .	4	0.091	-0.093	4.5098	0.341
. .	. * .	5	-0.047	0.096	4.5955	0.467
.* .	.** .	6	-0.140	-0.290	5.3777	0.496
. .	. * .	7	-0.043	0.098	5.4540	0.605

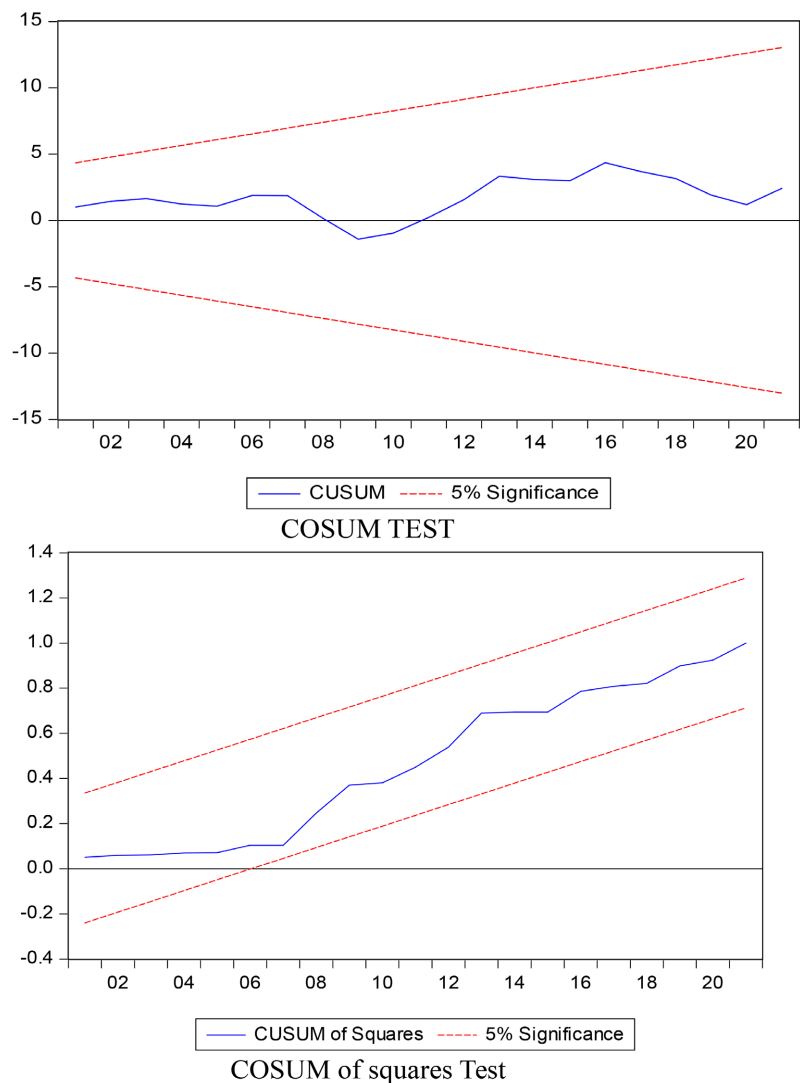
The results of heteroscedasticity tests using the ARCH approach are shown in **Table 10**, which show that there is no heteroscedasticity (the chi-square of 0.9969 is greater than the critical p -value of 5%).

Table 10. Heteroskedasticity Test: Breusch-Pagan-Godfrey.

F-statistic	0.369885	Prob. F (8, 21)	0.9249
Obs*R-squared	3.705165	Prob. Chi-Square (8)	0.8827
Scaled explained SS	1.176277	Prob. Chi-Square (8)	0.9969

Source: Author’s estimates in EViews 10 based on World Bank data.

For stability properties, graphs 1 and 2 use the CUSUM and CUSUM square tests (**Figure 2**). It emphasizes that both tests satisfy the properties because both residuals are within the 5% level of significance.



Source: Author’s estimates in EViews 10 based on World Bank data.

Figure 2. Stability test results.

7. Conclusion and Recommendation

The study's goal was to look into the impact of unemployment on economic growth in Burundi.

According to the ARDL model, there is a significant negative relationship between unemployment and GDP in both the short and long run. Furthermore, the research passed all diagnostic tests. To that end, the Burundi government should boost economic growth by creating jobs, particularly for young people who face high unemployment rates.

Burundi's government must take the lead in the implementation of national employment policies and strategies by taking an innovative approach to addressing the issue of youth employment through market-based training modules and by involving members of the Burundi Diaspora.

The project's goal was to contribute to the reduction of unemployment in Burundi, which is a source of fragility, by creating sustainable jobs and providing youth with the necessary professional and business skills to succeed in the formal labor market through diaspora engagement.

- Improving at-risk youth's vocational skills through appropriate Diaspora training aimed at improving at-risk youth's economic prospects;
- Enhance targeted dialogue with the Burundian Diaspora as trainers and distance mentors in order to promote youth employment;
- Improve Diaspora-Government dialogue in order to increase Diaspora participation in the country's economic development and promote youth empowerment.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- Abdul, J. (2007). Is Okun's Law Applicable to the Relationship between Output and Unemployment in Malaysia? *IJEM*, 2, 337-344.
- Banda, H. (2016). *The Impact of Economic Growth on Unemployment in South Africa: 1994-2012*. <https://businessperspectives.org>
- Makaringe, S. C., & Khobai, H. (2018). *The Impact of Unemployment on Economic Growth*. <https://ideas.repec.org/p/mnd/wpaper/1815.html>
- Meidani, A. A. N. (2015). *The Dynamic Effect of Unemployment Rate on Per Capita Real GDP in Iran*. <https://doi.org/10.5539/ijef.v3n5p170>
- Okun, A. (1962). The Relationship between Economic Growth and Unemployment. In *The Proceedings of the Business and Economic Statistics Section*. The American Statistical Association. https://link.springer.com/referenceworkentry/10.1057/978-1-349-95121-5_2346-1
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationship. *Journal of Applied Economics*, 16, 289-326. https://www.researchgate.net/publication/322208483_Pesaran_et_al_2001_Bound_Te

[st_and_ARDL_cointegration_Test](#)

Soylu, Ö. B., Çakmak, İ., & Okur, F. (2018). Economic Growth and Unemployment Issue: Panel Data Analysis in Eastern European Countries. *Journal of International Studies*, 11, 93-107. <https://doi.org/10.14254/2071-8330.2018/11-1/7>

Stephen, B. A. (2012). Nigeria's Stabilization Policy, Unemployment Crisis, and Economic Growth. *Universal Journal of Management and Social Sciences*, 2, 55-63.