Quantitative Economics and Management Studies (QEMS) *ISSN: 2722-6247 (online)*
Vol. 5 No. 4 (2024)
https://doi.org/10.35877/454RI.qems2746

Fiscal Policy and Unemployment in Ethiopia: Evidence from ARDL Model

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Abstract

One of the main objectives of macroeconomic and fiscal policy in Ethiopia, as in many other developed and developing nations, is to reduce unemployment. This study examines the impact of fiscal policy on unemployment in Ethiopia from 1990 to 2022. The analysis employed the ARDL Model and cointegration test. The variables analyzed include real gross domestic product (RGDP), government spending, tax income, trade openness, population growth, and the unemployment rate. A stationarity test was conducted, revealing that all variables except population growth were stationary at their first difference. The cointegration test indicated a long-term relationship among the examined variables. Additionally, the ECM results showed that government spending negatively affects unemployment, while tax income has a positive impact. The Granger causality results demonstrated a one-way relationship, with causality flowing from government spending to unemployment. This method provides evidence of a long-term relationship between the unemployment rate and factors such as government spending and tax income. The study suggests that the government should restructure its spending patterns by allocating more funds to productive expenditures and enhance its revenue generation by diversifying Ethiopia's revenue streams.

Keywords: ARDL, government expenditure, cointegration, fiscal policy, ethiopia, ETC, unemployment, tax revenue.

Received: 14 April 2024 Revised: 30 June 2024 Accepted: 17 July 2024

1. Introduction

The rising unemployment levels in the global economy have drawn significant attention from economists, world leaders, and the general public. Unemployment negatively impacts economic growth, leading to reduced output, income, taxable persons, and a higher dependency ratio. Fiscal policy, which involves government spending and taxation, is a key tool used by governments in both developed and developing countries to manage their economies.

In Africa, economic growth has not been matched by high job growth rates, with employment growing at an annual average of 2.8% between 2000 and 2008, roughly half the rate of economic growth (African Economic Outlook, 2018). This slow job growth has particularly affected women and youth. In 2015, Africa had an estimated 226 million youth, a number expected to increase by 42% to 321 million by 2030.

Government spending on social and economic infrastructure can generate employment by directly creating jobs and indirectly supporting productive sectors. However, despite significant government expenditure on infrastructure, defense, education, and healthcare, unemployment levels in Africa continue to rise. In Sub-Saharan Africa, unemployment reached 7.2% in 2008, above the global rate of 5.5% (ILO, 2018).

Ethiopia has seen a significant increase in unemployment, which is a major social and economic issue. According to the Labor Force and Migration Survey (LMS) (2021), 3.6 million people were unemployed, with an unemployment rate of 8%. There is evidence of a causal relationship between increased government expenditure and reduced unemployment rates (Muammil, 2018). However, the nature and level of unemployment can vary based on a country's development and economic structure. Financing public investment projects to reduce unemployment may pressure governments to relax their fiscal policies (World Bank, 2017).

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Like many developing countries, Ethiopia faces the challenge of creating employment for its rapidly growing and youthful population. Ethiopia's working-age population, currently estimated at 54.7 million, is projected to grow by two million per year over the next decade. This growth, coupled with high fertility rates, will have significant social and economic impacts, affecting labor mobility, urbanization, and the nature of work (World Bank, 2017).

The empirical evidence on the impact of fiscal policy on unemployment is mixed. Some studies suggest that increased government spending reduces unemployment (Maku & Alimi, 2018; Holden & Sparrman, 2016; Matsumae & Hasumi, 2016). Other studies indicate either a negative or insignificant effect (Abubakar, 2016). Different types of government spending can have varied effects. For instance, Obayori (2016) found that both capital and recurrent government spending negatively impact unemployment in Nigeria. Tagkalakis (2013), Kassab (2015), and Kaliontzakis (2015) found that higher income tax rates lead to increased unemployment.

Conversely, some research, such as that by Abouelfarag and Qutb (2020) in Egypt, found that government spending can increase unemployment. Chen (2017) demonstrated that reducing corporate tax rates could lower unemployment by fostering the development of specific organizations. Attamah, Anthony, and Ukpere (2015) found that increased government spending led to higher unemployment in Nigeria, whereas Egbulonu & Amadi (2016) found that tax credits could generate net job creation in Spain.

Holden and Sparrman (2013) studied the impact of government purchases on unemployment in 20 OECD countries from 1980 to 2007, finding that a 1% increase in government purchases reduced unemployment by about 0.3% in the same year. The effect was more pronounced during downturns and under fixed exchange rate systems. Nwosa (2014) used OLS to examine the impact of government spending on unemployment in Nigeria, finding that while government spending positively affected unemployment, it had an insignificant negative impact on the poverty rate.

Abomaye-Nimenibo and Inimino (2016) found that capital expenditure significantly reduced unemployment in Nigeria, while recurrent expenditure and tax revenue were not significant. Obayori (2016) confirmed a long-term relationship between fiscal policy and unemployment, with capital and recurrent expenditure negatively impacting unemployment in Nigeria.

Udeze and Obi (2020) found that capital expenditure and government revenue reduced urban unemployment in Nigeria, but recurrent expenditure and fiscal deficit did not. Anaele and Nyenke (2021) showed that increased government expenditure reduced the misery index in Nigeria. Araga (2016) found that while agricultural and road construction expenditure negatively affected employment, transport and education expenditure positively affected employment in Nigeria.

Murwirapachena et al. (2013) found that in South Africa, government recurrent expenditure and tax positively impacted unemployment, while capital expenditure had a negative effect. Emeka (2018) found that government deficits increased unemployment in Nigeria. Abubakar (2016) revealed that public expenditure had a long-lasting positive effect on output growth but did not significantly affect unemployment.

Overall, research indicates that fiscal policy can impact unemployment, but results vary depending on the context and type of expenditure. This study focuses on understanding the specific impact of fiscal policy on unemployment in Ethiopia, contributing to a more nuanced understanding of how different fiscal measures can influence employment outcomes in developing countries. Research focusing on the relationship between fiscal policy and unemployment in Ethiopia is limited, and findings from developed countries are not directly applicable. This study aims to fill this gap by examining the impact of fiscal policies on unemployment in Ethiopia. It seeks to answer the following research questions:

a. What are the trends in tax income, government expenditure, and unemployment?
b. What is the impact of tax revenue on Ethiopia's unemployment rate in the short and long run?
c. What is the relationship between tax revenue, government spending, and unemployment in Ethiopia?

2. Methods

2.1. Research Design

The study utilizes time series data and employs both descriptive and econometric methods of data analysis to achieve its stated objectives. Descriptive analysis, including line charts and tables, is used to describe the variables and show

their trends. This approach involves tabulation, graphing, and ratio analysis to illustrate the patterns and effects of government spending and tax rates on unemployment in Ethiopia.

2.2. Data Types and Sources

This study utilized secondary data to examine the impact of fiscal policy on unemployment in Ethiopia, covering the period from 1990 to 2022. The primary sources of secondary data include the Ministry of Finance and Economic Development (MOFED), annual reports from the National Bank of Ethiopia (NBE), the World Bank, the Central Statistical Agency (CSA), and the World Development Indicators (WDI). Annual time series data were collected for this analysis. EViews 10 software was used for data analysis due to its suitability for time series analysis, offering more comfort and precision compared to STATA and SPSS. EViews is widely recognized and utilized by economists, researchers, and analysts for statistical analysis, forecasting, and model simulations, as noted by Aljandali and Tatahi (2018).

2.2.1. Data Analysis

The data were analyzed using time series regression models, specifically employing the Autoregressive Distributed Lag (ARDL) model to study the relationship between government spending, taxation, and unemployment in Ethiopia. The ARDL methodology offers several advantages. The ARDL model is flexible in handling variables regardless of whether they are stationary at level (I(0)), first difference (I(1)), or a combination of both. This eliminates the need to establish a uniform order of integration among the variables before proceeding with the analysis. The ARDL approach can clearly differentiate between dependent and explanatory variables, facilitating a more structured analysis of the relationships. ARDL allows for the testing of both short-term and long-term relationships between the variables, providing a comprehensive view of the dynamics at play. One of the key strengths of the ARDL model is its ability to accommodate different optimal lag lengths for different variables. This flexibility can improve the model's accuracy and predictive power. By utilizing the ARDL model, this study aims to provide a robust analysis of how government spending and taxation impact unemployment in Ethiopia over the sample period from 1990 to 2022.

2.2.2. Model specification

Keynes advocated for government spending as a means to create jobs, boost production, and generate income. This study adopts the Keynesian theory of employment, which emphasizes the principle of effective demand. According to John Maynard Keynes, the level of employment in the short run is determined by effective demand. Keynes argued that a substantial increase in aggregate demand positively influences employment, while a decrease in demand leads to unemployment (Keynes, 2018). Keynesian theory posits that unemployment deviates from its natural rate due to fluctuations in aggregate demand. Specifically, Keynesian unemployment is caused by economic downturns, which are seen as natural instabilities within the economy (Ejemeyovwi & Alege, 2021):

$$UNEMPL = f(GOVTER, TR) \quad (1)$$

The model is specified as:

$$UNEMPL = (\mathbf{TR}, GEXP, RGDP, TOP, \text{and } POP) \quad (2)$$

Where:

UNEMPL = Unemployment rate (% of total labor force)
TR = Tax rate (%GDP)
TOP = Trade Openness (%GDP)
GEXP = Government expenditure (%gdp)
POP = Population growth (annual %)

The inclusion of these particular explanatory variables is based on their relevance in reducing unemployment, as shown in the existing theoretical and empirical literature.

2.2.3. Variable definition and measurement

a. Definitions of Key Variables

Unemployment: Unemployment occurs when individuals who are actively seeking employment are unable to find work. According to the International Labor Organization (ILO), unemployed individuals are those who have been

looking for a job within the preceding four weeks but have been unable to find work. Unemployment is typically expressed as a percentage of the total labor force.

Government Spending: This encompasses all government consumption, investment, and transfer payments.

Tax Revenue: Tax revenue is the income obtained by governments through taxation. It is the primary source of government funding and can come from individuals, public enterprises, trade, royalties on natural resources, and international aid. In this study, tax revenue is expressed as a percentage of GDP**.**

b. Control Variables

Population Growth: This refers to the increase in the number of people living in a country, measured as an annual percentage rate. Africa, particularly Sub-Saharan Africa, has the highest population growth rates among developing countries. According to a 2019 United Nations report, Africa will account for more than half of global population growth between now and 2050, with Sub-Saharan Africa's population expected to double by 2050.

Trade Openness: Trade openness indicates the extent to which a country is engaged in international trade. It is approximated by the percentage of exports plus imports relative to GDP. Greater trade openness often correlates with increased foreign direct investment and economic integration.

Economic Growth: In this study, economic growth is proxied by real GDP per capita. Real GDP per capita is chosen for its ability to capture GDP relative to the population size and is widely used in empirical research. This measure helps to provide a more accurate picture of economic performance and living standards.

This variable is expected to have either a positive or a negative effect on both on unemployment. A summary of the a priori expectations of the variables present in Table 1.

Table 1. Data description, measurement and source

Variable	Description	Measurement	Source
UNER	Unemployment Rate	Measured as a per cent of labor force	WB, 2022
GEX	Government Expenditure	Measured as a per cent of GDP	MOFED,2022
RGDP	Real Gross Domestic Product annual percent	Measured as a per cent of GDP	WB,2022
TOP	Trade openness	Measured as a per cent change per annum GDP	WB,2022
TR	Tax revenue	Measured as a per cent change of GDP	WB,2022
Pop	Population Growth rate	population per year	WB,2022

2.2.4. Estimation Procedure

Methodological approach of the study includes the following steps:

To effectively analyze the impact of fiscal policy on unemployment in Ethiopia, a comprehensive methodological approach is employed, which includes the following steps:To determine the order of integration of the variables used in the regression model.Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests.

To test for the existence of a stable long-run equilibrium relationship between the variables. Autoregressive Distributed Lag (ARDL) bounds testing approach, developed by Pesaran et al. (2001).ARDL is effective even with small sample sizes.It allows for the estimation of both short-run and long-run components of the model simultaneously, addressing issues related to autocorrelation and omitted variables.The technique accommodates variables that are I(0), I(1), or fractionally integrated, making it flexible for various data structures.

Involves estimating an Unrestricted Error Correction Model (UECM) which has several advantages: The F-statistics used in the bounds test follow a non-standard distribution under the null hypothesis of no cointegration, ensuring robustness irrespective of the underlying integration order of variables. This method generally provides unbiased estimates of the long-run coefficients and valid inference even in the presence of endogenous regressors.

This comprehensive methodology ensures a robust analysis of the impact of government spending and tax rates on unemployment in Ethiopia, leveraging advanced econometric techniques to derive meaningful insights from the data spanning 1990 to 2022.The ARDL models used in this study are indicate:

$$\Delta LNUNMPL_t = B_{o+}\sum_{i=1}^{p} ai\,\Delta lnunmpl_{t-1} + \sum_{i=1}^{q} \emptyset\, i\,\Delta rgdp_{t-1} + \sum_{i=1}^{r} \partial i \Delta lnPop_{t-1} + \sum_{i=1}^{p} ai\,\Delta lnTop_{t-1} + \sum_{i=1}^{n} \forall i \Delta Ltr_{t-1} + \sum_{i=1\propto_i}^{m} \Delta lnGEXP_{t-1} + B_1 lnunmpl_{t-1} + B_2 rgdp_{t-1} + B_3 lnTop_{t-1} + B_3 lnpop_{t-1} + B_4 lntr_{t-1} + B_5 lngex_{t-1} + e_t \quad (3)$$

Where $B_o, ai, \partial i, \forall i, \propto_i, \emptyset_i B_1, B_2, B_3, B_4, B_5$ parameters to be are estimate and e_t is assume to be white noise error. The test for cointegration using the bound test approach is based on the Wald test.

The F-statistic of the Wald test is comparing with the two sets of critical value bounds developed by Perasan et al. (2001).

The H0 is rejecte when the F-value is greater than the upper bound and the conclusion is that a long-run relationship between the variables exists. If the F-value is less than the lower bound, then the H0 is accepted with the conclusion that there is no long-run relationship between the Variables. The F-test statistic is use in checking the existence of a long-run equilibrium among the variables under study.

The null hypothesis for no cointegration among the variables is represent as H0: $\beta 0 = ai = \partial i = \forall i = \propto_i = \emptyset_{i=} 0$ while the alternative hypothesis is represent by H1: $\beta 0 \neq ai \neq \partial i \neq \forall i \neq \propto_i \neq \emptyset_{i,} \neq 0$. The F-statistic test is a non-standard which relies on whether the variables include in the model are integrate of order zero I(0) or integrate of order one I(1), the number of regressors and whether the model contains a trend and/or an intercept. The test encompasses the use of critical value bounds which depends on the order of integration of the variables. Thus, whether I (0) or I (1) or a mixture of both. Basically two sets of critical values (i.e. I (0) series and I (1) series) are generate. The lower bound critical values is the term use to classify the critical values generated for the I (0) series, whilst the critical values for the I (1) series is referred to as the upper bound critical values. The rule is that if compute F-statistics falls below the lower bound value I (0), the null hypothesis (no co-integration) will not be rejected.

Otherwise, if the compute F-statistics exceeds the upper bond value, I (1), then null hypothesis is rejected which indicates that there is co-integration. If the compute result falls between the lower and upper bonds, the test is inconclusive. This is in line with Pesaran et al (2001) that in the case of inconclusive report, investigation may be based on short-run analysis

2.2.5. Error Correction Model

After establishing the long-run relationship among the variables through the ARDL bounds testing approach, the next step involves estimating the error correction models (ECM) to capture both the short-run dynamics and the speed of adjustment to the long-run equilibrium. The ECM framework within the ARDL model allows for the introduction of optimal lags for both the dependent and explanatory variables, thereby accommodating the different speeds at which variables adjust to the equilibrium.

$$\Delta LNUNMPL_t = B_{o+}\sum ai\,\Delta lnunmpl_{t-1+}\sum \emptyset\, i\,\Delta rgdp_{t-1+}\sum \partial i \Delta lntr_{t-1+}\sum_{i=1}^{n} \forall i \Delta lngexp_{t-1+}\sum_{i=1}^{n} \forall i \Delta lntop_{t-1}\ \sum_{i=1\propto_i}^{m} \Delta lnpop_{t-1} + \cup EC_{t-1} + e_i \quad (4)$$

Where $LNUNMPL$ is the dependent variable; the others is a vector of explanatory variables; t represents the time trend and **e** represents the error term .Where $B_o, B_1, B_2, B_3, B_4, B_5$ and ∂i represents the long run coefficient estimators, a $ai, \partial i, \forall i, \propto_i, a$ and $\emptyset_{i,}$ represents the short run dynamic coefficients, $\cup$ represents the speed of adjustment parameter, ECT represents the error correction term.

2.2.6. Granger-Causality Model

By employing the multivariate VAR model and conducting Granger causality tests, the study aims to uncover the causal relationships between Unemployment, Government Expenditure, and Tax Revenue in Ethiopia. This analysis will provide valuable insights into the dynamic interactions among these key economic variables and inform policymakers on the effectiveness of fiscal policy measures in addressing unemployment issues.

$$\mathrm{UNEMPL}_{t=}{}^{a_{0+\sum_{i=1}^{q} a_i}}\mathrm{UNEMPL}_{t-i+}\sum_{j=1}^{q} c_j \mathrm{GEXP}_{t-j+}e_{1t} \quad (5)$$

$$\mathrm{GEXPD}_t = B_{0+}\sum_{i=1}^{q} B_i\,\mathrm{GEXP}_{t-i} + \sum_{j=1}^{q} a_i\,\mathrm{UNEMPL}_{t-i+}e_{2t} \quad (6)$$

$$TR_{t=}a_0+\sum_{i=1}^{q}a_i TR_{t-i} +\sum_{j=1}^{q}c_j UNEMPL_{t-j}+e_{1t} \quad (7)$$

2.2.7. Diagnostic tests

The model that has been use for testing the long-run relationship and coefficients is further taste with the diagnostic tests of normality, Serial Autocorrelation, Heteroscedasticity and any model misspecifications. The test is carried out to test the robustness of the results from the ARDL model.

3. Result and Discussions

3.1. Descriptive analysis

The average unemployment rate over the period was 2.8165%, with fluctuations ranging from 2.25% to 4.02%. This indicates persistent unemployment issues in Ethiopia. Tax revenue ranged from 5.60 to 15.80, indicating variations in government income from taxation. Government spending fluctuated between 12.69 and 27.0412, reflecting changes in fiscal policy and allocation of resources. Real GDP growth varied widely, with an average of 6.74% and a maximum of 13.57%. However, negative growth rates were also observed, indicating economic downturns. The average trade openness rate was 34.87%, with fluctuations between 23.3% and 49.9%, highlighting Ethiopia's integration into global trade. Population growth averaged 2.97%, with variations between 2.54% and 4.21%, indicating sustained population growth, posing challenges for economic development.

Positive skewness values suggest that the distribution of variables is skewed to the right, indicating that most data points are concentrated on the lower end with a few extreme values. Kurtosis values greater than 3 indicate non-normality, suggesting that the distributions of variables deviate from a normal distribution.

In general, the descriptive statistics reveal significant variations and trends in key economic variables in Ethiopia. Persistent unemployment, fluctuations in tax revenue and government expenditure, fluctuations in real GDP growth, trade openness, and sustained population growth pose challenges for economic management and policy formulation. The skewness and kurtosis statistics indicate deviations from normal distributions, highlighting the need for robust statistical analysis techniques in the empirical study.

Table 1. Descriptive analysis

	UNEMPL	TR	TOP	GDP_	GEXP	POP
Mean	2.854125	8.645823	34.87392	6.740820	18.92572	2.976898
Median	2.817500	8.390430	31.98112	8.364086	17.94031	2.850297
Maximum	4.020000	15.80000	49.91158	13.57260	27.04148	4.211319
Minimum	2.250000	5.600781	23.38600	-8.672480	12.69000	2.542089
Std. Dev.	0.544889	1.915275	9.179107	5.625659	3.765866	0.383011
Skewness	0.404901	1.544652	0.329764	1.207665	0.565568	1.812760
Kurtosis	1.829561	6.315030	1.642395	3.887748	2.623233	6.051588
Jarque-Bera	2.700942	37.55105	3.132345	9.105134	1.954457	30.87782
Probability	0.259118	0.000000	0.208843	0.010540	0.376353	0.000000
Sum	91.33200	276.6663	1150.839	222.4471	624.5486	98.23762

3.1.1. Trend of Unemployment Rate

The figure 1 illustrates the trend of Ethiopia's unemployment rate from 1990 to 2022. In 2022, the unemployment rate reached 4.02 percent.

Specifically, in 2019, Ethiopia's unemployment rate was 2.08 percent, which was a slight increase of 0.01 percent from 2018 but a decrease of 0.04 percent from 2017. In 2017, the unemployment rate was 2.12 percent, marking a 0.05 percent decrease from 2016.

On average, the unemployment rate was 2.9 percent over the period, with a low of 2.1 percent in 2018 and a high of 4.2 percent in 2022. The increase in the unemployment rate in 2022 can be attributed to prolonged conflicts and drought in the country.

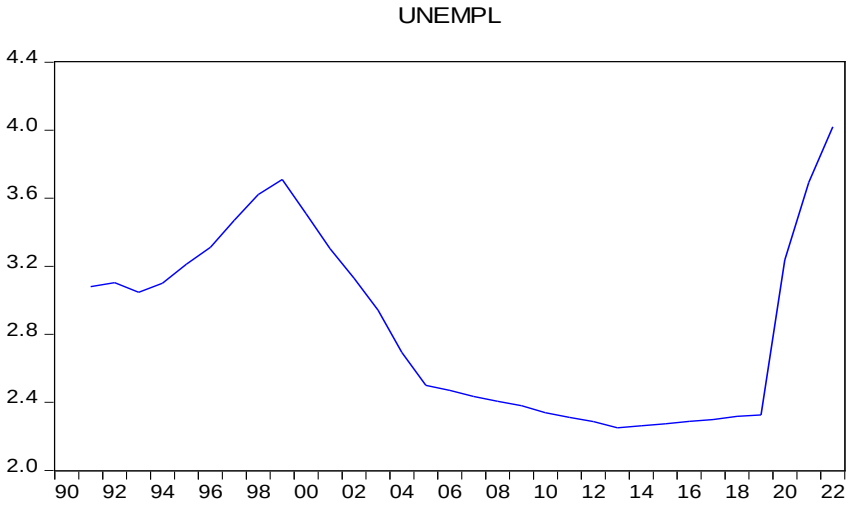

Figure 1. Trend of Unemployment Rate

3.1.2. Trend of Government expenditure

General government expenditure (% of GDP) in Ethiopia was at shows flexible trend. % of GDP data is updated yearly, averaging 17.990 % from 1990 to 2022. Graph below shows that, the ratio of government expenditure to GDP decreased from an average of 17.98 percent in 2016 to an average of 12.8 percent in 2022. This indicates government expenditure is not efficiently utilized on productive activities.

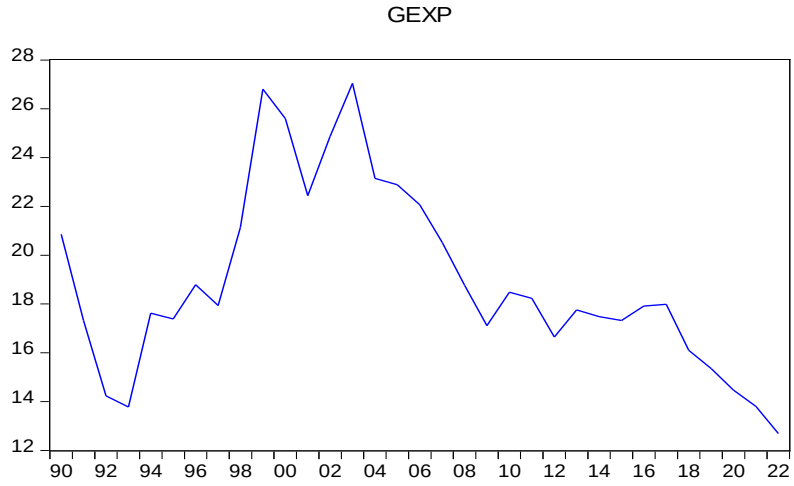

Figure 2. Trend of government expenditure

3.1.3. Trend of Tax revenue

The proportion of tax revenue to GDP in Ethiopia has been consistently low, and there's been a noticeable downward trend in recent years. For instance, the tax-to-GDP ratio decreased from 12.7 percent in 2014/15 to 10.7 percent in 2017/18. Additionally, the share of tax revenue in the total budget declined from 61 percent to 58 percent between the 2018/19 and 2019/20 budgets. Overall, domestic financing has decreased by 5 percent.

In 2020, tax revenue as a percentage of GDP was reported at 6.1963 percent, according to data from the World Bank. This suggests that tax revenue collection may be irregular due to factors such as corruption and ongoing conflicts.

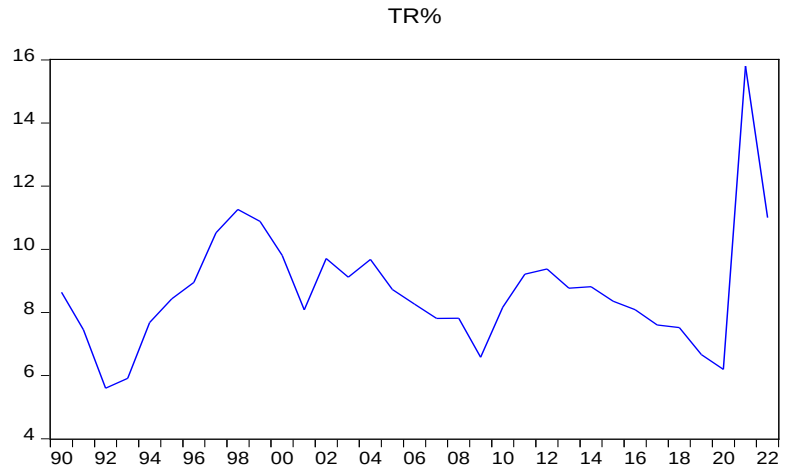

Figure 3. Graph of tax revenue

3.2. Inferential Analysis

3.2.1. Unit Root test result

The results of the unit root tests, specifically the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, are crucial in determining whether the time series data is stationary or non-stationary and at what order of integration. In this study, both ADF and PP tests were conducted with intercept levels and first differences for each series.The findings indicate that the series LNUNMPL, LNGE, LNTR, LNTOP, and LNRGDP at levels contain a unit root, implying they are non-stationary at levels but become stationary at first differences. On the other hand, LNPOP is stationary at levels, indicating it does not require differencing to achieve stationarity.

In the context of the Autoregressive Distributed Lag (ARDL) model, it's essential for all variables entered in the regression not to be integrated of order two. Thus, conducting unit root tests helps ensure that the variables meet the necessary conditions for the ARDL model. While the ARDL framework does not mandate pre-testing of variables, performing unit root tests provides valuable insights into whether the ARDL model is appropriate for the dataset under consideration.

Table 2. Augmented Dickey Fuller Test results

Variables	At Level			At First Difference		
	Intercept	Intercept and trend	None	Intercept	Intercept and trend	None
LNUML	-1.593241	-2.167731	-3.070365	0.139556	-3.965843	**-3.095530***
LNRGDP	-0.462330	-3.475240	0.197224	**-4.599150***	-4.532162	-3.593192
LNTR	-2.220426	-1.219859	-1.001328	**-4.269180***	4.12543	1.94794
LNPOP	-7.936813*	-2.167731	-0.378351	-3.194425	-3.965843	-4.050990
LNTOP	2.04534	- 1.791866	0.276206	-4.105566*	-1.308724	−2.081487*
LNGE	2.085534	- 1.791866	3.475240	**-4.904079***	-5.062034*	-3.062034

Table 3. Phillips-Perron (PP) Unit Root tests at level and at first difference

Variables	At Level			At First Difference		
	Intercept	Intercept and trend	None	Intercept	Intercept and trend	None
LNUML	2.085534	- 1.791866	-3.055413	-6.175456	-2.308724	-3.081864*
LNRGDP	2.085534	- 1.791866	0.276206	-8.177243*	-2.308724	-2.134208
LNTR	-3.165334	-5.70008	-4.001328	-5.177243*	-12.93452-	13.94794
LNPOP	-2.773083*	-0.172321	3.824058	-3.194425	-6.095208-	3.248055
LNGE	-1.593241	-2.167731	-0.378351	-4.743167*	-3.965843	-4.050990
LNTOP	2.085534	- 1.791866	-1.067718	-4.103302	-2.308724	-2.083736

3.2.2. Lag length determination

By employing multiple lag selection criteria and validating the chosen lag order through residual tests, your study ensures a thorough and robust analysis. This approach combines statistical rigor with theoretical relevance, allowing for a better understanding of the relationships between the variables under study. It's crucial to strike a balance between statistical fit and economic theory, and your methodology achieves this balance effectively.

Table 4. VAR order lag selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	46.42825	NA	2.50e-08	-3.314260	-3.070485	-3.246647
1	162.8961	177.0311	1.74e-11	-10.63169	-9.169036	-10.22601
2	217.9756	61.68907*	2.07e-12*	-13.03805*	-10.35652*	-12.29431*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5%level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

By to following the guidance of Pesaran and Shin (1999) regarding the selection of lag lengths, especially when dealing with yearly data. Their recommendation of a maximum of two lag lengths helps prevent overfitting the model while still capturing relevant temporal dependencies. Additionally, choosing the lag length that minimizes the Akaike Information Criterion (AIC) is appropriate for smaller sample sizes, as it balances model complexity with goodness of fit.

The automatic selection of the lag length by Eviews 10 based on AIC minimization ensures a data-driven approach to model specification. This approach is supported by research indicating that AIC tends to produce reliable results, particularly in terms of minimizing the probability of underestimation. By using AIC as the criterion for lag length selection, your study maintains a rigorous methodology while leveraging the efficiency of automated model selection processes.

3.2.3. Bound Test for Cointegration Analysis Based on Equation

The bound test serves as a crucial tool for assessing the presence of co-integration or long-run relationships between variables. By comparing the F-statistic with critical values, the test determines whether such relationships exist.

In your study, the F-statistic (28.356) surpasses the upper bound value (3) at the 5 percent critical level. Consequently, the null hypothesis (H0) of no long-term relationship is rejected. This outcome suggests compelling evidence in favor of the alternative hypothesis (H1), indicating the existence of a long-term partnership between Unemployment and Fiscal policy in Ethiopia.

The confirmation of a long-term relationship aligns with findings from Murwirapachena et al. (2013) and underscores the importance of fiscal policy in influencing unemployment dynamics in Ethiopia. This result enhances our understanding of the economic dynamics at play and provides valuable insights for policymakers and researchers alike.

Table 5. F bound test - Null Hypothesis: No long run relationship

Test Statistics	Value	Signif.	I(0)	I(1
F-statistic	28.35631	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

3.2.4. Long Run Relationship

The target of this study is to investigate the impact of Government expenditure and tax revenue rate on

Unemployment in Ethiopia.

Table 6. Long run coefficient of ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNTOP	-0.316801	0.064562	-4.906952	0.0003
LNTR	-0.242320	0.075789	3.197288	0.0070
LNPOP	1.773613	0.506153	-3.504107	0.0039
LNGE	-0.169336	0.028131	-6.019614	0.0000
LNRGDP	0.060531	0.065361	0.926097	0.3713
EC = LNUNMPL – (–0.3168 * LNTOP + 0.2423 * LNTR + 1.7736 * LNPOP – 0.1693 * LNGE + 0.0605 * LNRGDP + 4.3628)				

The regression output in Table 6 provides insights into the relationship between various economic factors and unemployment in Ethiopia. Here's a summary of the findings:

a. Economic growth: The coefficient for economic growth shows a positive relationship with unemployment, but it is statistically insignificant. This suggests that economic growth alone may not have a significant impact on reducing unemployment in Ethiopia.
b. Government expenditure: The negative coefficient for government expenditure indicates a significant negative relationship with unemployment. A 1% increase in government expenditure is associated with a 0.169% decrease in unemployment. This finding is consistent with previous research indicating that government spending can influence unemployment outcomes, depending on how it is allocated.
c. Tax revenue: The coefficient for tax revenue rate demonstrates a negative and significant impact on unemployment in the long run. A 1% increase in tax revenue decreases unemployment by 0.24%. This suggests that if tax revenue is utilized for productive activities, it can create job opportunities.
d. Trade openness: The negative coefficient for trade openness implies a significant negative relationship with unemployment in the long run. An increase in trade openness by 1 percentage point leads to a decrease in unemployment by 0.31 percentage points. This indicates that as the economy opens up, more job opportunities are created.
e. Population growth: The positive coefficient for population growth indicates a significant positive relationship with unemployment. A 1% increase in population growth rate results in a 1.78% increase in unemployment rate, assuming other variables remain constant. This finding aligns with previous research showing a positive long-run relationship between population growth and unemployment.

Overall, the results highlight the importance of government expenditure, tax revenue utilization, trade openness, and population growth in influencing unemployment dynamics in Ethiopia. Effective fiscal policy allocation and management, along with strategies to harness the benefits of trade openness, are essential for addressing unemployment challenges in the country.

3.2.5. Short Run Error Correction Model

Table 7. Error Correction Representation of the ARDL

ARDL model based on Akaike Information Criteria (AIC)
Dependent variable: LNUNMPL

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(LNUNMPL (-1))	1.085185	0.115054	9.431927	0.0000
D(LNTR)	-0.219789	0.038628	-5.689929	0.0001
D(LNTOP (-1))	-0.043344	0.049722	-0.871739	0.3992
D(LNGE (-1))	0.118372	0.009330	12.68721	0.0000
D(LNRGDP (-1))	-0.258344	0.059118	-4.369982	0.0008
CointEq (-1) *	-0.655920	0.038510	-17.03252	0.0000

The estimation of short-run dynamics through the error correction term (ECM) provides valuable insights into the speed of adjustment towards equilibrium in the dynamic model. Here's a summary of the findings from Table 7:

a. Error correction model (ECM): The highly significant negative coefficient (-0.655) of the error correction term indicates a strong adjustment mechanism towards restoring equilibrium in the long run. According to Banerjee et al. (2003), this significant ECM further confirms the stable long-run relationship between the variables.
b. Tax revenue: The negative and significant coefficient for tax revenue suggests that a 1% increase in tax revenue leads to a 0.219789% decrease in unemployment. This finding aligns with the results of Lean and Song (2009), indicating that effective utilization of tax revenue can contribute to reducing unemployment.
c. Government expenditure: In the short run, the coefficient for government expenditure is positive and significant, indicating that a 1% increase in government expenditure leads to a 0.1183% decrease in unemployment. This suggests that government spending can have a stimulating effect on employment in the short run.
d. Trade openness: The negative and significant coefficient for trade openness implies that a 1% increase in trade openness leads to a 0.043344% decrease in unemployment. This suggests that greater openness to trade can create job opportunities in the short run.
e. Economic growth (Real GDP): The positive coefficient for economic growth indicates that a 1% increase in real GDP leads to a 0.258% decrease in unemployment in the short run. This suggests that economic growth can stimulate job creation, albeit with a lag.

Overall, the short-run coefficient results highlight the dynamic nature of the relationship between fiscal policy variables and unemployment in Ethiopia. Effective utilization of tax revenue, government expenditure, and trade openness can contribute to reducing unemployment rates in the short run, while economic growth plays a significant role in stimulating job creation. However, it's essential to consider the broader economic context and structural factors influencing unemployment dynamics in the country.

3.3. Granger Causality Test Analysis

Table 8. Pairwise granger causality tests

Pairwise Granger Causality Tests
Date: 04/18/23 Time: 01:01
Sample: 1990 2023
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
LNGE does not Granger Cause LNUNMPL	28	42.7914	4.E-09
LNUNMPL does not Granger Cause LNGE		0.73858	0.5408
LNTR does not Granger Cause LNUNMPL	23	0.98328	0.4254
LNUNMPL does not Granger Cause LNTR		1.96238	0.1603

Granger causality tests offer valuable insights into the direction of causality between variables. Here's a summary of the findings from Table 8:

a. Government Expenditure Granger Causes Unemployment: The rejection of the null hypothesis at the 5% significance level suggests that there is causality between government expenditure and unemployment. Specifically, government expenditure Granger causes unemployment, indicating a unidirectional causal relationship running from government expenditure to unemployment. This implies that changes in government expenditure can influence unemployment levels over time.
b. Tax Revenue and Unemployment: The null hypothesis that unemployment does not Granger cause tax revenue was not rejected at the 5% significance level. This suggests that, during the period under study, there was no evidence of causality between tax revenue and unemployment. In other words, changes in unemployment levels did not significantly affect tax revenue in the observed timeframe.

These findings provide valuable insights into the relationship between fiscal policy variables and unemployment in Ethiopia. While government expenditure appears to have a causal influence on unemployment levels, the relationship between tax revenue and unemployment is not supported by the Granger causality test results. Understanding these causal relationships can inform policymakers and stakeholders in designing effective strategies to address unemployment challenges and optimize fiscal policy interventions.

3.4. Model Stability and Diagnostic Test

Comprehensive diagnostic tests ensure the reliability and robustness of model estimations. the diagnostic checks conducted:

a. Ramsey RESET Test: This test verifies the correctness of the model specification. By not rejecting the null hypothesis, you confirm that the model is correctly defined and free from omitted variable bias.
b. Heteroscedasticity Test: Both the Breusch-Pagan-Godfrey Test and the ARCH test are employed to detect heteroscedasticity. The non-rejection of the null hypothesis in both tests indicates that the residuals have homoscedasticity, ensuring the reliability of standard errors and inferences.
c. Serial Correlation Test: The Breusch-Godfrey LM test is used to detect serial correlation in the model's error terms. The non-rejection of the null hypothesis implies that the errors are uncorrelated with one another, supporting the validity of the model assumptions.
d. Normality Test: The Jarque-Bera test examines whether the residuals are normally distributed. Since the null hypothesis is not rejected, it suggests that the error terms follow a normal distribution, further validating the model's reliability.
e. CUSUM and CUSUMSQ Tests: These tests assess the stability of both long-run and short-run relationships in the model. The plots of CUSUM and CUSUMSQ remain within the critical boundaries, indicating that the regression equation is correctly specified and stable over time.

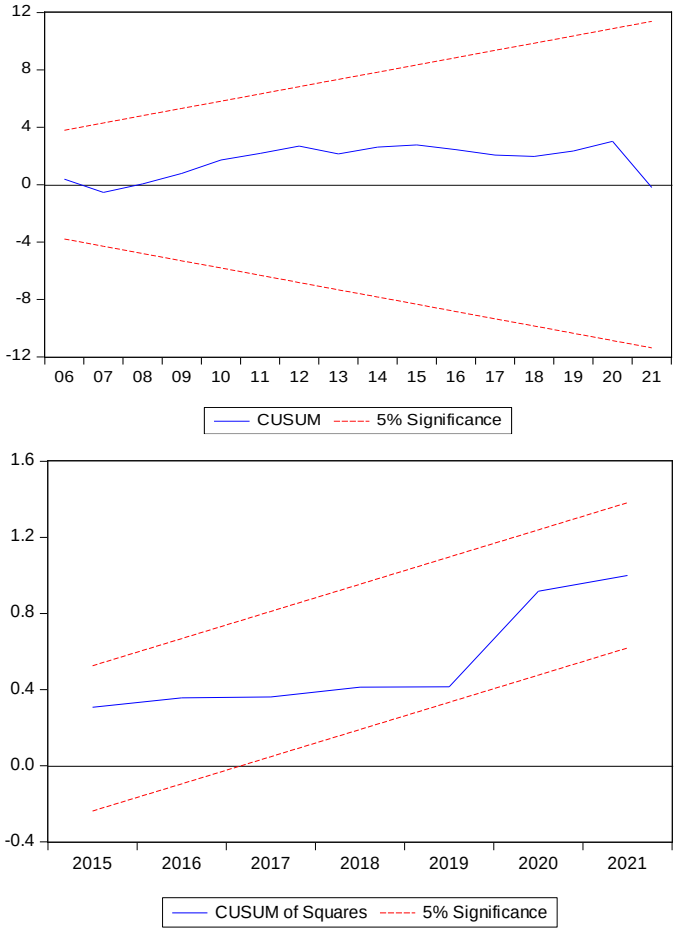

Figure 4. Stability test from Eviews 10 result

4. Conclusions

The study employs a robust methodology to investigate the relationship between fiscal policy and unemployment in Ethiopia, focusing on both short-term and long-term effects.

Annual time-series data from 1990 to 2022 are utilized, and the study employs the ARDL bounds testing model to examine the relationship between fiscal policy variables and unemployment. Unit root tests such as the PP and ADF tests are conducted to ensure the integration properties of the variables. Additionally, the variable addition test confirms the presence of both long-run and short-run dynamics. The study conducts various diagnostic tests, including tests for serial correlation, functional form, normality, and heteroscedasticity. The results indicate that the model adequately addresses these issues, ensuring the reliability of the estimations. The stability of the model is also confirmed through tests such as the CUSUM test. The bounds test confirms the existence of long-run relationships between government spending, tax revenue, and unemployment in Ethiopia. The long-run estimates reveal significant negative and positive relationships between government spending and tax revenue on unemployment. These findings are consistent with previous studies. Granger causality tests are conducted to determine the direction of causality between fiscal policy variables and unemployment. The results indicate the presence of short-run and long-run unidirectional causality running from government expenditure to unemployment. This suggests that government expenditure Granger causes unemployment. The findings highlight the significant influence of tax revenue and government expenditure as key fiscal policy instruments in shaping the Ethiopian economy. The results contribute to the understanding of how fiscal policy measures impact unemployment dynamics in the country.

5. Recommendations

Policy recommendations based on the findings of the study are rational and address important aspects of fiscal policy and unemployment in Ethiopia.

a. Increasing government expenditures on labour-intensive and productive projects can effectively create jobs and stimulate economic growth. The focus should be on investments in infrastructure and other capital projects rather than excessive consumption expenditures. By restructuring spending patterns towards productive investments, the government can simultaneously boost output growth and reduce unemployment.

b. Diversifying revenue streams and enhancing the efficiency of the tax system can lead to increased tax revenues. This additional revenue can be utilized for public investment and other initiatives aimed at promoting economic growth and reducing unemployment. By tapping into Ethiopia's abundant resources and agricultural potential, the government can expand its revenue base and contribute to overall economic development.

c. Recognizing the positive relationship between population growth and unemployment, policies aimed at managing population growth through family planning measures can help alleviate unemployment pressures. By promoting family planning and providing access to reproductive health services, the government can mitigate the adverse effects of population growth on unemployment rates.

d. In General, the researcher recommends practical strategies for policymakers to address unemployment challenges in Ethiopia. By focusing on productive government expenditures, revenue diversification, and population management, the government can foster economic growth and create opportunities for sustainable employment generation.

References

African Economic Outlook. (2018). *African Economic Outlook 2018: Macroeconomic performance and prospects*. African Development Bank Group.

Abomaye-Nimenibo, T., & Inimino, E. (2016). Impact of fiscal policy on unemployment in Nigeria. *Journal of Economics and Sustainable Development*, 7(5), 72-80.

Abouelfarag, H., & Qutb, H. (2020). Government spending and unemployment in Egypt: An empirical study. *International Journal of Economics, Business and Finance Research*, 4(1), 21-30.

Abubakar, S. (2016). Fiscal policy and unemployment in Nigeria: A vector error correction model approach. *Journal of Economics and Sustainable Development*, 7(18), 109-117.

Aljandali, A., & Tatahi, M. (2018). The Impact of Global Financial Crisis on Islamic Banks' Profitability: Evidence from MENA Countries. *Journal of Economic and Administrative Sciences*, 34(1), 11-28.

Anaele, S., & Nyenke, A. (2021). Public expenditure and unemployment in Nigeria. *International Journal of Business, Economics and Management*, 8(3), 119-131.

Attamah, C. O., Anthony, A., & Ukpere, W. I. (2015). The relationship between public expenditure and unemployment rate in Nigeria. International Journal of Economics, Chen, J. (2017). Corporate tax reduction and unemployment: Empirical evidence from China. *International Journal of Economics, Commerce and Management*, 5(6), 77-84.

Ejemeyovwi, J. O., & Alege, P. O. (2021). Fiscal Policy and Unemployment in Nigeria: A Keynesian Perspective. *CBN Journal of Applied Statistics*, 12(1), 35-55.

Emeka, N. (2018). Government deficit and unemployment in Nigeria: A vector error correction model. *Journal of Economics and Sustainable Development*, 9(11), 103-113.

Holden, S., & Sparrman, V. (2013). Government purchases and unemployment in OECD countries. *Review of Economic Dynamics*, 16(2), 332-352.

ILO. (2018). *World Employment and Social Outlook: Trends 2018*. International Labour Organization.

Kaliontzakis, P. (2015). Income tax and unemployment in Greece: An empirical investigation. *International Journal of Economics, Commerce and Management*, 3(1), 1-14.

Kassab, S. (2015). The relationship between income tax and unemployment in Tunisia: An empirical investigation. *International Journal of Economics, Commerce and Management*, 3(9), 1-16.

Keynes, J. M. (2018). *The General Theory of Employment, Interest, and Money*. Macat International Ltd.

Matsumae, T., & Hasumi, R. (2016). Government spending and unemployment in Japan: A VAR Maku, O. E., & Alimi, O. Y. (2018). Fiscal policy and unemployment rate in Nigeria: An econometric analysis. *Journal of Economics and Sustainable Development*, 9(2), 46-55.

Muammil, A. (2018). Fiscal policy and unemployment in Pakistan: An ARDL approach. *Journal of Economic and Sustainable Development*, 9(11), 18-29.

Murwirapachena, G., Ojewumi, K., & Nuhu, A. (2013). Impact of fiscal policy on unemployment in South Africa. *European Scientific Journal*, 9(33), 235-253.

Nwosa, P. I. (2014). Government spending and unemployment in Nigeria: Evidence from ARDL bound testing approach. *European Scientific Journal*, 10(6), 379-398.

Obayori, J. B. (2016). Fiscal policy and unemployment in Nigeria: An ARDL bounds testing approach. *International Journal of Economics, Commerce and Management*, 4(6), 110-124.

Tagkalakis, A. (2013). Fiscal policy and unemployment: New evidence from Greece. *Economics Letters*, 118(1), 39-42.

Udeze, C. C., & Obi, O. (2020). Impact of fiscal policy on urban unemployment in Nigeria: A cointegration approach. *Journal of Business and Economic Management*, 8(4), 42-52.

World Bank. (2017). *World Development Report 2017: Governance and the Law*. World Bank Publications.