European Business & Management
2022; 8(6): 106-123
http://www.sciencepublishinggroup.com/j/ebm
doi: 10.11648/j.ebm.20220806.11
ISSN: 2575-579X (Print); ISSN: 2575-5811 (Online)

An Econometric Analysis of Impact of Inflation and Economic Growth on Unemployment in Ethiopia

Takele Wogari

College of Business and Economics, Wollega University, Nekemte, Ethiopia

Email address:
obsumaanwaangaarii@gmail.com

To cite this article:
Takele Wogari. An Econometric Analysis of Impact of Inflation and Economic Growth on Unemployment in Ethiopia. *European Business & Management*. Vol. 8, No. 6, 2022, pp. 106-123. doi: 10.11648/j.ebm.20220806.11

Received: October 11, 2022; **Accepted**: November 22, 2022; **Published**: January 9, 2023

Abstract: The study examined the impact of inflation and economic growth 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 real gross domestic product (RGDP), inflation rate and unemployment rate. Stationarity test was conducted and the results indicated that all the variables except LNUNMPL and LNED were stationary at level; however, LNUNMPL and LNED became stationary after first differencing. The cointegration test result revealed that long run relationship exists among the variables under study. More so, ECM result showed that RGDP and inflation has negative and significant impact on unemployment. Finally, the Granger causality results indicated unidirectional relationship between UNEMP and RGDP, as well as between unemployment and inflation with causality running from RGDP to UNEMP and from inflation to UNEMP Based on the findings above, the study therefore, recommends that government should as a matter of urgency create more employment opportunities to absorb the teeming population of the unemployed labour force in the country through modernization of the agricultural sector, bring in modern equipment in the facilities of agriculture to make the sector more attractive to all citizens despite one's qualifications and profession, as that alone would go a long way in reducing unemployment level in the country.

Keywords: Economic Growth, Unemployment, Cointegration, ARDL

1. Introduction

1.1. Background of the Study

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. It is more evident in developing nations and it gives birth too many undesirable social consequences in the country e.g. 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, [26]. Globally, unemployment continues to increase in both developing and the developed nations. In 2014, over 201 million people were unemployed in the world, a figure that is 31 million more individuals that were unemployed before the financial crisis in 2007.

Unemployment is a very serious problem in Africa [38]. The need to avert the negative effects of unemployment has made the tackling of unemployment problems to feature very prominently in the development objectives of many developing nations high level of unemployment indicates the failure of a country's economy to use its labour resources effectively. There are various factors explaining unemployment, such as a low level of general economic activity, recession, inflation, rapid changes in technology, disability, willingness to work and discrimination.

The relation between unemployment and inflation has long held the attention of most economists. For some time, it was believed that there was a trade-off between the two that policymakers could exploit. In other words, a lower unemployment rate could be had by tolerating a higher rate of inflation. That notion is no longer widely held, at least as regards the long run. While minimal unemployment might seem a desirable policy goal, few economists would define

full employment as employment for everyone who wants a job. Instead, many would argue that full employment is the lowest rate of unemployment consistent with a stable rate of inflation. This rate is known as 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. So, unexpected inflation is accompanied by an increase in the unemployment rate.

The macroeconomic objectives which the government strives to achieve are the maintenance of stable domestic price level and full-employment. Macroeconomic performance is judged by three broad measures—unemployment rate, inflation rate, and the growth rate of output [37]. The long-run relationship between changes in the rates of GDP growth and unemployment is the rate of growth in potential output. Potential output is an unobservable measure of the capacity of the economy to produce goods and services when available resources, such as labor and capital, are fully utilized. The rate of growth of potential output is a function of the rate of growth in potential productivity and the labor supply when the economy is at full employment.

Economic growth is viewed as a significant instrument for reducing unemployment, poverty and to help improve the living standards of people. Bruno, A. and Ken, M. revealed that an increase in the growth rates of GDP is expected to increase employment levels thus reducing unemployment. This is a widely accepted economic theory, which is well documented through the theoretical proposition relating output and unemployment which is known as Okun's law [9]. Argues that Okun's Law describes one of the famous empirical relationships of output (GDP) and unemployment in macroeconomic theory and thus has been found to hold for several countries mainly developed countries.

Moreover, considering how unemployment is related to economic growth [13] assessed long-run effects of growth on unemployment, but while others attest significant relationship between growth and Unemployment, Bean and Pissaride [30] stated otherwise using OECD countries. In another dimension, Moreno-Galbis [24] explained that economic growth tend to decrease unemployment especially for individuals who absorbed training, but accelerate rate of unemployment for unskilled employees who seek not to train, establishing "creative destruction effect".

In the case of Ethiopia, several factors contribute to the causes of youth unemployment. Ethiopia's labor force is predominantly young), increasingly located in urban areas, and characterized by a low skill base, low productivity and widespread underemployment. While there has been strong economic growth since 2002, it is clear that long term trends remain insufficient to keep up with population growth and until now have not enabled significant reductions in poverty. Indeed in urban areas, the recent Poverty Assessment suggests that the poverty rate may have increased slightly, and job creation in off-farm activities has been slow [42]. Unemployment Rate in Ethiopia decreased to 16.80 percent in 2015 from 17.40 percent in 2014. Unemployment Rate in Ethiopia averaged 19.88 percent from 1999 until 2015, reaching an all-time high of 26.40 percent in 1999 and a record low of 16.80 percent in 2015. In 2018, unemployment rate for Ethiopia was 5.3% [42].

1.2. Statement of Problem

Unemployment and inflation are critical issues today in developing countries including Ethiopia. In examining economic growth, inflation and unemployment nexus around the world, many studies have proved the existent of conflicting relationship between economic growth and unemployment; with some showing a positive relationship while others showing an inverse relationship. These include the works of [26, 38], and [34] among others.

The studies by [11] 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. [38] Conducted a research on the effect of inflation on the growth and development of Nigerian economy and conclude that inflation affect economic growth negatively.

Arnold, R. A. 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 [6].

Asif, K. & Aurangzeb,. Analyzed factors affecting unemployment rate in Pakistan, India and China. The study concludes that GDP, inflation and exchange rate have significant impact on unemployment [7]. The relation of GDP and unemployment is found positive in case of Pakistan. Umair, M., & Ullah, R Use longitudinal study to find the impact of inflation on GDP and unemployment rate in Pakistan. The study finds insignificant influence of inflation on GDP and unemployment rate [37]. Maqbool. Et al found that rise in inflation reduces unemployment in Pakistan but this adjustment depends from previous period equilibrium [26]. The study suggests that by enhancing domestic industrial support policies may attract FDI as well. [21] analyzed inflation and interest rate for Jordan over the period of 1990 to 2012. Granger causality test results show bidirectional causality between inflation and unemployment, economic growth and budget deficit. The results show a weak positive relationship between inflation and interest rate, due to unfavorable economic conditions of Jordan over the estimated period.

Aqil, M. et al, Analyze the determinants of unemployment in Pakistan from 1983 to 2010. The study finds GDP growth and inflation has insignificant effects on unemployment

while population growth rate and FDI can reduce unemployment in economy [5].

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 and no study was conducted on Ethiopia as a developing country cannot escape from high unemployment rate due to the inability for people to find the required jobs of their educational qualification, issues of job selectiveness by graduates and rapid rural-urban migration. Also, most studies were conducted using old data and showed no consensus or clear elaboration in relation to whether economic growth and inflation substantially affect unemployment, hence the need of a research of this nature. Therefore, latest data is required to evaluate the nexus of inflation, economic growth and unemployment and these concluded researches have opened spaces for practical, empirical and methodological research gaps that warrant further research. 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, economic growth and unemployment in Ethiopia.

1.3. Objectives of the Study

1.3.1. General Objective of Study

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

1.3.2. Specific Objective

The specific objectives of the study are:

i). To assess the inflation, unemployment and economic growth trends.
ii). To examine impact of economic growth on unemployment.
iii). To examine impact of inflation on unemployment.
iv). To investigate the long-run and short-run relationship between inflation and unemployment in Ethiopia.
v). To examine the causality between inflation and Economic growth as well unemployment in Ethiopia.

1.4. Research Hypothesis

This study tries to identify the effect of inflation and economic growth on unemployment and also to determine the causality among the unemployment, GDP growth rate and inflation in Ethiopia. Based on the objectives, the following hypotheses were developed.

H0: economic growth has insignificant impact on unemployment in Ethiopia.

H1: Economic growth has significant impact on unemployment in Ethiopia.

H0: Inflation has insignificant impact on unemployment in Ethiopia.

H1: Inflation has significant impact on unemployment in Ethiopia.

H0: There is no long-run relationship between inflation, economic growth and unemployment in Ethiopia.

H1: There is long-run relationship between inflation, economic growth and, unemployment in Ethiopia.

H0: There is no short-run relationship between inflation, economic growth and unemployment in Ethiopia.

H1: There is a short-run relationship between inflation, economic growth and unemployment in Ethiopia.

H0: There is no causal relationship between inflation and unemployment as well economic growth and unemployment in Ethiopia.

H1: There is a causal relationship between inflation and unemployment as well economic growth and unemployment in Ethiopia.

2. Literature Review

This chapter is devoted to the theoretical and empirical literature on inflation, economic growth and unemployment. It is divided into three main sections. The first section explores the theoretical literature. The second section reviews empirical studies related to the subject of time series and finally conceptual framework of the study.

2.1. Unemployment

The term unemployment is defined by [4] as the total number of people who are willing and able to work, and make themselves available for job at the prevailing wage but no work for them. This therefore, implies that unemployment is a state of joblessness in the country. Unemployment is situation where by a worker is or workers are involuntarily out of work [8]. This means that workers are willing and able to work but cannot find any work. Also classical economists defined unemployment by the as the excess supply of labour over the demand for labour which is cause by adjustment in real wage. The Classical or real wage unemployment occurs when real wages for job are set above the market-clearing level, causing number of job-seekers to exceed the number of vacancies.

2.1.1. Economic Growth

Dickey, D. A. and Fuller, W. A. define Economic growth as an increase in capital per head [17]. Since per capital is not the only requirement for growth, this is because if capital is made available without at the same time providing a framework for its use, it will be wasted. Economic growth is defined by [9] as increase in output of an economy's capacity to produce goods and services needed to improve the welfare of the country's citizens. Also Growth is seen as a steady process which involves raising the level of output of goods and services in the economy. Growth is meaningful when the rate of growth is much higher than population growth because it has to lead to improvement in human welfare.

Therefore, growth is seen as a steady process of increasing the productive capacity of the economy and hence, of increasing national income, being characterized by higher rates of increase of per capita output and total factor productivity, especially labours productivity.

2.1.2. Inflation

Michael Bräuninger and Markus Pannenberg. Defined inflation is a rise in the general level of prices of goods and services in an economy over a period of time. When the general price level rises, each unit of currency buys fewer goods and services. Moreover, inflation also reflects erosion in the purchasing power of money a loss of real value in the internal medium of exchange and unit of account in the economy. A great measure of price level is the inflation rate, the annualized percentage change in a general price index normally the Consumer Price Index over time [27].

2.2. Theoretical Literature

The Okun's Law

Okun's law shows the relationship between unemployment and economic growth in an economy. The theory argued that unemployment has negative correlation with economic growth in any given economy. It believed that a percentage decrease in unemployment rate leads to 3 percent increase in economic growth [31]. When the growth rate of unemployment increases by 1% above the trend rate of growth, it can only result to 0.3% reduction in unemployment. In testing the validity of the theory [23] revealed that Okun's theory of unemployment indeed showed existence of inverse relationship between unemployment and economic growth. The validity of the theory was tested by employing US real GDP data and the result indeed supported the theoretical relationship of unemployment and economic growth.

More so, Michael Bräuninger and Markus Pannenberg stated that if real GDP performance increases by 3% and unemployment reduces by 0.3%, it implies that the increase in the real GDP performance for each percentage reduction in unemployment rate accounts for average 2% growth rate in real GDP of the country. The popularized Okun's law which states that a fall in unemployment rate to 1%, will result to an increase in output by 3%, gave an important conclusion that an economy should increase consistently to reduce unemployment, and that the growth of actual output must surpass that of the potential output. One should not overlook that Okun's law provides an important link between the labour and product markets. Okun's law is held to high esteem because of two most important economic variables which it buttressed to obviously related [27].

As [26]) reported, 'the literature has traditionally shown a negative relation between unemployment and growth.' Adebayo, A. argued that 'the fundamental inverse relationship between unemployment and growth has been known to economists for a very long time.' changes in GDP growth can cause asymmetric changes in the unemployment rate. [1]

In the difference version of Okun's Law, the changes in the unemployment rate from one quarter to the next moved with quarterly growth in real output and took the form: Change in the unemployment rate = a + b∗ (Real output growth) (1) This captures how output growth varies simultaneously with changes in the unemployment rate. The parameter b is often called "Okun's coefficient". As Knotek, further explained, "one would expect the Okun's coefficient to be negative, so that rapid output growth is associated with a falling unemployment rate and slow or negative output growth is associated with a rising unemployment rate. The ratio "–a/b" gives the rate of output growth consistent with a stable unemployment rate [22].

2.3. Phillips Curve

One of the main concerns of many countries both the developed and developing is the connection between inflation and unemployment in recent times. The real connection between inflation and unemployment has always seemed to be a great worry to many economists. 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.

Thus most economists argue that both inflation and unemployment at low levels unsustainable for a long period and eventually, inflation likely to rise [15]. Various theories have tried to examine the relationship of inflation and unemployment where different conclusions have being drawn. Putting across a well-known example, the monetarists are of the view that inflation prevents the actual functioning of an economy while 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. The Phillip's curve, a well-known theory is however is of the view that there is considerable tradeoff between unemployment and inflation.

The Phillips curve theory came about from experience of the United States in the 1960s where uncalculated rise in the prices reduces the real earnings of workers and prompting more employers to demand the service of more labors and reducing unemployment. The Phillips curve was by A. W. Phillips in 1958 and became a power tool that came to affirm the inverse relationship that existed between inflation and unemployment. Using Britain's experience for his work, the experience of US in the 1960s contributed much in support of the Phillips curve. According to Phillips, when supply on the labor market tightens, the unemployment level in the economy tends to fall because more labors are demanded. To entice workers, there is mostly an increase in wages which is mostly linked with an increase in prices. Thus unemployment becomes inversely related to inflation and vice versa [10]. It has therefore being realized that, the Phillips curve, which emphasize on the tradeoff between inflation and unemployment is mostly evident in the short run. In the long run, the Phillips curve becomes vertical at the natural rate of unemployment.

Following the introduction of the Phillips curve, economists for long accepted there was always a tradeoff that existed between the unemployment and inflation rates of an economy that can be exploited. But there came about in history where at a very low unemployment, inflation rather fell against normal expectation especially in the long run. This new situation experienced was dubbed as the "natural rate hypothesis" [10]. Now policy makers are seeking the actual rate of unemployment level that can affect policies of inflation.

Inflation tends to be a torn in the flash for many economies especially when it is at high levels because many policies designed to bring it down are mostly not readily seen. This brings short run economic cost to policies aimed at bringing down high inflation because as agreed upon by many economists, high inflation rates are better to avoid altogether. [10]. Many policy makers are also in search of activities and decisions that are most likely going to lead to an increase in inflation because most policies design to affect inflation only occur gradually and may even eventually get out of control for interventions of policy makers when the full force effect comes to play.

2.3.1. Traditional Philips Curve Theory

The original Phillips equation was explained by Marika et al (2006) as; whereas wage inflation, as the constant and unemployment as the coefficient. Some of the basic assumptions binding the traditional Phillips curve were the existence of a negative linear relationship between unemployment and wage inflation, a long run non-zero trade off which indicates a non-vertical Phillips Curve and thus no Non-Accelerating Inflation Rate of Unemployment (NAIRU) exists, presence of a competitive market and also taking into consideration that the structure of the economy does not change.

The traditional Phillips curve comes with a theory on how inflation is determined in an economy and that inflation is driven by unemployment in the traditional Phillips curve. It also discusses how to control the two variables without causing the other to move in the wrong direction. It therefore continues to suggest that, if policy makers are able to put stringent measures to control unemployment and output gap, the economy will be more stable [33].

2.3.2. Modern Phillips Curve

One of the most widely used structural models in modern times is the modern Phillips curve. In the modern Phillips curve, the current inflation is influenced by the by the next period expected inflation and also driven by the real marginal. Thus, it put emphasis on how important a future component is to the current variable and also the role played by the marginal cost as a driving force behind the variable in question.

The modern Phillips curve assumed that, there is the presence of adaptive expectation, rational expectation and inflation inertia, markets are also imperfectly competitive, wages and prices are sticky and that monetary policy could systematically affect output in the short run.

One of the most distinctive policy implications in most of the models featuring the modern types of Phillips curve is its optimality of price stability. A fully credible bank using the Phillips curve specification can bring about some drastic effect where disinflation arises but without causing a recessionary cost. This can only be the case when inflation is purely forward looking phenomenon. The modern inflation tends to provide a theory on how inflation is determined and suggest that the expected path of marginal cost is mostly caused by the short run dynamics of inflation [21].

The modern Phillips curve tends to contradict the view that, unemployment rate is as a result of inflation pressure but rather, the obvious thing to do is to look at inflation as it anticipates, measures and leads to almost every economic activity [33]. This modern Phillips curve thus points out that, inflation is hugely determined by expected future real marginal cost and not as conventionally defined where unemployment rates and output gaps are seen to be highly correlated to marginal cost. When monetary policy makers therefore stimulate or make economic decisions by lowering the level of interest rates, it affects demand. Firms to meet these high demand must employ more workers and wages are increased are increased to entice these new workers. These increases in wages tend to increase the marginal cost of the firm's production. This tells us that, monetary policy can end up being an inflationary process where prices of goods and services are increased due to this rise in marginal cost of firm.

2.3.3. Interpretation of the Phillips Curve by Keynesians, Monetarists and the New Classical

The main theory behind unemployment and inflation trade-off can be explained by what happens in the economy with an example of an increase in the aggregate demand. It is obvious that when the aggregate demand in an economy increases, there is an increase in the output level. This increases the demand for more workers while the economy moves towards full employment. There is however an increase in inflation, but because real GDP have increased and firms take in more workers, it leads to a decline in unemployment.

The most important and widely known group of economists on the theories of trade-off between unemployment and inflation are the Keynesians, monetarist and the classical. They hold different viewpoints on how they agree with, mostly the Phillip's curve and how practicality applies when the subject of discussion comes to play. Different views have enable improvement on the works of A. W. Phillip and various changes put in place to capture the controversial and technicality of the Phillip's curve when history at some point failed to agree with the theory.

2.4. Empirical Review Literature

Among numerous studies undertaken with regard to inflation, economic growth and unemployment, this work seeks to empirically look into some of these literatures which include; [23] embarked on a study which dealt with the

cointegration between inflation and unemployment in Turkey; he used monthly time series data between the periods of 2006 to 2011. This period was used because it was when the inflation target regime had been forced explicitly. The time series data was monthly for both inflation and unemployment which resulted in total of 70 observations. Stationary were checked for the various data after which cointegration analysis were proceeded. The ARDL test was used to cointegrate the variables which involves two stages that include, firstly, developing the Unrestricted Error Correlation Model (UECM) and finally the observation of co integration between the series were realized. The cointegrations were observed for both short-run and long-run to critically look at their trend. After several analysis, Karahan study came out that, the stable trade-off between inflation and unemployment which is proofed by the Conventional Philips Curve only existed in the short-run but was not the case in the long-run when the ARDL was used to quantitatively analyze the relationship between inflation and unemployment between the year 2006 to 2011 in turkey.

Kwam, A. studied the relationship between employment and economic growth in Nigeria, and the results showed that foreign direct investment, inflation and interest rate have positive relationship with employment rate in the economy [23].

Similarly, Aminu, U. and A. Z. Anono. examined the relationship between unemployment rate and productivity growth in Nigeria for the period between 1986 and 2010, using Johansen cointegration test and error correction model (ECM) technique. Stationarity test was conducted through the applications of the Augmented Dickey-Fuller (ADF) and Phillips-Perron unit root tests, and the results showed that all the variables were integrated of the same order at first difference. The results of the Johansen cointegration test indicated that long run equilibrium relationship exist among the variables under study [4].

Walters, Investigated the relationship between unemployment, inflation and economic growth in Nigeria. Using secondary data with OLS regression method, their results confirmed that interest rate and total public expenditure bares significant impact on economic Growth in the long run whereas on the contrary, inflation and unemployment has inverse effects on growth in the Nigerian economy. They clarify further that this increase is likely due to Interruptions in the supply chain of goods both from the domestic and foreign supply outlets other than the suspected aggregate demand pressure. The study concludes with a confirmative note on the existence of a causal linkage between inflation, unemployment and economic growth in the Nigerian economy recommending among others the need for government to improve the Macroeconomic policy instruments to the attainment of sustainable and enabling environment in Order to propel domestic output [41].

Rutayisire, Explored the existence of Philip curve in Pakistan. Granger causality test was employed on the data collected from Economic survey of Pakistan, world development indicators. The study shows that there is causal and long run relationship while there is permanent relationship between inflation and unemployment in the long run [32]. Aqil, Ali and S [33] conducted a study Pakistan to find out the factors that influence the level of employment. Time series data was collected on which correlation and multiple regression analysis was run. The results show that GDP and inflation have no significant impact on unemployment while FDI and population rate have significant and negative impact on unemployment.

Furthermore, in [34] study on the impact of inflation and unemployment on the Economic growth of Pakistan via the ARDL model approach found that a long run relationship.

Between the variables existed. Stober, E. Oinvestigated the existence of an Okun-type relationship for the Nigerian economy during the period 1970 to 2009. The results showed that a long run inverse relationship exists between unemployment and output in Nigeria. The Okun coefficient was 1.75 percent indicating that a one percent decrease in unemployment rate is accompanied by a 1.75 percent increase in GDP [35].

However, [34] tests the long run effects of economic determinants of youth unemployment in Kenya and he documents evidence supporting the negative relationship of foreign direct investment and external debt on youth unemployment. By contrast, in a country-specific study, [26] finds no statistical significant effect of external debt on unemployment in Pakistan. He further notes that funds borrowed by foreign lenders were not utilized appropriately. The estimation result of this study failed to determine the significant long run relationship between economic growth and unemployment level.

Teshome, [36] analyze the relationship between inflation and economic growth in Ethiopia using statistical analysis, even though the method he applies for the analysis is open to critique. Accordingly, he states that it is difficult to specify the exact relationship between inflation and growth. Moreover, inflation has a negative impact on unemployment and the causality test shows that there is no causation between unemployment and inflation. Also, the ARCH and GARCH revealed that the data exhibit a high volatility clustering.

Using the full-employment model, the study by [15] 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.

The study by [14] found the determinants of unemployment duration in urban Ethiopia and concludes that mean duration is 3 years for completed spells and 4.7 years for incomplete spells. According to [13] study on the characteristics and determinants of unemployment, underemployment and inadequate employment in urban Ethiopia, finds that the youth are characterized by relatively high unemployment which differs among the youth group across location, gender and education.

2.5. Conceptual Framework of the Study

These diagrams show the nexus between inflation, economic growth and unemployment. It indicates they can affect each other.

Variables

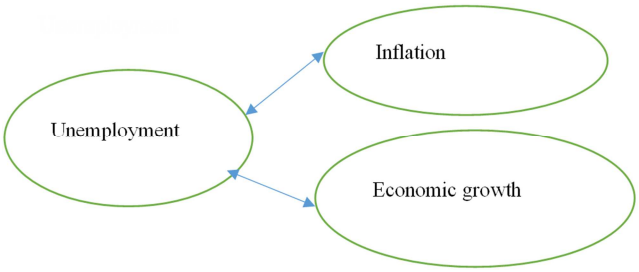
Independent Variable.

1) GDP

2) Inflation

Dependent Variable.

Unemployment.



Source: by author (2019).

Figure 1. *Conceptual framework.*

3. Research Methodology

This chapter provides a description of the methodology used to achieve the objectives of the study. It is further divided into six sections. Specifically, the first section presents data source and data type. The second and third sections present data analysis and discussions on specification of the model. The fourth section presents brief explanation of variables. The fifth section presents estimation strategy which entails unit root test, cointegration and error correction techniques, stability and diagnostic test procedures.

3.1. 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 unemployment, 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.

The time series data were tested for stationarity. [29] The consequence of using non-stationary time series data to specify a model gives spurious results; a phenomenon that was first discovered by Gujarati and Porter further warned that results from a spurious regression are misleading and cannot be used for testing hypotheses about the parameters and also impossible to generalize the behaviour of the time period under review. To perform the unit root tests for the variables; real GDP, Inflation rate, and unemployment rate, this study used the Augmented Dickey-Fuller (ADF) technique and philipherron test. Eviews-9 will be used 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.

3.2. Model Specification

This paper adopt [26, 5] 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 as the independent variables while unemployment as dependent variable.

$$UNEMPLt = f(RGDP, INFL, INTR, ED,) \quad (1)$$

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 establish 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

$$Lnunmpl = a + \beta 1\ Lnrgdp + \beta 2Infl + \beta 3\ INTR + \beta 4lNED + \varepsilon t \quad (2)$$

These are, INTR, the interest rate, and. The β represent the parameters of the independent variables, a constant and εt the error term.

This model implies that the unemployment rate will negatively or positively be related to economic growth rate, external debt, Inflation Rate and interest rate. The expected Signs from the regression equation to be estimated will be as follows.

$$B1 < 0\ \beta 2 < 0\ \beta 3 > 0\ \beta 4 < 0$$

A priori Expectations

In line with okuns law, economic growth is the parameter that to a large extent theoretically determines the unemployment rate. Thus economic growth is expected to have negative impact on unemployment rate. External debt is expected to foster growth and development.

Thus, external debt is expected to have negative sign mainly because this is expected to cause decrease in unemployment rate. Also, in line with Phillip's curve), an increase in the inflation rate will decrease unemployment rate. Thus the researcher expects the coefficient of inflation to be negative.

3.3. Definition and Measurement of Variables

3.3.1. Inflation (InfL)

Traditionally, inflation was understood as a general increase in the price levels or a situation of more money in the economy chancing fewer goods and services in the economy. That, it is not

just a general increase in price but a 'sustained' increase in the General Price level. Inflation as a measure of prices is an index charting changes in the prices paid by consumers. It is determined by comparing the price, in two different periods, of a fixed basket of goods and services. *Consumer Price Index (CPIt):* Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly it measures changes in the prices of basket of goods and services that households consume. A price index is usually given a value of unity, or 100, in some reference period and the values of the index for other periods of time are intended to show the average proportionate or percentage change in prices from this price reference period. CPI is expressed in averages of the year in the data. Inflation: Increase in general price level of goods and services over specific time period in an economy is called inflation.

3.3.2. Unemployment (UNMPL)

Unemployment is a situation in which persons of working age, able and willing to work are unable to find paid employment. It also means when people, who are qualified by age to work cannot find a job. The unemployment rate can be calculated or measured as unemployment divided by total labor force multiply by 100. That is, Unemployment = ((Number of Unemployed) / (Labor Force) x 100). Where, Labor force is the combination of employed and unemployed people who are qualify by age and able to work in country. That is, labor force is the people who are willing and able to work. The size of the labor force is used to determine the unemployment rate. The percentage of the unemployed in the labor force is called unemployed rate *Lf* is the labour forcerefers to the condition and extent of joblessness within an economy, and is measured in terms of the unemployment rate, which is the number of unemployed persons who are willing and able to work divided by the total civilian labor force. Hence, unemployment is the condition of not having a job, often referred to as being "out of work", or unemployed. The terms unemployment and unemployed are sometimes used to refer to other inputs to production that are not being fully used, for example, unemployed capital goods. unemployment as the number of people who are unemployed in an economy, often given as a percentage of the labour force. When people are actively seeking for a job but they are unable to find a work is called unemployment.

3.3.3. Economic Growth

Is a macro-economic variable used by economists to monitor economic progress [18] Economic growth is defined as the continued increase in the total production also known as Gross Domestic Product (GDP), which is a measurement of total output. Real Gross domestic product (RGDPt**)** is aggregate measure of the size of an economy adjusted for price changes. Gross domestic product (GDP) is the value of all final goods and services produced in the country for a given period of time measured in local currency. The market value of GDP depends on the actual quantity of goods and service produced, and their price. The actual quantity of goods produced some times is called the volume. Therefore, RGDP was used to capture the overall economic performance.

3.3.4. External Debt

External debt is that part of the total debt in a country that is owed to foreign citizens, firms and institutions. The debt includes money owed to private commercial banks, other governments, or international financial institutions such as the IMF and World Bank. External Debt leads to decrease in unemployment.

3.3.5. Interest Rate (IR)

Interest rate is the remuneration of asset lends to borrower or it may be the payment against the saving certificates of banks. Rate of interest directly affect the behaviour of consumers and producers. The consumers attempt to save more wealth by reducing consumption expenditures when rate of interest is at higher level. Increase in savings allows more credit availability for investment on one hand, while the reduction in consumption has negative effects on the sales of producers which in turn may increase the unemployment [24].

The rate of interest can be used as a policy variable to control exchange rate volatility and provides future expectations regarding inflation [6]. Increase in interest rate provides less incentive to investors which lead low investment and increase unemployment that can cause recession, while increasing the rate of interest causes decrease in inflation rate.

3.4. Estimation Procedure

Methodological approach of the study includes the following steps:

i) the test of stationarity of the individual series in the regression model or otherwise to determine the order of integration of the variables, ii) the test of the existence of a stable long-run equilibrium relationship between the variables and iii) 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 [20], 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. Johansen co integration test will also employ to test the long run relationship between the variables used in the model.

3.4.1. Unit Root Testing (Stationary Test)

In estimating parameters of a time series model, it is required that all data should be tested in order to determine the order of integration of each of the variables specified in the model. Testing for stationary before estimation is deemed necessary as most time series variables are non-stationary and estimations with these series might produce spurious results. Testing for stationary enables the researcher to determine the order of integration of the variables so as to choose an appropriate

estimator. The study opts for the use of the Augmented Dickey Fuller (ADF), Dickey-Fuller-GLS (DF-GLS) and the Phillip-Perron (PP) tests in carrying out the stationarity test. These tests are employed concurrently for robust results.

Augmented Dickey Fuller (ADF) Test

The ADF test developed [16] is an augmented version of the Dickey-Fuller (DF) test for more complicated and larger time series models. The augmentation term is included in order to change the residuals into white noise without altering the distribution of the test statistics under the null hypothesis of a unit root. The procedure of stationarity testing using the ADF is similar to that of the DF test but rather applied to a particular model as specified below.

$$\Delta Yt = \alpha + \delta t + \lambda Yt\text{-}1 + B1\Delta Yt\text{-}1 + \ldots + Bj\text{-}i\Delta Yt\text{-}j + 1 + \mu t \quad (3)$$

Simply,

$$\Delta Y_t = \alpha + \delta_t + \lambda Y_{t\text{-}1} + \sum_{t=1}^{j} B_1 \ \Delta Y_{t-1} + \mu_t \quad (4)$$

Where α is a constant term, δ is the coefficient of the time trend, j is the optimal lag length, Δ is the difference operator, t represents the time trend and μ represents the Gaussian white noise. The test for stationarity is carried out under the null hypothesis $\lambda = 0$ as against the alternative hypothesis $\lambda < 0$. After computation of the test statistic, it is then compared with the critical values. Therefore, if the test statistics is larger than the critical value, then the null hypothesis of $\lambda = 0$ is rejected implying that there is an absence of a unit root (stationary). Similarly, the acceptance of the null hypothesis implies that the series has a unit root and hence non stationary. In this case the test statistics is lesser than the critical values.

Phillips-Perron (PP) Test

An improvement of the ADF test is usually viewed as a DF test developed to cater for heteroscedasticity and autocorrelation. In light of this, [31] proposed a modification of the ADF test technique by non-parametrically correcting any heteroscedasticity and serial autocorrelation in the residuals. Specifically, the PP test tries to handle any deviations so as not to achieve white noise in the estimated model. The PP test is specified below;

$$\Delta Yt\text{-}1 = \delta 0 + yYt\text{-}1 + Vt \quad (5)$$

From the equation (3.14) the null hypothesis and alternative hypothesis are specified as $\hat{y} = 0$ and $\hat{y} \neq 0$ respectively. If the null hypothesis is rejected, then the variable in question is said to have no unit root and hence stationary, otherwise non stationary.

In relation to the PP test, it is not necessary to state a lag length in the test. Since the PP statistics has the same asymptotic distribution as the ADF t-statistics, the critical values are still used in this context.

3.4.2. Estimation Technique s and ARDL Modeling Approach

Since unit root tests have been applied, the next step is to use the ARDL approach, developed by [29] in order to investigate the long-run relationship between the examined variables. The bounds testing ARDL provide valid results regardless of whether the variables are integrated *I* (0) or *I* (1). In addition, compared with the other cointegration approaches, reduces the potential problems of autocorrelation and endogeneity in the model. Moreover, the ARDL approach provides effective and consistent results when the sample is small. Finally, a dynamic error correction model can be derived from the ARDL method through a simple linear transformation.

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 [29]. 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. Thirdly, the standard Wald of F-statistics used in the bounds test has non-standard distribution under the null hypothesis of no cointegration relationship between the examined variables, irrespective whether the underlying variables are I (1), I (0) or fractionally integrated [29]. Fourthly, this technique generally provides unbiased estimates of the long run model and valid t -statistics even some of the regresses are endogenous.

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

$$\Delta LNUNMPL_t = B_{o+} \sum_{i=1}^{p} ai \ \Delta lnunmpl_{t-1} + \sum_{i=1}^{q} \emptyset\, i \ \Delta lnrgdp_{t-1} + \sum_{i=1}^{r} \partial i \Delta inf_{t-1} + \sum_{i=1}^{n} \forall i \Delta intr_{t-1} + \sum_{i=1\propto_i}^{m} \Delta lned_{t-1} + B_1 lnunmpl_{t-1} + B_2 lnrgdp_{t-1} + B_3 INF_{t-1} + B_4 lned_{t-1} + B_5 intr_{t-1} + e_t \quad (6)$$

Where $B_o, ai, \partial i, \forall i, \propto_i, \emptyset_{i,} B_{1,} B_2, B_3, B_4, B_5$ 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. The Wald test hypothesis conducted was

$$H0: \beta 0 = ai = \partial i = \forall i = \propto_i = \emptyset_{i=} 0 \quad (7)$$

$$H1: \beta 0 \neq ai \neq \partial i \neq \forall i \neq \propto_i \neq \emptyset_{i,} \neq 0 \quad (8)$$

The F-statistic of the Wald test is compared with the two sets of critical value bounds developed by Perasan et al. (2001). The H0 is rejected 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 used in checking the existence of a long-run equilibrium among the variables under study. The null hypothesis for no cointegration among the variables is represented as H0: $\beta 0 = ai = \partial i = \forall i = \propto_i = \emptyset_{i=} 0$ while the alternative hypothesis is represented 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 included in the model are integrated of order zero I (0) or integrated of order one I (1), the number of regressors and whether the model contains a trend and/or an intercept. The test involves 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 generated. The lower bound critical values is the term used 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 computed F-statistics falls below the lower bound value I (0), the null hypothesis (no co-integration) will not be rejected. Otherwise, if the computed F-statistics exceeds the upper bond value, I (1), then null hypothesis is rejected which indicates that there is co-integration. If the computed result falls between the lower and upper bonds, the test is inconclusive.

3.4.3. 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 model (ECM) within the ARDL framework will be estimated in order to obtain the short run and long run relationships among the economic variables understudy.

A generalized form of the ECM within the ARDL frame work is represented below: This technique also allows for the introduction of optimal lags of both the dependent and explanatory variables. Implying that, various variables are allowed to have their optimal speed of adjustment to the equilibrium. A generalized representation of the ARDL model is shown Thus, equation (2) in the ARDL version of the error correction model can be expressed as equation (3): The error correction version of ARDL model pertaining to the variables in equation (2) is as follows where ∪ is the speed of adjustment parameter and EC is the residuals that are obtained from the estimated cointegration model of equation.

$$\Delta LNUNMPL_t = B_{o+} \sum ai\, \Delta lnunmpl_{t-1} + \sum \emptyset\, i\, \Delta lnrgdp_{t-1} + \sum \partial i \Delta inf_{t-1} + \sum_{i=1}^{n} \forall i \Delta intr_{t-1} + \sum_{i=1 \propto_i}^{m} \Delta lned_{t-1} + \cup EC_{t-1} + e_i \quad (9)$$

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 $ai, \partial i, \forall i, \propto_i, a$ nd $\emptyset_{i,}$ represents the short run dynamic coefficients, ∪ represents the speed of adjustment parameter, ECT represents the error correction term.

3.4.4. 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). Yahaya, Salisu and Umar (2015) study indicates Akaike Information Criterion (AIC) and Scharwz Information Criterion are employed because they are the most popular used selection criteria for models.

3.4.5. Granger-Causality Model

In order to determine which variable causes the other between inflation, economic growth and unemployment, the study employed the Granger Causality Test. The study adopted the multivariate vector autoregressive (VAR) model to determine causality between inflation rate, economic growth and Unemployment rate.

$$\text{UNMPL}_t = a_{0+\sum_{i=1}^{q} a_i} UNMPL_{t-i} + \sum_{j=1}^{q} c_j INFL_{t-j} + e_{1t}$$

$$\text{INFL}_t = B_0 + \sum_{i=1}^{q} B_i\, INFL_{t-i} + \sum_{j=1}^{q} a_i\, UNMPL_{t-i} + e_{2t}$$

$$\text{RGDP}_t = a_0 + \sum_{i=1 a_i}^{q} RGDP_{t-i} + \sum_{j=1 C_j}^{q} UNMPL_{t-j} + e_{1t}$$

$$\text{UNMPL}_t = B_0 + \sum_{i=1 B_i}^{q} RGDP_{t-i} + \sum_{j=1 a_j}^{q} UNMPL_{t-j} + e_{2t}$$

Where,

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

UNMPL= Unemployment rate;

RGDPt = Economic growth measured as the real Gross Domestic Product (GDP);

e_{1t} And e_{2t} = error terms.

3.4.6. Stability Test

According to [29] 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. Plots of Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMQ) test as postulated by [9] will be employed. If the movement of the CUSUM and CUSUMQ residuals lies outside the critical lines then it can be concluded that there is instability in the estimated coefficient and parameter variance over the sample period. On the Other hand, if the movements of the CUSUM and CUSUMQ lie within the critical lines then it can be concluded that there is stability among the estimations.

3.5. 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 reliability of the goodness of fit of the model is determined by conducting the diagnostic and stability tests of the model. The test is carried out to test the robustness of the results

from the ARDL model.

4. Analysis of Data and Discussion of Empirical Results

This chapter presents the estimation and discussion of results. It first presents discussion of descriptive analysis and the stationary properties of the variables. This is followed by the long-and short-run dynamics of the variables. Lastly the Granger causality results within the VAR framework are interpreted.

4.1. Descriptive Analysis

Descriptive analysis of the variables provides some important information about the data such as pattern, trend and variation of the targeted variables. Mahmood and Munir, (2017) found that the descriptive statistics are essential as a pretest requirement and they provide some useful information regarding the suitability of data. Therefore, Findings as seen in table1 showed that the Ethiopian economy was growing on the average of 7.07% between the years 1991 – 2018. Also, the maximum economic growth rate from 1991-2018 in Ethiopia was 13.5% which occur in year 1996. In the same vein, the minimum growth rate of the economy stood at -0.89%. Jarque-Bera statistics of 7.91 and the probability value of 0.019% show that economic growth rate was normally distributed since the null hypothesis of normality is accepted at 1.9%.

Table 1. *Descriptive analysis.*

Variable					
Statistics	**INFL**	**UNMPL**	**INTR**	**ED**	**RGDP**
Mean	4.906461	5.448429	11.92518	46.40985	0.070741
Median	4.050500	5.250500	11.88000	41.23056	0.099000
Maximum	10.54300	8.710000	15.50000	90.79844	0.135000
Minimum	1.437000	3.081000	6.800000	11.20000	-0.089000
Std. Dev.	2.631238	1.455255	2.025502	25.15423	0.062627
Skewness	0.652959	0.328951	-0.663611	0.317277	-1.293381
Kurtosis	2.185046	2.965942	4.140669	1.765999	3.590189
Jarque-Bera	2.764498	0.506327	3.573082	2.246321	7.919619
Probability	0.251013	0.776341	0.167539	0.325250	0.019067

Source: author's computation.

Unemployment rates stood at 5.44% on the average from 1991-2018 in Ethiopia. The maximum unemployment rate from 1986-2015 in Ethiopia was 8.71% which occur in year 1999 while the minimum unemployment rate stood at 3.08%in year 1991. This show that growth in Ethiopia GDP has not really reduces unemployment as expected as Ethiopia experienced a higher economic growth in year 2018 than in 1995. Jarque-Bera value of 0.506 and the probability value of 0.77% show that unemployment rate was normally distributed since the null hypothesis of normality is accepted at 77.63%.

Table 1 describes descriptive statistics of the dependent (Unemployment) and independent variables (Economic growth, inflation, external debt and interest rate). The study has 28 observations. It shows there is a slight gap between minimum and maximum values of unemployment during the study period which directs a consistent and less unstable unemployment in Ethiopia. It is found that the variation and gap amid minimum and maximum values of economic growth is relatively low in Ethiopia. Inflation in Ethiopia has a large gap during the study period within its minimum and maximum values. It directs an unstable inflation. The distribution of data is also an important feature for statistical analysis. Skewness and "Kurtosis measures whether the targeted variables are following the normal distribution or not? Skewness individually measures deviation from symmetry, in other words it measures the strength of outlier" (Mahmood. and Munir (2017). Most of the variables in the analysis are positively skewed, while two of them are negatively skewed and the highest Skewness showing in inflation. Another important descriptive statistical measure relative to the normal distribution of the variable is peakedness. Kurtosis measures the peakedness of the focused variable. The coefficient values of kurtosis indicate that unemployment follow peakedness while GDP, inflation, interest rate and external debt follow flatness.

4.2. Unemployment Trend in Ethiopia

From the figure 1, it has seen that unemployment rate is increased only by 0.1% in 1991-19921 but decreased by 1% in year 1993-1994. It increased continuously reached to 8.71in year 1999. Unemployment rate sometime increased and decreased as shown in the above graph, so it seen that, there is fluctuation in unemployment rate in Ethiopian economy. Unemployment Rate in Ethiopia decreased by 4.90 percent in 2013 from 5.20 percent in 2012. Unemployment Rate in Ethiopia averaged 5.4 percent from 1991 until 2018, reached all-time high of 8.71 percent in 1999 and recorded lowest of 3.08 percent in 1991.

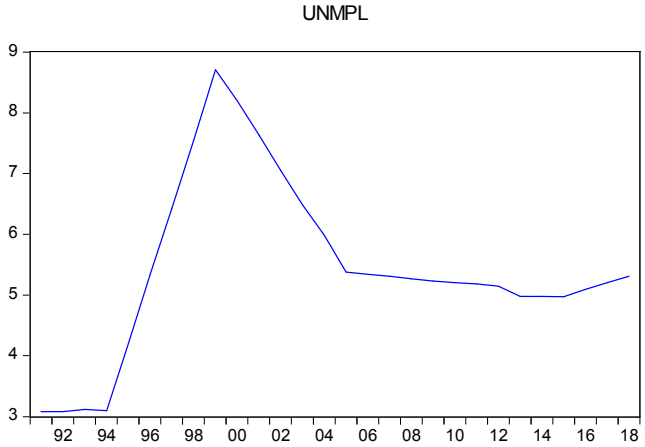
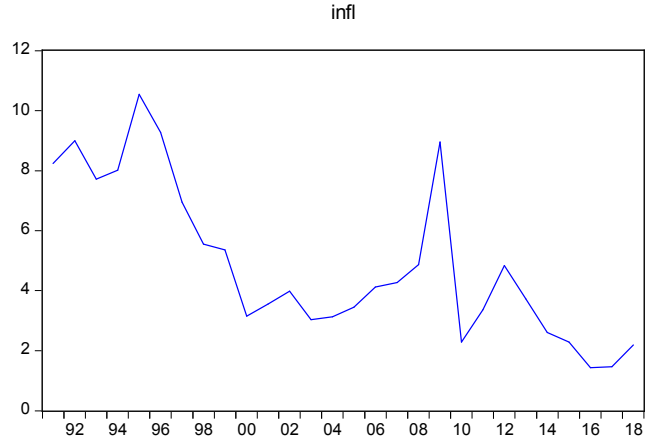


Figure 2. *Unemployment trend graph.*

4.2.1. Inflation Trend in Ethiopia

The figure 2 shows average inflation rate (%) in Ethiopia from the year 1991-2018. In year 1991-1995 inflation rate is increased by 10.7%, but decreased by 3.2% in 1995-2000. It

was increased continuously and reached to 9% in 2003-2009. From the above data we can conclude that situation of inflation in Ethiopia sometime increased or decreased i.e., fluctuated not linearly changed.



Source: author's computation

Figure 3. *Inflation trend graph.*

4.2.2. Economic Growth Trend in Ethiopia

The figure shows economic growth rate (%) in Ethiopia from the year 1991-2018. In year-1993 inflation rate is increased by 13.4%, but decreased by 3.5% in 1994. It was increased reached to 10.4% in 2015 and again reduced to 7.7% in 2018. From the above data we can conclude that situation of economic growth in Ethiopia sometime increased or decreased i.e., fluctuated not linearly changed.

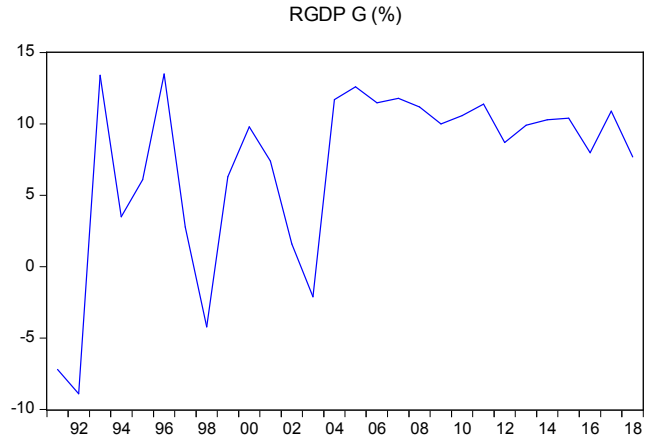


Figure 4. *Economic growth trend.*

4.2.3. Inflation, Economic Growth and Unemployment in Ethiopia

Ethiopia data on inflation and unemployment shows an inverse-kind of relationship between inflation and unemployment. In the early 2000s, inflation portrayed downward trend from 10.54% 1995 to 5.35% between in 199. On the other hand, unemployment declined from 4.2% in 1995 to 8.71% in 1995. Thus, when inflation increases considerably high; unemployment is exceptionally less. From the figure 3, it has seen that whether Phillips curve situation exist in our Ethiopian economy during study period. Phillips curve means inverse relationship between inflation and unemployment in the short run period.

From the figure 1, it has seen that unemployment rate is increased only by 0.1% in 1991-19921 but decreased by 1% in year 1993-1994. It increased continuously reached to 8.71 in year 1999. Unemployment rate sometime increased and decreased as shown in the above graph, so it seen that, there is fluctuation in unemployment rate in Ethiopian economy. Unemployment Rate in Ethiopia decreased by 4.90 percent in 2013 from 5.20 percent in 2012. Unemployment Rate in Ethiopia averaged 5.4 percent from 1991 until 2018, reached all-time high of 8.71 percent in 1999 and recorded lowest of 3.08 percent in. Unemployment rate sometime increased and decreased as shown in the above graph, so it seen that, there is fluctuation in unemployment rate in Ethiopian economy. Unemployment Rate in Ethiopia decreased by 4.90 percent in 2013 from 5.20 percent in 2012. Still with reference to Okun's Law, Bautista (2003) further pointed out that the rising GDP growth rates in 2004-2011, and 2013-2016 were accompanied by declining unemployment rates. The mixed evidences of Okun's Law suggest that there are other factors influencing the level of unemployment. Another track pursued in understanding the forces behind unemployment revolves around the Phillip's Curve.

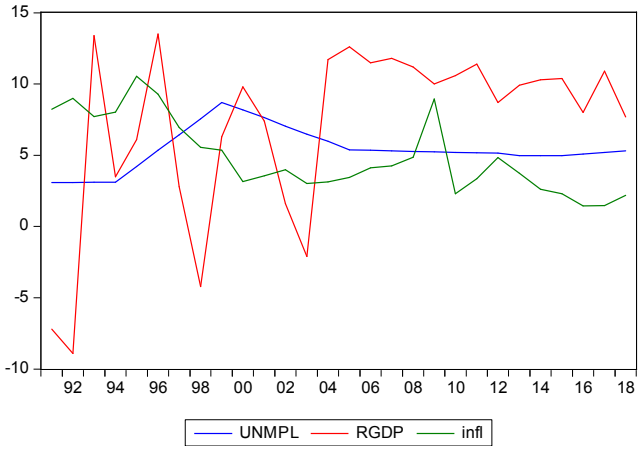


Figure 5. *Inflation, economic growth and unemployment trend graph.*

4.3. Result of Augmented Dickey Fuller and Phillip-Perron Unit Root Tests

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:

Table 2. *Augmented Dickey Fuller and Philip-Perron Unit Root Test with Intercept.*

variable	level t-static	value	1st difference t-static	value	5% Critical Value	Order of Integration
Lnunmpl	ADF	- -	-2.060027		-1.954414	I (1)
P-P	- -	- 2.081487	-1.954414	I (1)		
Lnrgdp	ADF	-2.986225	3.078193	I (0)		
P-P	6.119077	-2.976263	I (0)			
Inf	ADF	-5.223948	-2.976263	I (0)		
P-P	-5.223948	-2.976263	I (0)			
Lnexd	ADF	- -	-3.967378	-2.981038	I (1)	
P-P	- -	-3.967378	-2.981038	I (1)		
Intr	ADF	-3.543047	-2.976263	I (0)		
P-P	-3.532719	-2.976263	I (0)			

Source: Author's computation from E-views 9.0.

The result from augmented dickey fuller and Phillip –perron indicates that real gross domestic product, inflation rate and interest rate are integrated of order zero I (0) while unemployment rate and external debt are integrated of order one I (1) 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.

Table 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

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.

4.3.1. ARDL Cointegration Results

To test whether long-run relationship between INFL, ECG and UNMPL exists or not, the study used Autoregressive Distributed Lag (ARDL) also known as the bound test approach as opposed to the traditionally approaches developed by Engel and Granger (1987), and Johansen and Juselius (1990). These two methods require the variables to be integrated of the same order; either I (0) or I (1). Whereas the ARDL bound test for cointegration accommodates the different order of integration in the variables in this study. Before the long-run model was developed the lag length was determined. Table 3 presents results of the selection of lag length using the Akaike (AIC), Schwarz (SC) and Hanna-Quinn (HQ) information criterion. The lag selected by most methods is usually chosen, but this study chose to use Maximum lag order of 3 year. The optimal lag of one was selected as indicated by lag length selection criterion (Akaike (AIC), AND Schwarz Information criterion. The result of bound test for cointegration in table 3, indicates that null hypotheses cannot be rejected because the F- statistics (20.77) is greater than than upper bound value (3.49) at 5 percent critical value for case III (Unrestricted intercept and no trend) as it is found in M. H. Pesaran, Y. Shin and R. J Smith critical table. Therefore, there is long run relationship between inflation, unemployment and real GDP growth rate in Ethiopia. Similar study conducted by Chinweuba (2015) observed showed that there is a long-run equilibrium relationship between unemployment, inflation and gross domestic growth in Nigeria. AIC and SC criteria were used in the determination of optimum lag length of ARDL model and the estimation was made by taking maximum lag length as 3. ARDL (2, 0, 0, 2, and 2) model was selected as a common consequence of both criterions. The long run coefficients of ARDL (2, 0, 0, 2, and 2) were presented in Table 3. The coefficients of the variables were found to be statistically significant as seen from Table 5. 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. In other words increases in economic growth and external debt decreased the unemployment, while increases in interest increased the unemployment.

From Table 2, F statistic value 20.775 is more than the upper bound of Pesaran table at 5%, meaning that there is a long run relationship among GDP, the Inflation and unemployment for long run coefficient.

Table 4 *F bound test - Null Hypothesis: No long run relationship.*

Test sta.	Value	Signif.	I (0)	I (1)
F	20.775	5%	2.56	3.49
K	4			

Table 5. *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

The calculated F-statistic from Wald test of ARDL model, reported in 4 is higher than the upper bound critical values at five per cent level of significance. This implies that the null hypothesis of no co-integration can be rejected and therefore there is evidence to support the long run relationship among the variables. 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 0.02 percent decrease in unemployment rate.

Table 6. *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.**
Δ (LNUNMPL (-1))	0.169203	0.095458	1.772546	0.0966
Δ (LNRGDP)	-0.036665	0.010062	-3.644100	0.0024
Δ (LNED)	-0.052333	0.021259	-2.461612	0.0264
Δ (INTR)	0.013149	0.007934	1.657281	0.1182
Δ (INTR (-1))	-0.034636	0.003795	-9.125708	0.0000
Δ (INF)	-0.001410	0.000672	-2.096902	0.0534
Δ (INF)	0.001555	0.000623	2.495702	0.0247
ΔEC (-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)				
R-squared: 0.942383				
Adjusted R-squared: 0.909973				

Table 6 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 there is a statistically negative relationship between GDP and the unemployment rate. 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 0.05 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 R^2 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 8. 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 (0.2259) 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 (0.5143) 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 (0.8599) is greater than 0.05. In addition, the Ramsey's RESET shows that the model is correctly specified since the p-value (0.369) of the F-statistic is greater than 0.05.

4.3.2. Stability Test

Graphical representations of CUSUM and CUSUM square are shown in figures 1 and 2 for the long-run OLS model. According to [9] 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.

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. 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 Figure 5 and 6, 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.

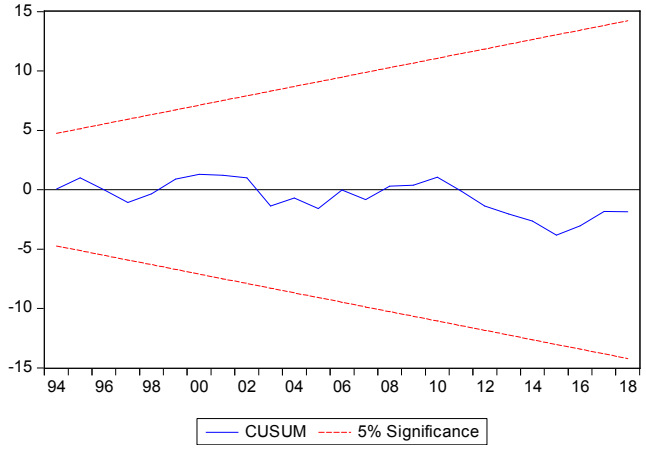


Figure 6. *CUSUM Curve.*

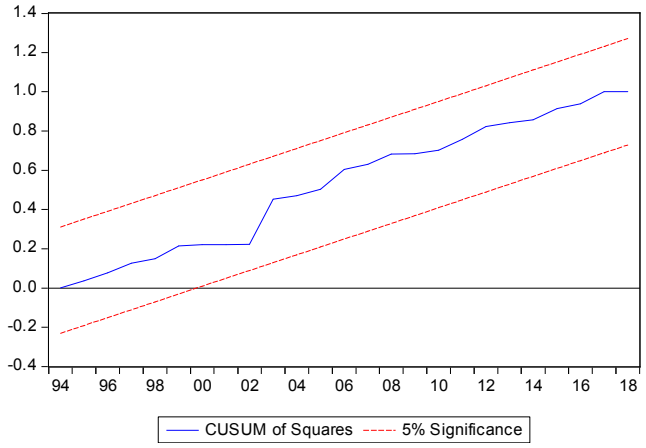


Figure 7. *CUSUM square.*

As it is clear from Figure 5 and 6, 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.

4.4. Granger Causality Test Analysis

In many previous studies which examine causality, Granger Causality tests have been the most commonly used method. This is because it not only tests the correlation between two variables but also specifies the direction of causality. However, growth and unemployment a swell inflation and unemployment are as widely suggested by many economist scholars in the literature reviewed are known to relate inversely. Since the Granger causality test is sensitive to the number of lags, the study chose the number of lags based on the Akaike (AI Schwarz (SC) C), and as presented in Table 3 in this chapter. The lag of 3 years was chosen as the optimal lag length selected by the AIC methods. The study then proceeded to run the Granger causality tests using Eviews 9 software. Based on the results presented in Table 7, 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. There was also causality detected between inflation and unemployment at 5% level of significance, meaning that inflation does Granger cause unemployment. The results also show that, within the sample of the study, there was unidirectional causality from inflation to unemployment.

Table 7. *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

Following the result in table 7, the null hypothesis that LNRGDP does not Granger because LNUNMPL is not rejected and that Lnunmpl does not Granger Cause Lnrgdp is rejected and it is to conclude that there is uni-directional causality between economic growth and unemployment in Ethiopia.

Table 8. *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

In the result shown in table 7, the null hypothesis that INFL does not Granger because LNUNMPL rejected and that LNUNMPL does not Granger Cause INFL does not rejected, further confirming a uni-directional causality exists between unemployment and inflation of Ethiopia.

Diagnostic Checking results

Jarque –Bera test: normality of data can be checked Through Jarque-Bera test. Jarque-Bera statistics follow chi-square distribution. Hypothesis for this test is stated below:

H0: Error term is normally distributed

H1: Error term is not normally distributed

The result is Prob Chi =.923 > α = 5% or 0.05. So the null hypothesis cannot be rejected rather it is accepted. Therefore it is concluded that error term of the model is normally distributed.

Ramsey RESET test: Regression Specification Error Test

suggested by Ramsey is used for checking of important variables that are not included in the model. In other words, it is used for checking whether the model is correctly specified or not. The hypothesis for this test is stated below:

H0: The model is correctly specified

H1: The model is not correctly specified

The result is Prob > F = 0.2284, this is >α=5% or 0.05. So the null hypothesis of the model is correctly specified cannot be rejected rather it is accepted. Therefore the conclusion of the test is the model is free from misspecification.

Table 9. *Diagnostic test result.*

TEST	NULL Hypothesis	TEST Statistic	P value
Ramsey Reset	No omitted variables	1.586678	0.2284
Breusch pagan test	No Heteroscedasticity	0.3152	0.3621
Jargue- Bera Test	There is Normal Distribution		
Breusch- Godfrey test	no serial correlation	0.7298	0.8526

So the null hypothesis of the no correlation y cannot be rejected rather it is accepted. Therefore the conclusion of the test is the model is free from serial correlation.

Breusch-Pagan Test: By this, heteroscedasticity in a multiple linear regression model can be checked. Hypothesis for this test is stated below: The result is Prob > chi2 = 0.3621, this is >α= 5% or 0.05. So the null hypothesis cannot be rejected. The conclusion is free from heteroscedasticity.

H0: Constant variance or Homoscedasticity.

H1: Heteroscedasticity.

5. Conclusions and Recommendations

5.1. Conclusions

The present study investigates whether fundamental macroeconomic variables affect the unemployment in Ethiopia or not. Towards this effort, the researcher have used annual data from 1991 to 2018 for the all the variables included in the estimation. The present paper used ARDL bounds testing approach to study the long run relationship among the variables. The bounds test confirms that there exist a long-run relationship 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. Therefore, the empirical findings lead to the conclusion that a long run relationship between unemployment rate, inflation rate, economic growth rate, external debt and interest rate exists. 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. Our empirical findings were consistent with [34, 23]. 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 a way to Göçer et al. (2013). On the other hand, study found that there was a positive long-run relationship between unemployment and interest rate.

Generally Regression results confirm Okun's Law in the Ethiopia – that is, economic growth is negatively influence unemployment. And the results of the study also confirmed Phillips Curve in the Ethiopia – that is, inflation negatively influences unemployment.

The error correction model of ARDL approach reveals that the adjustment process from the short-run deviation is quite high. More precisely, it is found that the ECMt-1 term is -0.249. This term is significant at 1%, again confirming the existence of co-integration that the derivation from the long run equilibrium path is corrected 24% per year. To determine the direction of causality granger causality is used in the study and 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 [34] 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. Further, The CUSUM and CUSUMSQ test confirms the long-run relationships between variables and also shows the stability of the coefficients.

5.2. Recommendation

1) There is need for the government to retain tight monetary and fiscal policies in order to fight inflation in the Ethiopian economy, since inflation have negative influence on Unemployment.
2) 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 and boost up the investor's confidence, with the growing economy. GDP is the most crucial economic indicator which tells us about the health of our economy. Thus, government should encourage stability in macroeconomic variables and employ such growth oriented and stabilization policies especially at macro level which will induce economic growth and development.
3) Given that external debt stock had negative impact on unemployment in Ethiopia implies that an increase in it will lead to decrease the unemployment rate the finding 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 reduces unemployment.

4) This study reveals that government of Ethiopia should emphasis on controlling interest rate and inflation rate to reduce the unemployment rate. The implication of the result implies that concrete 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.

References

[1] Adebayo, A. (2010). Youth unemployment and the National diroctrate of Employment Self employment programmes. The Nigerian Journal of Economic and Social Studies The Nigerian Journal of Economic and Social Studies.

[2] Aghion, P. and Howitt, P. (1994). "Growth and Unemployment", The review of Economic Studies, Vol. 61 No. 3, pp 447-494.

[3] Ahmed, S. a. (2005.). Inflation and Economic Growth in Bangladesh: 1981-2005. Policy Analysis Unit (PAU) working paper No. 0604.

[4] Aminu, U. and A. Z. Anono. (2012). Effect of Inflation on the Growth and Development of the Nigerian Economy. International Journal of Business and Social Science. Vol. 3, No. 10.

[5] Aqil, M., Qureshi, M. A., Ahmed, R. R., and Qadeer, S. (2014). Determinants of Unemployment in Pakistan. International Journal of Physical and Social Sciences, 4 (4), 676-682.

[6] Arnold, R. A. (2008). Economics. Mason, OH, USA Thomson South-Western.

[7] Asif, K. & Aurangzeb, (2013). Factors effecting unemployment: A cross country analysis. International Journal of Academic Research in Business and Social Sciences, 3 (1), 219.

[8] Bello, T. (2003). Attacking unemployment hurdles in the fragile economies of the Sub-Saharan Africa the experience of Nigeria. A paper presented at the –Economics for the Future-Conference; on the Occasion of the Celebration of 100 years oCambridge Economics; Cambridge, United Kingdom Septemberf.

[9] Bruno, A. and Ken, M. (2011). "Unemployment in the OECD". Oxford Review of Economics Policy, 27 (2): 207-220.

[10] Cashell, W. B. (2004). Inflation and unemployment: What is the connection? Federal Publications. Swedish Economic Policy Review 7 (2000), 107-153.

[11] Chang-Shuai, L. and L. ZI-Juan. (2012). Study of the Relationship among Chinese Unemployment rate Economic Growth and Finance. World Science Publishers. United States, Vol. 1, No. 1.

[12] Cuaresma, J. C. (2003). "Okun's Law Revised". Oxford Bulletin of Economics and Statistics, 65/4, pp. 439-451.

[13] Daveri, F. and Tabellini, G. (2000). "Unemployment, Growth and Taxation in Industrial Countries". Economic Policy Vol. 30, 49-88.

[14] Dendir, S. (2006). "Unemployment Duration in Poor Developing Economies: Evidence from Urban. Ethiopia." The Journal of Developing Areas.

[15] Desta, A. (2009). "Economic Growth for Inflation:. The EthiopianDilemma", Dominican University of California.

[16] Dickey, D. a. (1979). "Distribution of the Estimators for Autoregressive Time Series with a Unit Root." Journal of the American Statistical Association, 74, 427–431.

[17] Dickey, D. A. and Fuller, W. A. (1981). Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root. Econometrica, Vol. 49, pp. 1057-1072.

[18] Dumitrescu, B. A., Dedu, V., Enciu. (2009). The correlation between unemployment and real GDP growth: A study case on Romania. Annals of Faculty of Economics, 2 (1), 317-322.

[19] Engle, R. F. and C. W. J. Granger. (1987). "Co-integration and Error Correction: Representation, Estimation and Testing," Econometrica, Vol. 55), pp. 1-87.

[20] Harris, R. & Silverstone, B. (2001). "Testing for Asymmetry in Okun's Law: Cross-Country Comparison". Economics Bulletin, Vol. 5, No. 2, pp. 1-13.

[21] Jhingan, M. L. (2003). Advanced Macroeconomic Theory 11 Edition. Delhi: Vrinda Publications (P) LTD.

[22] Knotek, E. S. (2007). How useful is Okun's Law? Federal Reserve Bank of Kansas City, Fourth Quarter.

[23] Kwam, A. (2005). i "A Cross-Province Comparison of Okun's Coefficient for Canada",. Applied Economics Volume 37, Issue 5, pp. 561-570.

[24] Mahmoud, A. &. (2012). The relationship between unemployment and economic growth in Jordan and some Arab countries. World Applied Sciences Journal, 18 (5), pp. 673-680.

[25] Mankiw, N. G., & Taylor, M. P. (2014). Economics, South African Edition. 1st Edition Hamshire, UK. Cengage Learning.

[26] Maqbool, M. S., Sattar, T. M. A., and Bhalli, M. N. (2013). Determinants of Unemployment: Empirical Evidences from Pakistan. Pakistan Economic and Social Review, 51 (2), 191-207.

[27] Michael Bräuninger and Markus Pannenberg. (2002). Unemployment and Productivity Growth An Empirical Analysis within the Augmented Solow Model published in: Economic Modelling 19, 105-120.

[28] Organization, I. L. (2001). Labour Statistics Yearbook, Geneva.

[29] P. C. B. Phillips and P. Perron. (1988). "Testing for A Unit Root in Time Series Regression," Biometrika, Vol. 75, No. 2, doi: 10.1093/biomet/75.2.335, pp. 336-346.

[30] Pesaran, M. H., Y. Shin and Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationships". Journal of Applied Econometrics, Special Issue in Honour of J D Sargan on the theme "Studies in Empirical Macroeconometrics", D. F. Hendry and M. H. Pesaran (eds), Vol. 16, pp. 289-326.

[31] Phillips, A. W. (1958). The Relationship between Unemployment and the Rate of Change of Money Wages in the United Kingdom 1861-1957). Economica, 25 (10, 283–299.

[32] Rutayisire, M. (2013). "Threshold effects in the relationship between inflation and economic growth: Evidence from Rwanda". African Economic Research Consortium (AERC), 1-33.

[33] Sarel, M. (1995.). Nonlinear effects of inflation on economic growth. IMF WP/95/56, Washington.

[34] Shahid, M. (2014)., 'Effects of inflation and unemployment on economic growth in Pakistan. Journal of economics and sustainable development, 5, 15.

[35] Stober, E. O. (2015). "Unemployment Scourge: Rising to the Nigerian Challenge". The Romanian Economic Journal, XVIII No. 56, pp 181-200.

[36] Teshome, A. (2011). "Source of Inflation and Economic Growth in Ethiopia", Ethiopian Civil Service University.

[37] Umair, M., & Ullah, R. (2013). Impact of GDP and Inflation on Unemployment Rate: A Study of Pakistan Economy in 2000-2010. International Review of Management and Business Research, 2 (2).

[38] Umaru, Zubairu. (2012). An empirical analysis of the relationship between unemployment and inflation in Nigeria. Economics and Finance Review; 1 (12): 42-61.

[39] Unit, E. I. (2012). Country Report Ethiopia, March.

[40] MoFED. (2014/15). Annual Report.

[41] Walters, S. D. (1999). "An Indicator of South Africa's External Competitiveness". South African Quarterly Bulletin, 213: 54-67.

[42] World Bank. (2015). World Development Indicators.