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RESEARCH ARTICLE

ANALYSIS OF IMPACT OF INFLATION AND ECONOMIC GROWTH ON UNEMPLOYMENT IN ETHIOPIA

***Takele Wogari Irge**

Nekemte, Ethiopia

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ABSTRACT

The study examined the impact of inflation on unemployment Ethiopia; for the period 1991-2018. Cointegration test, Error Correction Model (ECM) technique and Granger causality test were employed in the analysis. The variables utilized in the investigation include inflation rate, external debt and unemployment rate. Stationarity test was conducted and the results indicated that all the variables except Inflation were stationary at first difference; however, inflation became stationary at level. The cointegration test result revealed that long run relationship exists among the variables under study. More so, ECM result showed that inflation has negative and significant impact on unemployment. Finally, the Granger causality results indicated unidirectional relationship between unemployment and inflation with causality running from inflation to Unemployment. Using this approach, the researcher find evidence of a long-run relationship between unemployment rate and inflation. Based on the findings above, the study therefore, recommends the need for the government to put in place policies that control inflation toward sunemploymentreduction.

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INTRODUCTION

The three Major Macroeconomic policy objectives are to achieve a sustainable economic growth with a low rate of inflation and low unemployment. Unemployment is a serious problem in most developing countries affecting growth and development. In developing nations, it leads too many undesirable social consequences in the country. For instance, crimes such as theft and burglary, suicide, assassination and a threat to the national security etc. It is a social, political as well as the economic challenge to the country. Joblessness leads to the wastage of human resources, robbery, theft, terrorism, mental illness like depression as well as murder, (Murugan, 2013). At world, unemployment continues to increase in both developing and the developed nations. Around 42 per cent of workers (or 1.4 billion) worldwide are estimated to be in vulnerable forms of employment, while this share is expected to remain particularly high in developing and emerging countries, at above 76 per cent and 46 per cent, respectively In 2017. Similarly over 192.7 million people were unemployed in the world, a figure that is 31 million more individuals that were unemployed before the financial crisis in 2007 (ILO, 2017). High level of unemployment shows the failure of a country's economy to use its labour resources effectively.

According to (Umo, 1996).factors explaining unemployment are such as a low level of general economic activity, recession, inflation, rapid changes in technology, disability, willingness to work and discrimination etc. The relation between unemployment and inflation has got high concern by most of economists. Some of them were believed that there was a trade-off between the two. On the other hand, a lower unemployment rate could be had by tolerating a higher rate of inflation. Where, some economists were defining employment for everyone who wants a job as full employment. However, some would argue that the lowest rate of unemployment consistent with a stable rate of inflation is full employment. This rate is said to be the natural rate of unemployment. The inverse relationship between inflation and unemployment rate as expressed by Phillips curve is only a short-term relationship i.e., unstable, because it prevails for a limited period of time and there are factors which lead Phillips curve to another situation, and the major factor that leads to instability is unexpected inflation where the real wage for workers is declining, which motivates them to demand higher nominal wage, as a result the business reduces its demand for labor, which increases unemployment. This unexpected inflation is leads to be an increase in the unemployment rate. Unemployment Rate in Ethiopia increased to 19.10 percent in 2018 from 16.90 percent in 2016. Unemployment Rate in Ethiopia average increase to 19.54 percent from 1999 until 2018, reaching an all-time high of 26.40 percent in 1999 and a

**Corresponding author: Takele Wogari Irge*
Nekemte, Ethiopia

record low of 16.80 percent in 2015. The study was organized under five (5) chapters. Chapter one covers the introductory aspect of the study which highlights the statement of the research problem, objective of the study and significance for the study. Chapter two reviews the literature on the subject area. Both theoretical and empirical studies were reviewed. Chapter three covers the methodology of the study whilst estimation and empirical analysis of the results of the model estimated are dealt with in chapter four. Chapter five covers, conclusion and recommendations for policy makers.

Statement of problem: Unemployment and inflation are critical issues today in developing countries including Ethiopia. In examining, inflation and unemployment relationship around the world, many studies have proved the existence of conflicting relationship between inflation and unemployment; some studies revealed a positive relationship while others showing a negative relationship. These include the works of Chang and Juan (2012), Umair & Ullah (2013), Arnold (2008), Asif & Aurangzeb (2013), Tunah (2010) and El-Agrody et al. (2010) among others. The study by Tunah (2010) carried out on the macroeconomic variables which cause of unemployment for Turkey.

He used Quarterly data from 2000 to 2008 is used as the sample data for the study. Augment Dickey Fuller test (ADF), Phillip-Perron test, Johansen's cointegration, and granger causality techniques were used for analysis. The study revealed that there is a significant impact on real GDP, consumer price index and previous unemployment rate on the unemployment rate. On the other hand real effective exchange rate has no impact on the unemployment. El-Agrody et al. (2010) examined the study of unemployment and its impact on the Gdp for Egypt. The study indicates that there is a significant positive impact of national unemployment, national investment, exchange rate and average per capita share of Gdp on the volume of Gdp. Chang-Shuai and Zi-Juan (2012) revealed that unemployment affected growth negatively while inflation affected positively growth in China. The study also revealed no causation between unemployment and inflation, but there is causation between unemployment and growth, while two-way causation existed between inflation and growth. Arnold (2008) revealed that there exists an inverse relationship between the rate of inflation and the level of unemployment, such that when the inflation rate is high, unemployment is low and vice versa. Asif & Aurangzeb (2013) Analyzed factors affecting unemployment rate in Pakistan, India and China. The study reveals that GDP, inflation and exchange rate have significant impact on unemployment. The relation of GDP and unemployment is found positive in case of Pakistan. However, a good deal of research work has been carried out on unemployment and inflation worldwide, but not much has been carried out using the Ethiopian economy. In addition, currently with the introduction of new economic reforms by the new administration in the country after strong protests against the EPRDF government, policy measures are expected to be made to reduce the current high unemployment rate. This would be challenging for the government to maintain high economic growth with the reduction of unemployment rate and keep inflation below two digits. Due to this researcher was motivated to examine

the empirical support for the relationship between inflation and unemployment in Ethiopia.

Objectives of the study

General objective of study: The general objective of the study is to examine the effects of inflation on unemployment in Ethiopia:

Specific objective: The specific objectives of the study are:

- To assess the inflation and unemployment trends.
- To investigate the long-run and short-run relationship between inflation and unemployment in Ethiopia
- To examine the causality between inflation and unemployment in Ethiopia

Research hypothesis

Based on the objectives, the following hypotheses were developed.

H1: There is long-run and short run relationship between inflation and, unemployment in Ethiopia

H2: There is a causal relationship between inflation and unemployment and unemployment in Ethiopia

Significance of the study: Such macroeconomic studies are very essential to macroeconomists, financial analyst, academicians, policy makers and central bankers' officials in understanding the impact of inflation and economic growth to the change in unemployment level and thus come up with the relevant policies so as to keep unemployment at the reasonable rate that stimulate production.

Scope and limitation of the study: The overall scope of the study being too large requires more detailed research; as the secondary data under study is for last 28 years only. The study is carried out on limited determinants where as more determinants may be included to have wide and in-depth analysis in future. Therefore, in this study, time series data were used. The studies were capture the annual period 1991 to 2018. The scope is limited to period (1991 to 2018) as a result of sufficient availability of data.

REVIEW OF RELATED LITERATURE: One of the main concerns of many countries in both the developed and developing is the relationship between inflation and unemployment in recent times. To many economists the relationship between inflation and unemployment has always seemed to be a great worry. When there is even a less chance for inflation in a particular period, economist still finds it very possible so far as unemployment rate falls below a certain level. According to Derek Stimel, (2009) many economists argue that both inflation and unemployment at low levels unsustainable for a long period and eventually, inflation likely to rise. Various theories have tried to examine the relationship of inflation and unemployment where different conclusions have being drawn. For instance, the monetarists are of the view that inflation prevents the actual functioning of an economy where as the structuralists are also of the view that inflation is a necessary condition and good for growth. Policy makers are mostly faced by the dilemma of a tradeoff between choosing unemployment and inflation considering the policy the

economy place more priority on at a particular point in time. However there is considerable tradeoff between unemployment and inflations The Phillip's curve view. A study by Karahan (2012) deals with the relationship between inflation and unemployment in Turkey; by using monthly time series data between the periods of 2006 to 2011. The time series data used monthly for both inflation and unemployment which resulted in total of 70 observations. After several analysis, Karahan study came yield that, the stable trade-off between inflation and unemployment which is proofed by the Conventional Philips Curve only existed in the short-run but when the ARDL was used to quantitatively analyze the relationship between inflation and unemployment between the year 2006 to 2011 in turkeywas not the case in the long-run. Khan, Khattak and Hussain (2012) investigated the inter-relationship of Gross Domestic Product Growth and Unemployment in Pakistan. They study by using the time series data from the time period of 1960 to 2005.at the beginning they used the Augmented Dickey-Fuller (ADF) test, the results shows all the variables are stationary on first difference then they used the Johansen Co-integration test. Their results revealed that 1% increase in GDP will reduce unemployment 0.63%. In the other way 1% decrease in unemployment will increase the GDP growth by 7.25%. The result also intimates that GDP Growth in long run has negative relationship with Unemployment in long run.

Study by Zabihi and Lotfi (2012) estimated and examined unemployment rate along with inflation and potential output growth. A new method covering Okun's Law Equations and Phillips Curve was provided using unobserved components model. In this method, unobservable key economic variables were logged as random unobserved processes in a system with three variables of unemployment, output growth and inflation. A study revealed that constantly negative relationship of output gap with deviation of unemployment rate from the unemployment rate with respect to inflation. In addition, business cycles had a negative impact on unemployment and inflation. In other words, production will be maximized without any inflationary pressure if actual unemployment rate reached the unemployment rate with regard to inflation. Chinweuba (2015) conducted a study on the relative impact of inflation and unemployment on economic growth in Nigeria with the data covering 1980-2013 periods. In the study, Johansen cointegration analysis and Granger causality test were utilized as econometric analysis methods and the results showed that there is a long-run equilibrium relationship between unemployment, inflation and gross domestic growth in Nigeria. Dumitrescu-Hurlin (2012) panel causality test results have indicated that there exists statistically significant bidirectional causality between inflation and youth unemployment and also between economic growth and youth unemployment. These results, indicates that inflation and economic growth substantially affect youth unemployment and the direction of the effect is negative on youth unemployment. Using the full-employment model, the study by Desta (2009) revealed that it is possible to assume that if a nation achieves full employment, economic growth is likely to precipitate an inflationary situation. Since the 10 percent increase in nominal GDP cannot keep pace with a 40 percent inflation rate, the acceleration of economic growth seems to be overstated.

RESEARCH METHODOLOGY

Research Design: The study uses annual time series data for the period 1991 to 2018. Inflation data were sourced from the

national Bank of Ethiopia. The study used real Gross Domestic Product (GDP) and consumer price index in Ethiopia as a proxy for economic growth and inflation respectively, sourced from the national bank (NB). Other variables used as control variables in the study were external debt and interest Rate all sourced from the World Bank. By using Eviews-9 for the analysis of the data because it is the most comfortable for time series analysis than STATA and SPSS. The data will be presented by using graphs, charts and tables.

Model Specification: This paper adopts Maqbool et al., (2013), Ali and Rehman (2015) and Aqil et al., (2014) which have focused on the impacts of different Economic and social factors in determining the unemployment. This study is following their methodology hence present models become as and modified it to incorporate economic growth proxy by the real GDP growth and inflation proxy by consumer price index as the independent variables while unemployment as dependent variable.

$$UNEMPL_t = f(RGDP, INFL, INTR, ED,) \quad (3.1)$$

Where: UNEMPL = unemployment rate (%)

RGDP= is real the Gross Domestic Product

INF = inflation (consumer prices index %)

ED = external debt (Debt disbursed excluding grants, \$ Million)

INTR=Interest rate

In order to examine the relationship between inflation, economic growth and unemployment the study will use multiple regressions where the dependent variable (UNEMPL) will be regressed against independent variables (RGDP, Infl, INTR, ED,). This model was specified as follows: The model is transformed into log-linear form, which is expressed as

$$\ln unempl = a + \beta_1 \ln infl + \beta_2 \ln ED + \epsilon_t \quad (3.2)$$

; The β represent the parameters of the independent variables, a constant and ϵ_t the error term. This model implies that the unemployment rate will negatively or positively be related to external debt, Negatively to Inflation Rate. The expected Signs from the regression equation to be estimated will be as follows.

A priori Expectations

$$\beta_1 < 0 \quad \beta_2 > 0$$

Estimation Procedure: Methodological approach of the study includes the following steps:

First, the test of stationarity of the individual series in the regression model or otherwise to determine the order of integration of the variables. Second, the test of the existence of a stable long-run equilibrium relationship between the variables and third, the estimation of the parameters of the model. To estimate equation, the stability properties of the variables employed will be first investigated. Two-unit root tests will be used in the study, i.e. the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP). The choice of two unit roots is informed by the imperatives of comparison and consistency. According to Hamilton (1994), the PP unit root test is generally considered to have a greater reliability than the ADF because it is robust in the midst of serial Correlation and heteroscedasticity, though it has its own shortcomings.

Unit Root Testing (Stationary Test): The time series data were tested for stationarity. To perform the unit root tests for the variables; real GDP, Inflation rate, interest rate, external debt and unemployment rate, this study used the Augmented Dickey-Fuller (ADF) technique and philipherron test. These tests are employed concurrently for robust results.

Estimation techniques and ARDL Modeling approach: After unit root tests, the next step is to use the ARDL approach, developed by Pesaran et al. (2001) in order to investigate the long-run relationship between the examined variables. Variables in time series analysis are classified as co-integrated if they exhibit long-run equilibrium relationship and share common trends. Considering the nature of the study, it is relevant to employ Autoregressive Distributed Lag (ARDL) bounds testing due to Pesaran and Shin (1999) and further extended by Pesaran, Shin and Smith (2001). This approach is based on the estimation of an Unrestricted Error Correction Model (UECM) which enjoys several advantages over the conventional type of cointegration techniques. First, it can be applied to a small sample size study. Secondly, it estimates to both short and long run components of the model simultaneously; removing problems associated with autocorrelation and omitted variables.

The ARDL models that are used in this study are shown below

$$\Delta LNUNMPL_t = B_0 + \sum_{i=1}^p a_i \Delta lnu nmpL_{t-1} + \sum_{i=1}^r \partial_i \Delta inf_{t-1} + \sum_{i=1}^m \alpha_i \Delta lned_{t-1} + B_1 lnu nmpL_{t-1} + B_3 INF_{t-1} + B_4 lned_{t-1} + e_t \quad 3.6$$

Where $B_0, a_i, \partial_i, \forall i, \alpha_i, \phi_i, B_1, B_3, B_4$, are parameters to be estimated and e_t is assumed to be white noise error. The test for cointegration using the bound test approach is based on the Wald test.

Error Correction Model: After the test of cointegration, the long-run relationship among the variables is established using the ARDL test for cointegration. The error-correction models (ECM) within the ARDL framework were estimated in order to obtain the short run and long run relationships among the economic variables understudy.

Lag selection criteria: In order to carry out ARDL estimation, the choice of lag length is vital. There is various lag length criteria, among them; Akaike information criterion (AIC), Sequential modified LR test statistic with each test at 5%, the Final prediction error (FPE), Schwarz information criterion (SC) and the Hannan-Quinn information criterion (HQ). However each of these has different penalty factors. For the purpose of this study, we therefore limit the selection to Akaike information criterion (AIC) and Schwarz information criterion (SC).

Stability Test: According to Pesaran and Shin (1998) the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) are employed in performing parameter stability test. The stability of the model and the coefficients are checked through the CUSUM and CUSUM-Q, while the graphical presentation of the recursive coefficients is used to judge the stability of the coefficients.

Diagnostic tests: The model that has been used for testing the long-run relationship and coefficients is further tested 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.

Granger-Causality Model: The study adopted the multivariate vector autoregressive (VAR) model to determine causality between inflation rate, economic growth and Unemployment rate.

$$UNMPL_t = a_0 + \sum_{i=1}^q a_i UNMPL_{t-i} + \sum_{j=1}^q c_j INFL_{t-j} + e_{1t} \quad (3.10)$$

$$INFL_t = B_0 + \sum_{i=1}^q B_i INFL_{t-i} + \sum_{j=1}^q a_j UNMPL_{t-j} + e_{2t} \quad (3.11)$$

$$RGDP_t = a_0 + \sum_{i=1}^q a_i RGDP_{t-i} + \sum_{j=1}^q c_j UNMPL_{t-j} + e_{1t} \quad (3.12)$$

$$UNMPL_t = B_0 + \sum_{i=1}^q B_i RGDP_{t-i} + \sum_{j=1}^q a_j UNMPL_{t-j} + e_{2t} \quad (3.13)$$

Where,

INF_t = Inflation rate measured as Consumer Price Index (CPI) annual change rate

UNMPL = Unemployment rate

RGDP_t = Economic growth measured as the real Gross Domestic Product (GDP)
 e_{1t}, e_{2t} = error terms

ANALYSIS OF DATA AND DISCUSSION OF EMPIRICAL RESULTS

Econometrics Analysis

ADF and PP Unit Root Test: Before carrying out the ARDL bounds test, stationarity properties of all the variables in the model is to be determined to know the order of integration for each variable. This is a necessary step to ensure that variables are not second-order stationary (i.e., I (2)). According to Ouattara (2006), the calculated F-statistics which Pesaran et al. (2001) provide are not valid in the presence of I (2) variables, since the bounds tests are based on the assumption that variables are either I (0) or I (1). Consequently, the use of unit root tests in the ARDL procedure may still be needed to make sure that none of the variables is integrated of order 2 or beyond. The results from the ADF unit root tests are hereunder tabulated: The result from augmented dickey fuller and Phillip –perron indicates that real gross domestic product, unemployment rate and external debt are integrated of order one I (1) while inflation rate and interest rate are integrated of order zero I (0). Having determined that the orders of integration of the variables retained in the model are either 0 or 1, the ARDL bounds test can then be easily applied to determine the cointegration relationship among the variables in the model. After the lag of the model was chosen, the test for cointegration between Inflation, Economic growth and unemployment using the ARDL model was performed. Thereafter, the diagnostic tests for normality, serial correlation, heteroscedasticity on the model were performed.

ARDL Cointegration results: To test whether long-run relationship between INFL, ECG and UNMPL exists or not, the study used Autoregressive Distributed Lag (ARDL). The result of bound test for cointegration in table 4a indicates that

Table 4.2a. Augmented Dickey Fuller Test results

Variable	At Level			At First Difference		
	Intercept	intercept and trend	none	intercept	intercept and trend	None
LNUNMPL	-4.022953	-3.129942	-0.016210	-2.077818	-2.273330	-2.060027*
INFL	-5.223948 *	-5.703810	-1.282809	-5.547781	-5.397205	-5.696591
LNRGDP	3.078193	-0.622489	3.82405	-4.704595 *	-5.559325	0.581662
LNED	-1.593241	-2.167731	-0.378351	-3.967378*	-3.965843	-4.050990
INTR	-3.543047*	-3.475240	0.197224	-5.584969	-5.612381	-5.579231

* indicates significant at 5%. Source: Author's computation from E-views 9.0

Table 4.2b. Phillips-Perron (PP) Unit Root tests at level and at first difference

Variable	At Level			At First Difference		
	Intercept	intercept and trend	none	intercept	intercept and trend	None
LNUNMPL	2.085534	-1.791866	0.276206	-2.103412	-2.308724	-2.081487*
INFL	-5.223948 *	-5.700080	-4.001328	-13.59244	-12.93452-	13.94794
LNRGDP	6.119077	-0.172321	3.824058	-4.704595 *	-6.095208-	3.248055
LNED	-1.593241	-2.167731	-0.378351	-3.967378*	-3.965843	-4.050990
INTR	-3.532719*	-3.460233	0.260202	-5.584969	-5.596944	-5.579231

* indicates significant at 5%.

Table.4.3. VAR order lag selection criteria (max=3)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-178.2894	NA	1.606376	14.66315	14.90693	14.73077
1	-70.17022	164.3412	0.002181	8.013618	9.476269	8.419295
2	-21.28507	54.75137*	0.000425	6.102805	8.784332	6.846547
3	18.96774	28.98202	0.000296*	4.882580*	8.782983*	5.964386*

* 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

Table.4.4a. F bound test - Null Hypothesis: No long run relationship

Test Statistics	Value	Signif.	I(0)	I(1)
F	20.67	10%	2.2	3.09
		5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
K	4			

Table.4.4b. Long run coefficient of ARDL (2, 0, 0, 2, 2) model

Variable	Co-eff.	Std. error	T statistic	Prob
LNRGDP	-0.147005	0.047464	-3.097221	0.0074
LNED	-0.209820	0.092130	-2.277439	0.0378
INTR	0.164418	0.050848	3.233521	0.0056
INF	-0.015254	0.006164	-2.474612	0.0258
C	2.575643	0.720769	3.573463	0.0028

Table 4.4c. Error Correction Representation of the ARDL (2, 0, 0, 2, 2) model

ARDL model based on Akaike Information Criteria (AIC) Dependent variable: LNUNMPL				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\Delta(LNUNMPL(-1))$	0.169203	0.095458	1.772546	0.0966
$\Delta(LNRGDP)$	-0.036665	0.010062	-3.644100	0.0024
$\Delta(LNED)$	-0.052333	0.021259	-2.461612	0.0264
$\Delta(INTR)$	0.013149	0.007934	1.657281	0.1182
$\Delta(INTR(-1))$	-0.034636	0.003795	-9.125708	0.0000
$\Delta(INF)$	-0.001410	0.000672	-2.096902	0.0534
$\Delta(INF)$	0.001555	0.000623	2.495702	0.0247
$\Delta EC(-1)$	-0.249416	0.034515	-7.226239	0.0000
ECM = LNUNMPL - (-0.1470*LNRGDP -0.2098*LNED + 0.1644*INTR-0.0153*INF + 2.5756)				

Table 4.5a pairwise granger causality tests (lag 3).

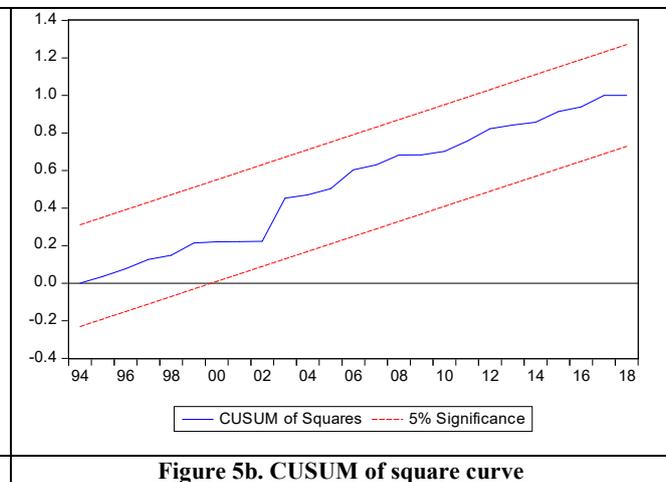
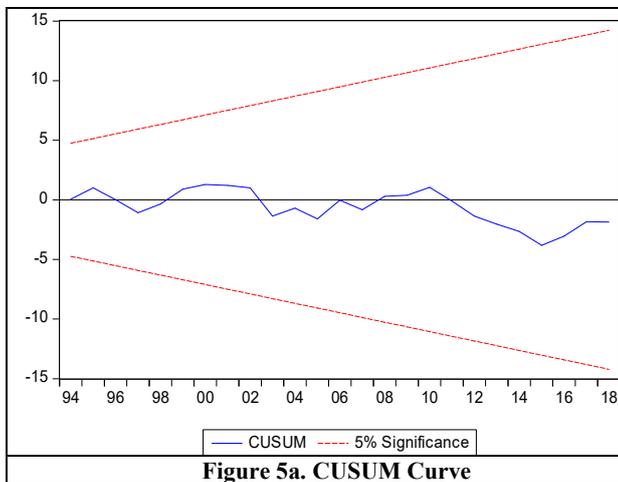
Null Hypothesis:	Obs.	F-Statistic	Prob.
LNRGDP does not Granger Cause LNUNMPL	24	4.84535	0.0104
LNUNMPL does not Granger Cause LNRGDP		0.32338	0.8579

Table 4.5b. Pairwise granger causality tests (lag 3).

Null Hypothesis:	Obs.	F-Statistic	Prob.
INF does not Granger Cause LNUNMPL	24	4.98360	0.0093
LNUNMPL does not Granger Cause INF		1.17890	0.3596

Table 4.6. Diagnostic tests result

TESTNULL Hypothesis	TEST Statistic	value	probability value
Ramsey Reset	1.5866780	2.284	
Breusch pagan test	0.31520	0.3621	
Jargue- Bera Test	0.8328720	0.6593	
Breusch- Godfrey test	0.72980	0.8526	



null hypotheses were rejected because the F- statistics (20.67) is greater than upper bound value (3.49) at 5 percent critical value. Therefore, there is long run relationship between inflation, unemployment and real GDP growth rate in Ethiopia. Similar study conducted by Khan, Khattak and Hussain (2012), Chinweuba (2015) observed showed that there is a long-run equilibrium relationship between unemployment, inflation and gross domestic growth in Nigeria. The coefficients of the variables were found to be statistically significant as seen from Table 4.4b. The results demonstrated that there was a long run relationship among the variables and Inflation, external debt and economic growth had negative impact on unemployment, while interest rate had positive impact on unemployment. There is a statistically negative relationship between inflation, GDP and the unemployment rate. The results show that increase in the GDP by 1 percent leads to 0.147 percent decrease in unemployment and this is significant at 1 percent significance level. Inflation rate has negative effect on unemployment. Result show that 1 percent increase in inflation rate leads to 0.015 percent decrease in unemployment rate. External debt has negative effect on unemployment. Result show that 1 percent increase in external debt leads to 0.2 percent decrease in unemployment rate and 1 percent increase in interest rate leads to 0.1 percent increase in unemployment rate. Table 4.4c shows short run coefficient results. Shows that, in the short run, inflation, external debt, Interest rate and economic growth has a Negative and significant impact on unemployment.

The results show that increase in the GDP by 1 percent leads to 0.036 percent decrease in unemployment. Inflation rate has negative effect on unemployment. Result show that 1 percent increase in inflation rate leads to 0.001 percent decrease in unemployment rate. External debt has negative effect on unemployment. Result show that 1 percent increase in External debt leads to 0.052 percent decrease in unemployment rate. The R² is 0.942383, meaning that 94.2% change in unemployment is explained by the inflation, external debt, Interest rate and economic growth. The Error Correction Term (ECT) measures the speed of adjustment towards equilibrium after the initial deviations are corrected. The ECT coefficient is -0.249416 and significant at the 5% level of significant. This indicates that at 24.9% of the dis-equilibrium due to the shock in the previous years is adjusted back to the long run equilibrium in the current year. To test whether the model has no problem and that the OLS assumptions have not been violated, diagnostic tests that include the normality test, serial correlation test, heteroscedasticity test and correct specification test were performed. The results of the diagnostic tests are shown in Table 4.5a. According to the results, the null hypothesis that there is no serial correlation was not rejected at 5% level of significance since the p-value (0.8526) is greater than 0.05. Similarly, the null hypothesis that there is no heteroscedasticity was not rejected at 5% level of significance since the pvalue (0.3621) is greater than 0.05. Also, the Jarque-Bera test shows that the residuals are normally distributed since the null hypothesis was not rejected at 5% level of

significance the p-value of Jarque-Bera statistic (0.6593) is greater than 0.05. In addition, the Ramsey's RESET shows that the model is correctly specified since the p-value (0.2284) of the F-statistic is greater than 0.05.

Stability Test: The stability test was conducted to determine the goodness of fit of the ARDL model. To check the structural stability is used two test that are Cumulative Sum and Cumulative Sum of Square. CUSUM test captures the systematic changes in regression coefficients while CUSUMSQ detain the departure of parameters from reliability. Graphical representations of CUSUM and CUSUM square are shown in figure 5a and 5b. According to Bahmani and Oskooee, (2004) the null hypothesis (i.e. that the regression equation is correctly specified) cannot be rejected if the plot of these statistics remains within the critical bounds of the 5% significance level. This graphs show the long run stability of the model because test statistics are within the bound values of a model for 5% significance level. As it is clear from Fig. 5a and 5b, the plots of both the CUSUM and CUSUM square. Within the boundaries and hence these statistics confirm the stability of the long run Coefficients of regressors. The graphs of statistical CUSUM and CUSUMQ are within the critical values at 5% significance level, which means that all the coefficients in ECM are stable.

Granger Causality Test Analysis: In many studies which examine causality, Granger Causality tests have been the most commonly used method. Based on the results presented in Table 4.2, hypotheses (a) (were rejected at 5% level of significance because their p-values are individually less than 0.05. But for the second null hypothesis was not rejected at 5% level of significance since the p-value is greater than 0.05. This means that during the period under study, there was unidirectional causality between an economic growth, inflation and unemployment because the null hypothesis that RGDP does Granger causes Unemployment was not rejected. This indicates there was causality between RGDP and unemployment at 5% level of significance, meaning that RGDP does Granger cause unemployment. These show that, within the sample of the study, there was unidirectional causality from economic growth to unemployment. Following the result in table above the null hypothesis that LN RGDP does not Granger because LN UNMPL is not rejected and that LN unmpl does not Granger Cause Lnr GDP is rejected and it is to conclude that there is uni-directional causality between economic growth and unemployment in Ethiopia. In the result shown above, the null hypothesis that INFL does not Granger because LN UNMPL rejected and that LN UNMPL does not Granger Cause INFL does not rejected, further confirming uni-directional causality exists between unemployment and inflation of Ethiopia.

Diagnostic Checking results: It is concluded that the model is normally distributed, correctly specified or not. free from misspecification. The conclusion is free from heteroscedasticity.

Conclusions and policy recommendations

Conclusions

The present study investigates whether fundamental macroeconomic variables affect the Unemployment in Ethiopia or not. The bounds test confirms that there exist long-run

relationships between inflation, economic growth and unemployment in Ethiopia. The long-run estimates of ARDL test showed negative and significant relationship exists between economic growth, inflation and unemployment. Inflation, external debt and economic growth have a negative and statistically significant impact on unemployment in the long run. Interest rate has positive and significant impact on unemployment in the long run. The negative impact of inflation and economic growth on unemployment is in line Philip's curve and Okun's law which believed that the unemployment is inversely related with both variables. The empirical findings were consistent with Ola- David and Oluwatobi (2012) and the researcher found that there was negative long-run relationship between unemployment and economic growth. Also the study found that there was a negative long run relationship between unemployment and inflation in line to Liu (2008) and Zaman et al (2011). On the other hand, study found that there was a positive long-run relationship between unemployment and interest rate same as Berument et al. (2008). Generally Regression results confirm both Okun's Law and Phillips Curve in the Ethiopia – that is, economic growth is negatively influence unemployment and also inflation negatively influences unemployment.

To determine the direction of causality granger causality is used in the study the result shows that there exists both short run and long run unidirectional causality running from, Economic growth (RGDP) and inflation to unemployment in Ethiopia. In Similar to Kargi (2014) and Sa' iduet al. (2015) the studies the result of causality test suggests that unemployment does not granger causes economic growth and inflation, but economic growth and inflation Granger cause unemployment. Therefore, the result suggests a one-way causation flowing from inflation and GDP to unemployment.

Policy Implication

- The finding implies that, economic growth has negative impact on unemployment in a country this show when the real GDP will raise it will help unemployment to decrease. It recommends that the government should put in place policy that helps with greater productivity towards reducing unemployment.
- The study reveals that inflation has negative influence on Unemployment. Thus the government of Ethiopia should emphasis on inflation rate to reduce the unemployment rate. The implication of the result implies that effort should be made by the policy makers to identify potential economic sectors that have capacity to ensure a creation of more job opportunities and activities in the economy which will therefore lead to a reduction in unemployment and the prices of commodities in their economies.
- Given that external debt had negative impact on unemployment in Ethiopia implies that an increase in it will lead to decrease the unemployment rate these implies that the government continues to properly utilize external debt by investing on selective and productive investment, including basic infrastructural developments that facilitate the productivity of different sectors of the economy. The productivity of economy in turn reduce unemployment.
- Since the study found a positive relationship between unemployment and interest rate in the national bank of Ethiopia should formulate and implement monetary

policies that encourage investments to reduce unemployment.

List Of Acronyms and abbreviations

ARDL	Autoregressive Distributed Lags
FDI	Foreign Direct Investment
GDP	Gross domestic product
GNP	Gross national product
IMF	International monetary fund
OECD	Organization for Economic Cooperation and Development
NAIRU	non-accelerating inflation rate of unemployment
ILO	International labour organization
CUSUM	Cumulative sum control chart
NBE	National Bank of Ethiopia
MOFED	Ministry of finance and economic development
ECM	Error Correction Model
VECM	Vector error correction model
WB	World Bank
WDI	World Development Indicator

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