

MACROECONOMIC DETERMINANTS OF UNEMPLOYMENT IN SOMALIA: THE CASE OF OKUN'S LAW AND THE PHILLIPS CURVE



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ABSTRACT

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This study aims to assess the impact of economic growth and inflation on unemployment in Somalia by testing the Phillips curve and Okun's law hypothesis utilizing the autoregressive distributed lag (ARDL) model and time series data covering the period from 1991 to 2017. The empirical results reveal the existence of long-run cointegration among the variables. Moreover, a negative relationship is established between economic growth and unemployment both in the short run and long run, hence confirming the validity of Okun's law hypothesis in Somalia. The impact of inflation on unemployment is inconsequential in the long run, although a strong negative association exists in the short run, thus supporting the presence of the Phillips curve hypothesis in Somalia in the short run. The study recommends that policymakers should enact policies that favor economic growth to mitigate unemployment and create a balance between the required level of inflation and unemployment in Somalia.

Contribution/Originality: Even though unemployment is a serious issue in Somalia, there is no study that has examined the determinants of unemployment. Hence, to bridge this gap, this study examines the impact of economic growth and inflation on unemployment in Somalia via testing using Okun's law and the Phillips curve.

1. INTRODUCTION

Unemployment remains a major macroeconomic concern for both developing and developed countries. High unemployment implies that the economy is not working at full capacity and efficiency. As a result, it brings serious economic and social complications by inhibiting income and output. Unemployment is a country-level issue that pertains to aggregate production. Several macroeconomic variables that influence unemployment have been documented, including, inter alia, economic growth, thus proving that the unemployment and economic growth nexus has been extensively investigated since the seminal work of Okun (1962) and Abu (2016). Okun reported that a 1% reduction in the unemployment rate will result in a 3% increase in economic growth. However, researchers have tested this theory in two forms by either regressing the unemployment rate on economic growth (Kim, Yoon, & Jei, 2020; Lee, 2000), or regressing economic growth on unemployment (Bod'a & Považanová, 2021; Gelfer, 2020; Nebot, Beyaert, & García-Solanes, 2019).

Unemployment is also related to inflation, as evidenced by many studies (Carrin & Barten, 1976; Egan & Leddin, 2017). The seminal work of Phillips (1958) documented a negative association between the rate of inflation and unemployment in his study entitled “The Relationship Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom 1861–1957”. This trade-off between inflation and unemployment is known as the Phillips curve. However, public policy makers and macroeconomists consider these two theories when it comes to addressing macroeconomic determinants of unemployment.

The attainment of full employment is regarded as one of the top priorities for the world’s nations. But unfortunately, after decades of unrest, Somalia is still struggling to reach political stability and achieve broad-based development. Furthermore, youth unemployment in the country is estimated at 67%, and it’s considered one of the biggest challenges currently confronting Somalis, especially the youth, who are estimated to account for 70% of the total population. Hence, this came as a result of prolonged crisis, political instability, and poor public institutions. Unemployment is not only confined to unskilled people, it’s also a major concern for highly skilled people (Borino & Sage, 2019).

Unemployment among the youth of Somalia has led to theft, child labor, kidnapping, mass migration, and the recruitment of teenagers by Islamic militants to engage in illegal activities, which have instigated instability and insecurity in the country. The lack of decent work opportunities is considered as one of the main reasons why people engage in and support violent activities in Somalia (World Bank, 2018). The ILO (2019) evaluated the impact of 50 projects related to the creation of employment opportunities – conducted in Somalia in the last decade – on the program beneficiaries’ willingness to engage in violent activities. It was found that improvement in employment levels has led to less willingness for the programs’ beneficiaries to participate in violent activities. Nevertheless, considering the importance of unemployment mitigation, Somalia has adopted several national development plans to tackle unemployment. For instance, one of the ten goals of the national development plan (2017–2019) includes “increased employment opportunities and decent work, particularly for the youth”. More recently, the federal government of Somalia officially launched its ninth national development plan (2020–2024), which aims to create more jobs, particularly for the most vulnerable groups, such as youth, women, and internally displaced persons (IDPs). But these national plans do not seem to be effective because there are no appropriate policies on the table to tackle unemployment and achieve high employment levels (Borino & Sage, 2019). This could be attributed to the lack of empirical studies which address the causes of unemployment.

Even though unemployment is a serious social issue, it can be overcome by using only aggregate policies. Examining and devising policies to reduce unemployment have attracted the attention of researchers and policymakers. Macroeconomic variables are cited as key determinants of unemployment. Accordingly, several studies have confirmed that economic growth undermines unemployment (Anyanwu, 2013; Huang, Huang, Liu, & Zhang, 2020). It is notable that Somalia’s real gross domestic product (GDP) per capita – measured for economic growth – has been on a downward trend since 1985 (see Figure 1), and this could be explained by the rise of the militia’s revolutionary fight against the military regime, which ultimately led to the collapse of the government in 1991 and, more importantly, the absence of governance after this period. After 1997, the real GDP per capita has shown a constant trend of stagnant growth. Furthermore, the inflation rate is another potential driver of unemployment (Phillips, 1958). Somalia’s inflation rate and unemployment rate are both high, which contradicts the theory of the Phillips curve. Thus, this poses the question of why the high rate of inflation in Somalia has not been able to reduce the unemployment rate as theory suggests. However, the high unemployment rate in Somalia could be related to the stagnant growth of real GDP per capita. Moreover, it’s worth investigating the nature of the relationship between high inflation and the high unemployment rate.

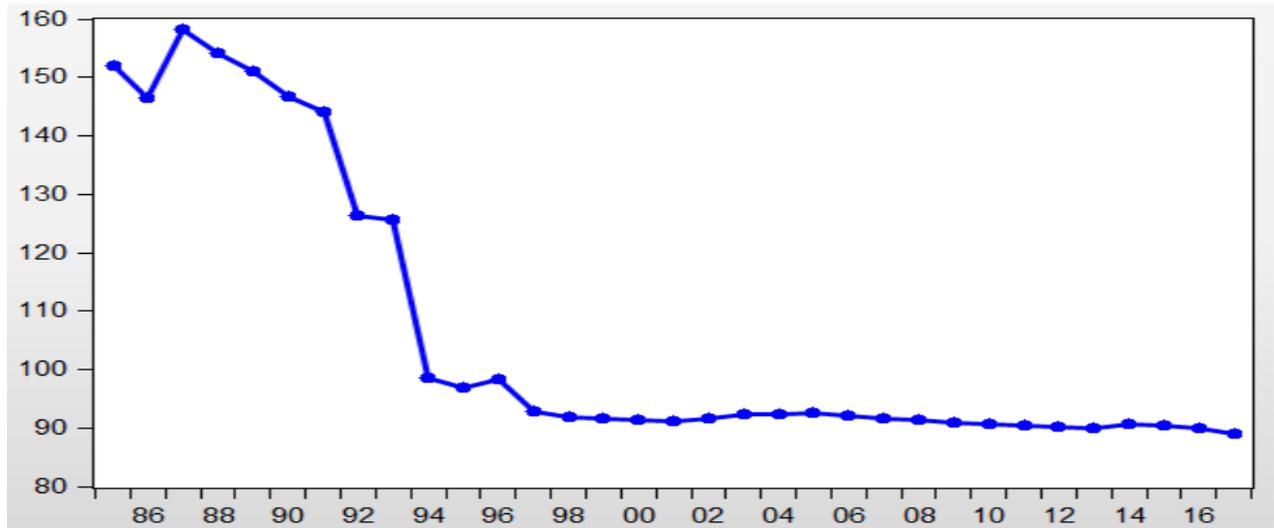


Figure 1. Real GDP per capita (hundreds of US dollars).

Source: OIC database.

Given the high unemployment rate, the stagnant growth of real GDP per capita, and the high inflation rate, there is still a lack of sufficient studies that consider the nexus between unemployment and macroeconomic variables (economic growth and inflation) in the context of Somalia. Several studies have tested the unemployment–inflation growth nexus in Africa (Folawewo & Adeboje, 2017), Asia (Mazumder, 2011), and Europe (Andonova & Petrovska, 2019). Therefore, according to the authors' best knowledge, this study is the first of its kind to try to bridge that gap by ascertaining the impact of economic growth and inflation rate on unemployment in Somalia.

The rest of the study is structured as follows: The second section reviews the empirical literature of the study; Data sources, descriptions, and econometric methodology are presented in section three; Section four contains the empirical analysis and discussions, and section five summarizes the study and suggests policy recommendations.

2. LITERATURE REVIEW

Researchers have examined the relationship between inflation and unemployment (Phillips curve), and economic growth and unemployment (Okun's law) over time. For instance, Abu (2016) examined the presence of Okun's law in Nigeria. The study used an ARDL technique with yearly time series data spanning from 1970–2014. They found that the unemployment rate has a long-term negative and statistically significant effect on economic growth by confirming the existence of Okun's law in Nigeria. In a recent study, Chuttoo (2020) assessed the impact of unemployment on economic growth in Mauritius to validate Okun's law. The study found that GDP per capita and unemployment are not significantly cointegrated, implying that unemployment doesn't influence Mauritius' economic growth, hence invalidating Okun's law hypothesis. This finding is consistent with the results of Doğan (2012) and Villaverde and Maza (2009), who found that unemployment and economic growth are significantly and negatively cointegrated in Turkey and Spain, respectively.

In a panel study, Anyanwu (2013) ascertained the macroeconomic determinants of youth employment in Africa. The study utilized panel data and panel cointegration methods – ordinary least squares and fixed effects. The empirical results found that real GDP reduces youth employment, whereas the quadratic term of real GDP per capita enhances youth employment. In a follow-up study, Motsatsi (2019) investigated the determinants of unemployment in the Southern African Development Community (SADC) by adopting the ARDL panel estimation method. The finding of the study revealed that economic growth is negatively and significantly related to unemployment, thereby confirming Okun's law hypothesis. Likewise, Huang et al. (2020) ascertained the endogeneity of Okun's law in large panel countries. They concluded that unemployment and economic growth are negatively related. Hence, this verifies the presence of Okun's law hypothesis. On the contrary, several studies have

concluded the absence of Okun's law hypothesis where unemployment and economic growth are not related (Durech, Minea, Mustea, & Slusna, 2014; Folawewo & Adeboje, 2017). In recent years, the nexus between unemployment and economic growth has been evaluated through asymmetric estimation methods. Koutroulis, Panagopoulos, and Tsouma (2016) explored the asymmetric response of unemployment to output in Greece. They found that unemployment responds negatively to shocks in output but not positive shocks. This implies that unemployment is higher during a recessionary period than an expansionary period.

On the other hand, macroeconomic determinants of unemployment are not only confined to economic growth but also other macroeconomic variables, such as inflation (as illustrated by the Phillips curve) that determines unemployment. For instance, Bhattarai (2016) assessed unemployment-inflation trade-offs in Organization for Economic Co-operation and Development (OECD) countries. The study found long-run cointegration between unemployment and inflation among the OECD economies. The unemployment rate varies significantly among these economies. In a single country study, Mazumder (2011) examined the stability of the Phillips curve in India. By using a sample period from 1970 to 2008, the study revealed that there is a negative relationship between inflation and unemployment, thereby verifying the existence of the Phillips curve in India. Several other studies have verified the trade-off between inflation and unemployment, thus confirming the Phillips curve hypothesis (Abu, 2017; Doğan, 2012; Mihajlović & Marjanović, 2020). Other studies have negated the presence of the Phillips curve hypothesis (Orji, Anthony-Orji, and Okafor (2015). Furthermore, volatility in inflation is a concern in many countries, which can pose a threat to employment. This justifies the studies on this issue, which include Feldmann (2012), who examined the impact of inflation volatility on unemployment in 20 industrial countries over the period from 1972–2003. The empirical findings revealed that higher inflation volatility induces a higher unemployment rate. The results are robust to changes in specification or sample size.

According to the heterogeneous findings of the reviewed literature above, the economic growth and unemployment nexus and the inflation and unemployment nexus are inconclusive as the literature has illustrated that unemployment is linked to both inflation and economic growth. Since there are no prior studies that have tested the application of these two theories in Somalia, this study contributes to the literature in the context of Somalia by testing the validity of Okun's law and the Phillips curve hypotheses.

3. METHODOLOGY

3.1. Data

The motive of this study is to examine the impact of macroeconomic variables on unemployment in Somalia, with a special focus on the application of Okun's law and the Phillips curve hypothesis. This study adopts the unemployment rate as the dependent variable, and several other variables were incorporated as explanatory variables, such as GDP deflator (used as a proxy of inflation), real gross domestic product (used as a proxy of economic growth), exchange rate, and foreign direct investment (FDI). Most previous studies measured inflation by using the consumer price index (CPI), but we employ the GDP deflator as a measurement of inflation due to the unavailability of CPI data in Somalia, whereas the rest of the variables' measurements are consistent with previous studies. The data utilized in this study is annual time series data covering the period from 1991 to 2017. Furthermore, all variables were converted into a natural logarithm to reduce heteroskedasticity. The data were sourced from the Organization of Islamic Cooperation (OIC) countries; the Statistical, Economic and Social Research and Training Center for Islamic Countries (SESRIC); the World Bank; and the Food and Agriculture Organization (FAO) statistics database. Detailed data descriptions and sources are presented in Table 1.

Table 1. Variable descriptions and sources.

Variable	Code	Description	Source
Unemployment	UNEMP	Percentage of the unemployment rate	World Bank
Inflation	INF	GDP deflator (index)	FAO
Real growth domestic product	RGDP	RGDP (US dollar)	SESRIC
Exchange rate	ER	Local currency per US dollar	FAO
Foreign direct investment	FDI	Annual total inflow (in millions of US dollars)	SESRIC

3.2. Unit Root Test

Any time series with the stochastic trend – random walk with drift – has a unit root indicating that the series is not stationary. The presence of a unit root in time series data leads to the series having a systematic pattern that is difficult to predict. To avoid estimation errors, a unit root test is conducted by using the augmented Dickey–Fuller (ADF) technique. The ADF is an extended method of the Dickey–Fuller (DF) technique by including extra lagged terms of the dependent variable to eliminate autocorrelation. The three possible equations that the ADF can take are specified as follows:

$$\text{No constant, no trend} \rightarrow \Delta y_{t-1} = \gamma y_{t-1} + \sum_{i=1}^p \beta_i \Delta y_{t-i} + \varepsilon_t$$

$$\text{Constant, no trend} \rightarrow \Delta y_{t-1} = \alpha_0 + \gamma y_{t-1} + \sum_{i=1}^p \beta_i \Delta y_{t-i} + \varepsilon_t$$

$$\text{Constant, trend} \rightarrow \Delta y_{t-1} = \alpha_0 + \gamma y_{t-1} + a_2 t + \sum_{i=1}^p \beta_i \Delta y_{t-i} + \varepsilon_t$$

The test statistic τ value is computed as:

$$\tau = \frac{\hat{\gamma}}{\sigma_{\hat{\gamma}}}$$

Where $\hat{\gamma}$ is the coefficient estimate and $\sigma_{\hat{\gamma}}$ is the standard error of the estimated coefficient. The null hypothesis (H_0) for the ADF states that the data series is non-stationary or contains a unit root, while the alternative hypothesis states that the data series is stationary or free from a unit root.

3.3. Econometric Modeling

An ARDL bound test developed by Pesaran, Shin, and Smith (2001) is adopted to analyze the data of the study. This approach is preferred over other cointegration test techniques for various reasons. First, unlike other techniques, the ARDL is convenient for a small sample size. Second, it is more flexible as the cointegration estimation can be conducted irrespective of the integration order of the variables unless they are not integrated at the second difference $I(2)$.

By testing the application of the Phillip's curve and Okun's law in Somalia, the model specification of the study is specified by following the study of Tenzin (2019) as follows:

$$\ln UNEMP_t = \beta_0 + \beta_1 \ln RGDP_t + \beta_2 \ln INF_t + \beta_3 \ln ER_t + \beta_4 \ln FDI_t + \varepsilon_t \quad (1)$$

Equation 1 presents the specified variables of the study. $\ln UNEMP_t$ is the log of the unemployment rate in year t , $\ln RGDP_t$ is the log of real GDP in year t , $\ln INF_t$ is the log of the inflation rate in year t , $\ln ER_t$ is the log of the exchange rate in year t , $\ln FDI_t$ is the log of foreign direct investment in year t , and ε_t stands for the error term in time t . However, the ARDL bound test equations for the long-run and short-run can be formulated as follows:

$$\ln UNEMP_t = \beta_0 + \sum_{i=0}^n \beta_1 \ln UNEMP_{t-1} + \sum_{i=0}^n \beta_2 \ln RGDP_{t-1} + \sum_{i=0}^n \beta_3 \ln INF_{t-1} + \sum_{i=0}^n \beta_4 \ln ER_{t-1} + \sum_{i=0}^n \beta_5 \ln FDI_{t-1} + \varepsilon_t \quad (2)$$

$$\ln \text{UNEMP}_t = \alpha_0 + \sum_{i=0}^n \alpha_1 \Delta \ln \text{UNEMP}_{t-1} + \sum_{i=0}^n \alpha_2 \Delta \ln \text{RGDP}_{t-1} + \sum_{i=0}^n \alpha_3 \Delta \ln \text{INF}_{t-1} + \sum_{i=0}^n \alpha_4 \Delta \ln \text{ER}_{t-1} + \alpha_4 \Delta \ln \text{FDI}_{t-1} + \text{ECT}_{t-1} + \varepsilon_t \quad (3)$$

Equation 2 is the long-run association among the variables of the ARDL model, while Equation 3 is the short-run dynamic relationship between the variables of interest. β_0 is the intercept of the long run, β_j is the coefficient of the long-run, α_0 is the short run intercept, α_j is the short-run slope coefficient, and ECT_{t-1} is the error correction term. Consistent with Pesaran et al. (2001), the study adopts the Wald F-test to examine the null hypothesis of no cointegration between unemployment and other macroeconomic variables against the alternative hypothesis of the existence of long-run cointegration among the unemployment variable and other macroeconomic variables. However, the study utilizes the critical values computed by Narayan (2005) due to their appropriateness for a small sample size. The hypotheses are expressed as follows:

$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ (null hypothesis = no cointegration).

$H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$ (alternative hypothesis = there is cointegration).

4. EMPIRICAL ANALYSIS AND DISCUSSION

4.1. Descriptive Statistics

Descriptive statistics are important for displaying the characteristics of the variables. Table 2 displays the summary statistics of the variables. Real GDP and exchange rate have the highest average values of 20.69 and 9.54, respectively, whereas unemployment and FDI are recorded to have the lowest average values of 2.45 and 3.15, respectively. Similarly, real GDP and exchange rate have the highest maximum values of 20.99 and 10.36, respectively. Moreover, the standard deviation of FDI is 1.97, which is the highest value compared to other variables. Hence, this denotes how volatile the values of FDI are. Furthermore, the Jarque–Bera probability value indicates that the variables are normally and identically distributed. The correlations of under-scrutinized variables are also presented in Table 2. It is established that unemployment is negatively related to real GDP, exchange rate, and FDI, whereas a positive correlation is established between unemployment and inflation. In addition, real GDP has a positive correlation with the exchange rate and FDI, and a negative correlation with inflation. Finally, the exchange rate has a positive correlation with FDI and inflation, whereas inflation associates negatively with FDI.

Table 2. Descriptive statistics.

Variable	lnUNEM	lnRGDP	lnINF	lnER	lnFDI
Mean	2.455	20.694	4.858	9.548	3.156
Median	2.461	20.685	4.866	9.809	1.945
Maximum	2.472	20.994	5.377	10.360	5.963
Minimum	2.416	20.431	3.899	8.294	-1.560
Std. Dev.	0.014	0.177	0.412	0.632	1.977
Skewness	-1.283	0.036	-0.497	-0.560	-0.178
Kurtosis	3.871	1.849	2.755	2.125	2.169
Jarque–Bera	8.266	1.495	1.181	2.273	0.919
Probability	0.016	0.473	0.554	0.320	0.631
Correlation					
lnUNEM	1				
lnRGDP	-0.389	1			
lnINF	0.030	-0.430	1		
lnER	-0.128	0.628	0.109	1	
lnFDI	-0.438	0.783	-0.155	0.600	1

The main prerequisite step for time series data analysis is to ascertain the order of integration of the variables. Although the ARDL method is good at estimating variables that are stationary at the level $I(0)$ and the first difference $I(1)$, or a combination of both, we utilize the augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests to check that none of the variables are integrated at the second difference $I(2)$. Hence, the unit root test results

reported in Table 3 indicate that real gross domestic product and inflation are stationary at a level, whereas the rest of the variables have a unit root problem. But at the first difference, all the variables are free from the unit root problem, which implies that they are stationary; therefore, we can proceed to use the ARDL cointegration method.

Table 3. Unit root tests.

Variable	ADF Level		PPLevel	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
Ln UNEMP	-2.938*	-3.181	-2.193	-2.322
Ln RGDP	-0.066	-4.617***	-0.494	-13.190***
Ln INF	-3.475**	-3.702**	-2.631*	-2.547
Ln ER	-2.509	-2.460	-1.065	-1.885
Ln FDI	-1.316	-2.886	-1.130	-2.880
	First difference		First difference	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
Ln UNEMP	-3.201**	-3.267*	-3.167**	-3.250*
Ln RGDP	-4.795***	-5.295***	-4.828***	-5.283***
Ln INF	-3.470**	-3.775**	-3.495**	-3.778**
Ln ER	-4.152***	-3.787**	-4.154***	-4.419***
Ln FDI	-6.114***	-6.019***	-6.944***	-7.282***

Note:***, ** and * represent significance at the 1%, 5% and 10% levels, respectively.

Subsequently, we determine the optimal lag length by using Hendry's general-to-specific approach, since it's an appropriate method for a small sample (Pesaran et al., 2001). Then, we test the existence of long-run cointegration among the variables utilizing the Wald F-test. The results (see Table 4) confirm that there is long-run cointegration between unemployment (dependent variable) and the explanatory variables since the Wald F-statistic (12.5) is greater than the critical value (6.56) at a 1% significance level.

Table 4. F-Bound cointegration tests.

Model	F-statistic	Significance	Bounds test critical values	
lnUNEMP = f(lnRGDP, lnINF, lnER, lnFDI)	12.5631	1%	K (4)	
			I(0)	I(1)
			4.824	6.56
			3.326	4.73
		10%	2.752	3.922

Note: The critical values are based on Narayan (2005). K=number of explanatory variables.

Subsequently, after confirming the existence of long-run cointegration among the variables, the next step is to estimate the long-run and short-run coefficient elasticities of the explanatory variables. The results, reported in Table 5, reveal that economic growth is negatively and significantly cointegrated to unemployment. A 1% increase in economic growth undermines unemployment by about 0.08% in the long run. This verifies the presence of Okun's law in the context of Somalia in the long run; however, the coefficient we found out is different from Okun's. This could be attributed to the low economic growth in Somalia. This finding is in line with several studies that validated Okun's law (Abu, 2016; Chuttoo, 2020; Villaverde & Maza, 2009).

Furthermore, inflation is deemed not to have any significant effect on unemployment in Somalia in the long run. Hence, the result does not hold the validity of Phillip's curve in Somalia. This is consistent with previous studies Orji et al. (2015). However, the absence of the Phillips curve hypothesis in Somalia can be attributed to Somalia's civil conflict since 1991. This has ruled out the functional central bank, which was taken advantage of by business traders, who forged paper notes and brought them into the country. Hence, the money supply growth skyrocketed, and consequently, inflation spiked. As a result, the purchasing power of the Somali shilling plummeted, which sabotaged domestic production and employment. This justifies our result that an increase in inflation does not reduce unemployment. Moreover, the absence of the Phillip's curve hypothesis in Somalia is also attributed to

the fact that the central bank of Somalia remains inactive, which has led the economy to be highly US dollarized, hence weakening the nexus between inflation and the unemployment rate.

Furthermore, FDI and exchange rate – incorporated as control variables – have a significant positive effect on the unemployment rate. A 1% increase in FDI and exchange rate enhance unemployment by about 0.0048% and 0.0099%, respectively, in the long run. FDI in Somalia induces the rise of unemployment, hence, this can be explained by the negligible amount of FDI received by Somalia. This is due to the poor institutional quality in the country. Furthermore, the depreciation of the exchange rate increases the unemployment rate. It is worth noting that Somalia has an exchange rate that is not regulated by the central bank. Hence, any increase in the exchange rate undermines employment.

The short-run dynamic effect and error correction term (ECT) findings are presented in Table 5. The previous year's unemployment value increases current unemployment by about 0.81% in the short run. Income and FDI do not have any significant effect on unemployment in the short run, while inflation reduces unemployment by 0.016% for a 1% increase in inflation in the short run. This verifies the presence of the Phillip's curve hypothesis in the short run. In addition, the exchange rate contributes to the unemployment rate by declining 0.018% in the short run for a 1% increase in the exchange rate. More importantly, the ECT shows a negative coefficient sign, which is significant at a 5% significance level, thus emphasizing the presence of long-run cointegration between the variables as uncovered by the Wald F-test. Interpretively, the disequilibrium that occurs in unemployment in the short run is adjusted at 19% by these explanatory variables in the long run annually.

Table 5. Long-run and short-run coefficient elasticities of the model.

Variable	Coefficient
Long-run coefficient elasticity estimates	
lnRGDP	-0.082*** (-5.127)
lnINF	0.001 (0.215)
lnFDI	0.004** (3.021)
lnER	0.009** (2.776)
Short-run coefficient elasticity estimates	
Constant	0.795** (2.428)
Δ (lnUNEM (-1))	0.818*** (4.153)
Δ (lnRGDP)	0.02371 0.728
Δ (lnRGDP (-1))	0.047** 2.223
Δ (lnINF)	-0.016*** (-3.353)
Δ (lnINF (-1))	0.027*** (3.902)
Δ (lnFDI)	0.001 (0.5842)
Δ (lnFDI (-1))	-0.002* (-1.802)
Δ (lnFDI (-2))	0.002 (1.383)
Δ (lnER)	-0.018*** (-3.466)
Δ (lnER (-1))	0.037*** (4.252)
Δ (lnER (-2))	-0.003 (-0.614)
ECT (-1)	-0.197** (-2.443)

Note:***, ** and* indicate significance probability values at the 1%,5%and 10% significance levels, respectively. T-statistics are reported in parentheses. Δ =differencing.

To verify the reliability and accurateness of the findings, several diagnostic tests were carried out, namely serial correlation, heteroskedasticity, normality, reset, and model stability, and no diagnostic problem was found as presented in Table 6. Moreover, the consistency of the model parameters is stable over the studied period as depicted by Figures 2 and 3. The adjusted R² is also reported in Table 6. The interested explanatory variables explain 86% of the variations in the unemployment rate in Somalia.

Table 6. Diagnostic tests.

LM Test	0.425 (0.422)
Heteroskedasticity Test	0.324 (0.904)
Normality Test	0.146 (0.929)
Reset Test	0.801 (0.388)
Adjusted R ²	0.868

Note: Values in parentheses () represent probability.

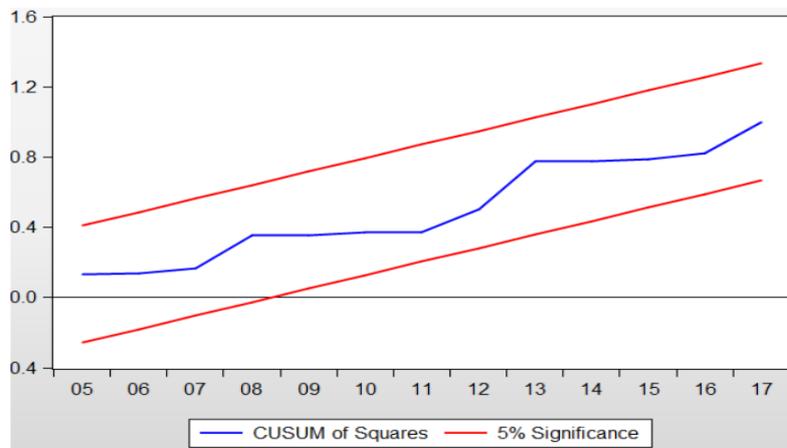


Figure 2. CUSUM test.

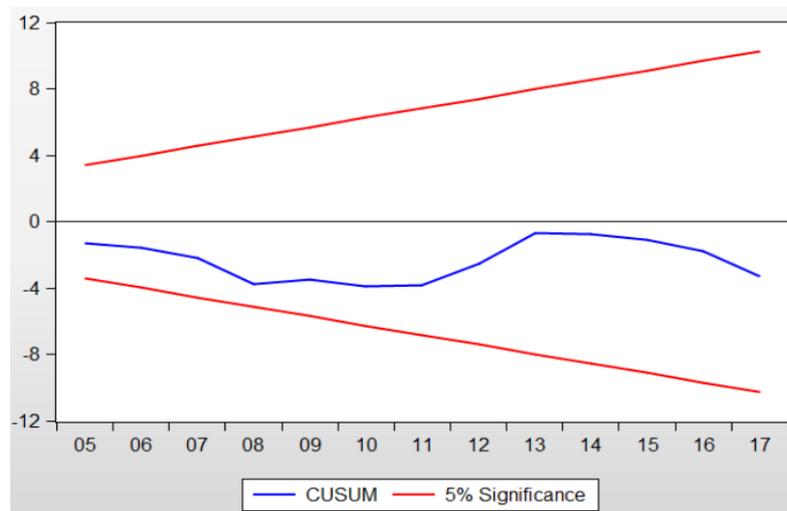


Figure 3. CUSUM square test.

Employing a single econometric technique can lead to biased inferences. Hence, to account for this concern, the fully modified ordinary least squares (FMOLS) is utilized to test the robustness of the long-run ARDL results. The results of the FMOLS, presented in Table 7, reveal that economic growth is negatively cointegrated with unemployment, confirming the validity of Okun’s law hypothesis. In addition, a rise in inflation significantly

reduces the unemployment rate in the long run, indicating the validity of the Phillip's curve hypothesis. This is different from the long-run ARDL result, which is statistically insignificant, but is the same as the short-run result. Overall, the FMOLS confirms the findings of the ARDL model, which revealed the existence of Okun's law in the long run and short run.

Table 7. FMOLS long-run results.

Variable	Coefficient
lnRGDP	-0.035* (-2.002)
lnINF	-0.014*** (-3.003)
lnFDI	-0.002* (-2.017)
lnER	(0.347) 3.262***
Constant	(9.019)

Note: ***, ** and * signify significance probability values at the 1%, 5% and 10% levels, respectively. Mean dependent variable = 2.455. T-statistics are in parentheses(). Adjusted R-squared = 0.126.

4.2. Granger Causality

One of the shortfalls of ARDL and FMOLS long-run cointegration is their inability to assess the causation of the variables. To account for this, we employed the Granger causality test to detect the direction of the variables' causation. The results presented in Table 8 indicate that inflation Granger-causes economic growth. In the same vein, a unidirectional causality is established from exchange rate to economic growth. Thus, monetary policy variables are vital in the causation of economic growth in Somalia.

Table 8. Pairwise Granger causality tests.

Null Hypothesis:	F-Statistic	Prob.
lnRGDP \rightarrow lnUNEM	1.283	0.299
lnUNEM \rightarrow lnRGDP	0.778	0.472
lnINF \rightarrow lnUNEM	0.277	0.760
lnUNEM \rightarrow lnINF	1.355	0.281
lnFDI \rightarrow lnUNEM	2.953	0.075
lnUNEM \rightarrow lnFDI	0.523	0.601
lnER \rightarrow lnUNEM	2.065	0.153
lnUNEM \rightarrow lnER	1.778	0.194
lnINF \rightarrow lnRGDP	5.618	0.012
lnRGDP \rightarrow lnINF	3.179	0.063
lnFDI \rightarrow LRGDP	0.519	0.603
lnRGDP \rightarrow LFDI	2.969	0.074
lnER \rightarrow LRGDP	9.455	0.001
lnRGDP \rightarrow LER	0.498	0.614
lnFDI \rightarrow LINF	3.337	0.056
lnINF \rightarrow LFDI	0.121	0.887
lnER \rightarrow LINF	3.208	0.062
lnINF \rightarrow LER	2.137	0.144
lnER \rightarrow LFDI	1.147	0.337
lnFDI \rightarrow LER	0.948	0.404

Note: \rightarrow indicates the hypotheses that the variables do not Granger-cause.

5. CONCLUSION AND POLICY RECOMMENDATION

Okun's law and the Phillip's curve are widely applied theories to assess the effect of economic growth and inflation on unemployment. Despite the assessment of the nexus among growth, inflation and unemployment in developed and developing countries, no study has tested them in the context of Somalia. Therefore, this study

examines the effect of economic growth and inflation on unemployment in Somalia. The study employed an ARDL cointegration method and FMOLS for a robust analysis of time series data stretching from 1991 to 2017. The results reveal the existence of long-run cointegration between the investigated variables. In addition, we found that an increase in economic growth lowers the unemployment rate in the long run and short run. Thus, this confirms the existence of Okun's law hypothesis in Somalia. However, inflation is not different from zero, which implies that it does not have any significant effect on unemployment in Somalia in the long run, but there is a significant trade-off between inflation and unemployment rate in the short-term –any increase in the inflation rate lowers the unemployment rate. When it comes to controlling variables, FDI and exchange rate significantly enhance the unemployment rate in the long run, but the exchange rate mitigates unemployment in the short run. However, unlike previous examinations, this study adopted the FMOLS estimation technique to ensure the robustness of the ARDL results. From the perspective of policy implications, the study found a trade-off between economic growth and unemployment rate in the short term and long term, and inflation and unemployment in the short-term, which verifies Okun's law and the Phillips curve hypothesis, respectively. Moreover, the cointegration was found to be stable in the long run. Based on these empirical findings, the study recommends that policymakers should enact policies that enhance economic growth to mitigate the unemployment rate, and an effective monetary policy that balances between inflation and unemployment.

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