

SCHOOL OF GRADUATE STUDIES

MACROECONOMIC DETERMINANTS OF UNEMPLOYMENT IN ETHIOPIA:A TIME SERIES ANALYSIS USING AUTOREGRESSIVE DISTRIBUTED LAG MODEL

BY

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DECLARATION

I hereby declare that this thesis entitled "*Macroeconomic Determinants of Unemployment in Ethiopia: Time Series Analysis* using autoregressive distributed lag model" has been carried out by me under the guidance and supervision of Dr. Mesele Araya.

The thesis is original and has not been submitted for the award of any degree or diploma to any university or institutions.

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This is to certify that the thesis prepared by Dejene Bekele, entitled: *The Macroeconomic Determinants of Unemployment in Ethiopia: Time Series Analysis using autoregressive distributed lag model* and submitted in partial fulfillment of the requirements for the Degree of Master of Science in Economics (Development Economics) compiles with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ACRONYMS

ADF	Augmented Dickey Fuller
ARDL	Autoregressive Distributive Lag
CSA	Central Statistics Agency
CUSUM	Cumulative Sum
ECM	Error Correction Model
EIC	Ethiopia Investment Commission
FDRE	Federal Democratic Republic of Ethiopia
FUNR	Female Unemployment Rate
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
IFS	International Financial Statistics
ILO	International Labour Organization
IMF	International Monitory Fund
JICA	Japan International Cooperation Agency
LPEA	Local private Employment Agency
LPEA	Local Private Employment Agencies
MoLSA	Ministry of Labour and Social Affairs
MUNR	Male Unemployment Rate
NBE	National Bank of Ethiopia
UNCTAD	Untied Nation Conference on Trade and Development
UNR	Unemployment Rate
UNSNA	United Nation System of National Accounts
USAID	United State Agency for International Development

Abstract

This study examined the macroeconomic determinants of unemployment in Ethiopia over a period of 1978 to 2018 by investigating the empirical relationship between unemployment (UN), real gross domestic product (RGDP), net foreign direct investment (NFDI), external debt (ED), real exchange rate (RER), inflation rate (INFR) and Proclamation that encourage private employment agencies as dummy variable (DM_LM) using Autoregressive Distributed Lag Model and Error Correction model (ECM). The result reveals that RGDP,NFDI and INFR) affect unemployment negatively in the short run while ED and RER have positive relation with unemployment and statistically significant at 5% level in the short run. However, in the long run, only RGDP and RER are negatively related with unemployment and statistically significant. The effect of economic growth is higher than other determinants in short run and long run. The ECM equilibrates the short run dynamics to the long run dynamics by the speed of 19.93%. The relationship between unemployment and inflation rate is negative in the short run and positive in the long run which implies Phillips curve exists only in the short run. It is recommended that policies and strategies focusing on increasing economic growth focusing on agriculture, improving trade balance through devaluing domestic currency relative to foreign currency, enhancing infant domestic industries instead of attracting FDI, reduce external loan, control inflationary problem, *investing in modernizing labour market service provision are crucial and that government should give due attention to reduce unemployment in Ethiopia.*

Keywords: unemployment, determinants, macroeconomic, ARDL

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Unemployment is defined as the proportion of people who are able to work and actively searching jobs but they are unable to find it; or having no job or being out of work. Owing to many factors, unemployment is becoming vital challenges to both developing and developed countries. Hence, it is a great concern to policy makers of many nations. Unemployment has resulted not only in economic instability but also triggers social problems. Some of the reasons for economic instability as presented by Kyei and Gyeke (2011) are that unemployment is the causes for crime, the erosion of human capital, misery and social unrest. In addition, Bakare (2011) also added that unemployment results in psychological problems such as hopelessness, frustration, hostility and gradual drift of unemployed youth into all manner of criminal behavior. According to Eita & Ashapala (2010), and Shahid, M.,M., Mahmood,T.,A.s, & M.N. Bhalli (2013) in the long-term unemployment always results in creating financial hardships, poverty, homelessness, crime, frustration and many other problems like family tension and breakdown, social isolation, loss of confidence and self-esteem which ultimately leads to the erosion of a healthy society.

Consequently, the level of unemployment of a country is widely used as overall status indicators in evaluating the current performance of the economy. Studies indicate that many nations in the world, particularly developing countries, have serious problem of unemployment that could affect their economic performance. According to ILO (2016) some countries that have been characterized by high unemployment rate of age 15+ are South Africa (27%), Lesotho(27.8%), Occupied Palestinian (27.0%), Swaziland (26.3%) and Mozambique (25.2%).Whereas, countries with the lowest unemployment rate are from southern Asia ,such as, Qatar, Cambodia, Thailand, Myanmar, and Bahrain and few African countries such as Niger(0.3%) & Rwanda (0.9%).

According to the ILO's new estimation, based on improved data sets and methodologies, the global unemployment rate is expected to fall slightly to 5.5 per cent in 2018 (from 5.6 per cent in 2017), which marks a turnaround after three years of rising unemployment rates. However, with

a growing number of people entering the labour market to seek employment, the total number of unemployed is expected to remain stable in 2018, above 192 million(ILO, 2018).

In Ethiopia, the aggregate unemployment rate is below 10 percent. But the unemployment rate in urban is eight times higher than rural unemployment. For example, CSA (2016) report indicates that unemployment rate in urban areas accounted 16.5 percent whereas only 2 percent in rural .In addition, female unemployment has higher probability of being not employed compared to males. For instance, in 2018 female unemployment rate was 26.4 percent which is more than double as compared to male unemployment rate of 12.2 percent. During this period the overall urban unemployment was about 19.1 percent (CSA, 2018).

Even though Ethiopia is one of countries in Africa with fast economic growth, it could not efficiently utilize the work forces that are essential to maintain the economic growth. In other words, the government could not be able to create enough job opportunities that can absorb potential labor forces through adopting appropriate employment policy. Economy is growing but unemployment is raising particularly urban unemployment and the problem is higher among youth. Right now, many Ethiopian youth are migrating to Middle East and European countries. They are facing life challenges everywhere. Thus, the issue of unemployment is crucial and urgent agenda of Ethiopian government. There are many factors that determine unemployment of nations identified by different scholars.

The study of Wilson(2012) indicate that the relationship between government consumption expenditure and youth employment focuses on the transmission mechanisms. That is ,at equilibrium, the rise in labour supply leads to a lower real wage, higher employment and higher output. However, the New Keynesian models considers some degree of stickiness, that is, the wages and prices do not adjust instantly to economic shocks (Christiano 2011). Fatás and Mihov (2002) found that increases in government consumption lead to increases in employment. Furthermore, O'Nwachukwu (2016) found that government expenditure, inflation rate and population are statistically significant in explaining changes in unemployment in Nigeria.

Hence, the aim of this study is to examine some macroeconomic determinants of unemployment in Ethiopia using time series data of unemployment, real gross domestic product, inflation rate,

net foreign direct investment, external debt, real exchange rate and private employment Agency's proclamation as a dummy variable of data ranging from 1978 to 2018.

1.2 Statement of the Problem

Unemployment is the main challenges of many countries in the world. The issue of unemployment gets a great attention globally in the agenda of poverty reduction. For instance, the post- 2015 development agenda (SDG) includes 17 goals of which the 8th goal focuses on decent work and employment creation of a country.

Ethiopian government also gives attention for the implementation of the goal to reduce unemployment. However, there is little improvement in unemployment reduction as the overall performance in employment creation has remained to be sluggish. The urban and the rural unemployment rates, on average, were 19.88 percent from 1999 until 2015 (CSA, 2018,) and 2 percent respectively (CSA, 2016).In 2018 urban unemployment rate was 19.1 percent which is higher than the previous year and has increasing trend from 2012 to 2018. On the other hand, Economic growth in Ethiopia was continuously in double digit for the last two decades. According to Ethiopia's Development Trends Assessment Report(2017) by USAID indicates that GDP growth averaged 10.4% between 2004 and 2015 which propelled Ethiopia from the second poorest country in the world to the 11th poorest. Over the same period, the size of the Ethiopian economy has nearly tripled (from US $17.2 billion to US $45.8 billion) GDP per capita is also doubled (from US $730 to US $1,500) and the portion of the population living under poverty line (US $1.90 per day) has decreased by 25%. Similarly, in 2017/18 nominal GDP was 84.3 billion USD which equivalent to 2.2 trillion Birr. Despite the fact that the economic growth is rapid and broad in Ethiopia; it fails to absorb all labor forces in the markets.

There are few studies have been conducted in various countries that show macroeconomic determinants of unemployment. The study conducted on the economic community of West Africa states (ECOWAS,) using panel data indicates that the GDP has insignificant effect on unemployment rate (Abiodun O., Folawewo,Oluwafemi M.Adeboje, 2017). It also showed that inflation has an overwhelming positive impact on unemployment which implies the invalidity of Phillips curve hypothesis. It further indicates, foreign direct investment and external debt exert a weak and negative impact on unemployment while population growth has an increasing effect.

However, as foreign investors invest more capital in the domestic economy, many job opportunities can be created for unemployed people. Other study by Mirkovic (2017) on unemployment in Croatia using VEC model found that an increase in productivity prices and wages affects unemployment negatively. In addition, the interest rate, money supply, income, exchange rate and export can determine the unemployment rate of a country (Asif, 2013; Bennett, 2011 and Dogan, 2012). Moreover, study conducted on determinants of China's unemployment shows that population and GDP growths have significant and long-run effect relationship with unemployment rate whereas inflation and foreign direct investment do not have significant impact on unemployment rate (Li Xuen C., Yun Bee C., 2017). This study further indicates that the impact and significance of macroeconomic variables on unemployment rate are country dependent.

However, to the best of my knowledge, no studies were conducted on macroeconomic determinants of unemployment in Ethiopia. Identification of macroeconomic determinants of unemployment is very important to formulate proper employment related economic policy that helps to reduce unemployment rate of a country. Therefore, the aim of this study is to examine some macroeconomic determinants of unemployment in Ethiopia that help to formulate proper policy to take action in reducing unemployment.

1.3. Research Questions

- What do the trends of unemployment rates look like in Ethiopia?
- How unemployment and macroeconomic variables related to each other? Do they have complementary or inverse relationship?
- Which macroeconomic variable(s) is the most determining factor of unemployment rate in Ethiopia?

1.4. Objective of the Study

1.4.1 General Objective

The general objective of this study is to examine the macroeconomic determinants of unemployment in Ethiopia during the last four decades (1978-2018).

1.4.2. Specific Objectives of the Study

The specific objectives of the study are:

1. To show the trends of unemployment rate in Ethiopia,
2. To determine the macroeconomic variables that has significant effect on unemployment in Ethiopia.
3. To indicate policy implications that will be used to equilibrate the supply and demand side of labour force in Ethiopia.

1.5. Significance of the Study

Unemployment is one of serious problem in Ethiopia. Few studies conducted so far used microeconomic data to investigate the determinant variables of unemployment in Ethiopia. But no studies were carried out on macroeconomic variable impact on unemployment. Therefore, the importance of this study is to examine the macroeconomic variables that determine employability of labor forces in Ethiopia. In addition, this study is helpful to policy makers to formulate appropriate policies and strategies. Furthermore, this study will help other researchers to make further research works in the area of unemployment.

1.6. Scope of the Study

The study will be conducted in identifying the significance of some macroeconomic variables that determine Ethiopian unemployment rate based on secondary data ranging from 1978 to 2018.

1.7. Organization of the paper

This research paper is divided into five chapters: chapter one deals with introduction that includes the background, statement of the problem, objective of the study, scope and significance of the study. Chapter two addresses literature review (theoretical and empirical) and chapter three deals with research methodology on the overview of unemployment rat verses its determinants; chapter four deals with data presentation and analysis that include both descriptive and econometric analysis and the last chapter deals with summary, conclusion and recommendation.

CHAPTER TWO

REVIEW OF LITERATURE

2.1. Theoretical Literature

2.1.1. Concepts and Definitions

By its very nature the concept of unemployment is complex and broad. For clear understanding about unemployment, it is important to explain some concepts of unemployment.

Economically Active Labor Force: As defined by the United Nation System of National Accounts (UNSNA), economically active population comprised all persons of either sex who furnish the supply of labour for the production of goods and services. In other words, it refers to persons who are engaged in work or available to engage in the economic or productive activities.

Employed Labour Force: The employed population is defined as persons above specified age who perform some work for wage, salary, profit or family gain in cash or in kind during the reference period. More generally, employed persons are those people who are engaged in economic activity to produce goods and services as defined by UNSNA. In this regards, there are important indicators of employment such as employment-to-population ratio, employment by occupation and industry, status in employment, number of hours worked and payments.

Economically Inactive Population: This refers to persons who are neither engaged nor available to provide their labour. Economically inactive population are not considered as unemployed person and they are excluded from unemployment analysis because of not fulfill the definition of unemployment.

Unemployed Labour Force: According to ILO definition, it is a person of working age (15 or above) who being without employment, available for work and actively looked for a job in the previous month. Based on this definition it is calculated by taking the difference between economically active labour forces and employed labour force.

Unemployment Rate: is the ratio of unemployed labor force to economically active labor force

$$\text{UNR} = \frac{\text{Unemployed Labour force}}{\text{economically active labour force}} X100$$

2.1.2. Stylized Facts of Unemployment

Unemployment rate contains an element that is not easy to measure, namely the number of people who do not have a job but would have liked to have one. For this reason there is some disagreement among economists about how much to trust statistics on unemployment rates. Should these be include among the time series that theories are held up against, or should one only most economists believe that one can safely trust reported statistics of unemployment to give at least some indication of the extent of involuntary unemployment (Birch and JØrgen, 2010). The identified stylized facts are presented as follows:

Stylized Facts 1: There is a tight negative relationship between the rate of growth in GDP and the absolute change in the rate of unemployment (Okuns Law).

Stylized Fact 2: There is no upwards or downwards trend in the rate of unemployment in the (very) long run.

Stylized Fact 3: There is a lot of variability in the rate of unemployment in the short run.

Stylized Fact 4: There is a lot of persistence in annual rates of unemployment.

Stylized Fact 5: Long-term unemployment varies tightly, positively and relatively strongly with overall unemployment.

Stylized Fact 6: There can be large difference in unemployment across geographical area for long periods of time.

Stylized Fact 7: There are considerable and long lived differences in rates of unemployment across educational groups with a broad tendency for higher education to mean lower unemployment.

Stylized Fact 8: When rates of unemployment are at their lowest, there is still a substantial amount of unemployment seemingly around 3-4 percent, and the natural unemployment rate that the annual rates fluctuate around is higher. The natural rate of unemployment can shift over time and be different in different regions and countries.

2.1.3. Unemployment Views in Different Schools of Thought

The theoretical issues of unemployment attempts to explain the causes and effects of unemployment in many nations. Economic literature provides many explanations for the determinants of unemployment. Some causes blame the economic systems, and others blame other factors such as foreign debt and population growth. Still, other theories shift the problem to external sources and shocks, or unpredictable events, and other argue that technology and labour market institutions are the causes of unemployment. In addition, other theories assumed that deficiency in aggregate spending and innovations are the essential factors for explaining the problem of unemployment.

Many models have been formulated by different economists in different time to explain the problem of unemployment. For instance, in the 1920s and early 1930s (during a great depression) economists such as Pigou (1929) and Keynes (1936) formulated a number of models to explain the causes of unemployment. The job and matching model was formulated by Mortensen (1970), Lippmann and McCall (1976) explain that the unemployment depends on job offer and job acceptance. The job offer depends on skills of labour, education, work experience and the demand condition of local area. Hence, different economists have viewed as ways in different time periods factors that affect unemployment as in classical, Keynesian and post Keynesian.

According to Hameed (2012) unemployment can be classified as follows: The first is seasonal unemployment which occurs when there is a limited need for a type of work to be performed during a particular period in a given year based on factors like deadlines or climate. As a result

people end up doing some work they are neither interested in nor trained for. It principally occurs when a person does not get the type of work he/she is proficient of doing. He may possess skills and proficiency but not for the job he is capable of doing. It is also referred to as underemployment. The second type of unemployment is disguised unemployment which is also known as hidden unemployment. It represents a scenario where more people are occupied in some action than the number of individuals required for the action. Extra workers available more than the required number of workers is engaged in disguised employment. The other is frictional unemployment which occurs during ones transition from one to another job. The period is sometimes called search unemployment and voluntary based on the circumstances of the unemployed individual. The last type is classical unemployment occurs when there are more people looking for work but are unable to find employments. It implies real wage unemployment. In this case, it occurs when real wages are positioned above market clearing level. In most cases unemployment is defined as the condition of having no job or being out of work or proportion of people which are able to work and actively searching jobs but they are unable to find it.

I. Unemployment in Classical Economic Theory

According to the classical theory an economy is always being at full employment rate. Classical assumes that there is no unemployment at any point in time. This is because the demand for labour will always equal the supply of labour at the prevailing money wage rate. In other words, if for any reason there is an increase in the supply of labour, the money wage would fall. As a result, more workers could be employed. Similarly, if there is a shortage of workers, the money wage would rise, thereby, eliminating the shortage. Thus, in the classical sense, there will be no voluntary unemployment. However, in the real world there is always at least some unemployment.

The classical theory, as explained by Pigou (1933) and Solow (1981) which explain the labour market consists of demand and supply of labour. The demand for labour is a derived demand, obtained from the declining portion of the marginal product of labour. The demand curve is a negative function of real wage in that if wages increase the quantity demand for labour will decline and the opposite is correct. The supply of labour is derived from worker's choice whether to spend part of time working or not working (leisure). Supply of hours worked is a positive

function of the real wage, because if the real wage rises, workers supply more hours of work. In equilibrium, demand and supply of labour are intersected at a clearing point that determines the equilibrium real wage rate and full employment. Sweezy (1940:807) explaining Pigou's "theory of unemployment," apart from frictional obstructions would be nonexistent if it were not for the fact that wage-earners habitually stipulate for a rate of wages higher than the "equilibrium level."

II. Unemployment in the Theory of Effective Demand

According to Keynesian theory market failure and involuntary unemployment exist due to the fail of demand towards product. If demand declines firms may not be able to reduce wages and sell products at lower prices; but may lay off workers and reduce output; resulting in lower employment and lower output; it is left to the market. The level of aggregate demand will provide the necessary increases in total revenues. On the other side, the cost of production has to decline. If revenue rises and cost declines, then the reasonable level of profits can be found. Consequently, higher profits will force the business enterprises to expand and employ more workers. Thus, employment will increase and the rate of unemployment will decline.

Keynes (1936) considers unemployment as an involuntary phenomenon which is consistent with classical view (i.e no voluntary unemployment). This means, that employment is cyclical, which resulted from up and down of aggregate demand. Investors hire workers and invest to produce output when the expectations about the economy and profits are favorable. When expectations about the future are supported by reality, investments and employment continue rising until equilibrium is reached. As the volume of the economy expands which result from large spending in investment, since labour is one of the factor of production, firms are forced to employ more workers, hence unemployment decline. According to this theory, labour's supply and demand equilibrium is attained by the intersection of the aggregate demand and supply which is the point of the effective demand which may be less than the full employment equilibrium. On the other hand, when expectations about the future of the economy are not favorable, private sectors invest and employ less number of workers. Thus, the equilibrium is achieved where cyclical unemployment exists, due to the deficiency of the aggregate demand, particularly investment expenditure. The post Keynesian economists also argues that involuntary unemployment is explained by inefficiency of effective demand, instability of exchange rates, and international mobility of finances which create uncertainty that weakens investors' confidence to make

investment to reduce unemployment (Davidson, 1998). Similarly other post Keynesian economists argue that the unemployment is due to the contractionary nature of monetary policy which creates deficiency in aggregate demand. Furthermore they think that the unexpected increase in price level, or a higher rate of inflation, will reduce the real wage and increase demand for labour and hence the rate of unemployment will decline. This is consistent with the proposition of Phillips curve implying that there is a tradeoff between the rate of unemployment and the rate of inflation.

In addition, Arthur Lewis (1954) develops what was called the Lewis model in which he assumes that if there was a surplus of labour and a given demand for the labour, then the wage rate is fixed. Lewis explained that under this condition capitalists do make a certain level of profit. The capitalists will reinvest part of the profits in new capitals. This new investment will create new jobs for people and it will attract labour from labour surplus rural areas to the modern areas (urban area).This increase in employment will provide more profits for the capitalists, and more profits will increase investment, employment, and income. Hence, demand for labour will shift to right when labour productivity rises, implying a declining of unemployment. However, the efficiency wage model can give rise to unemployment which implies that the real wage is unresponsive to demand shifts. Thus, the model indicates that shift in labour demand lead to large movement and small changes in the real wage. The model indicates as economic growth shifts, the demand for labour shifts outward, the real wage remains unchanged and unemployment trends downward (Romer, 2012).

According to Romer et.al (2012) there are two basic issues about unemployment, the first concerns is the determinants of average unemployment over extended periods. It implies whether this unemployment represents a genuine failure of markets to clear, and if so, what it causes and consequences are. One extreme view is the position that unemployment is largely illusionary, or the working out of unimportant frictions in the process of matching up workers and jobs. At the other extreme is the view that unemployment is the result of non-Walrasian features of the economy and that it largely represents a waste of resources. The second issue concern is the cyclical behavior of the labour market. The real wage appears to be only moderately pro cyclical; which is consistent with the view that the labour market is Walrasian only if market supply is quite elastic or if shift in labour supply play an important role in employment fluctuations. If

there is unemployment in a Walrasian labour market, unemployed workers immediately bid the wage down until supply and demand is in balance.

III. Unemployment in the Real Business Cycle Theory

Both classical and Keynes; departure from full-employment is disequilibrium and affect social welfare, but for real business cycle unemployment is caused due to the existence of economic growth fluctuation-or business cycle (boom or slump). Thus, it implies the up and down of economic trend affects the magnitude of unemployment; hence unemployment rate depends on the economic growth of the country. As economy expands, many job opportunities will open; hence employment raises that result in declining in unemployment. According to Okun's law for every one percentage point by which the actual unemployment rate exceeds the so called "natural rate" of unemployment, the real gross domestic product is reduced by 2% to 3%.

This theory argued that the growth of productivity of factors of production which forces technical method of production is the main source of employment and unemployment. If increasing returns to scale is obtained then the total factor productivity has increased. If the total factor productivity is not growing, then firms and the economy become inefficient. This result in, the reallocation of labour and capital cannot be achieved and labour and capital will be used in less profitable opportunities.

There are various causes for the slowdown in total factor productivity. The first issue is development in technology. Technology is not improving in the production of goods and services and workers' skills are not being enhanced. New products are not invented and when the prices of imported materials are increasing. Once total factor productivity is stagnating, the co-movements in other variables will slowdown. When consumption, investment, gross domestic product, and hours of work decline, the Solow's residual, which represents the growth in labour productivity is measured by the difference between actual and predicted productivity growth, will decline. Since there is no improvement in technology and productivity under this condition, therefore, unemployment raises.

IV. Market Structure and Unemployment

Microeconomic theory explains that market structure (perfectly competitive, pure monopoly, monopolistic completion and oligopoly) can affect the level of unemployment. In the case of perfectly competitive market the demand for labour and labour supply intersects to determine the wage rate and employment. Under this market condition, the demand for labour is determined by labour productivity. Workers will hire up to the point where the value of marginal product ($VMP_L = MP_L * P_L$) is equal to the wage rate.

Under imperfect market conditions the equilibrium condition is different from that of perfect market. In this case the demand for labour is the marginal revenue product of labour (i.e. MRPL=MPL X MRx), where MRx is the marginal revenue and MPL is marginal product of labour. Under this scenario, MRx is lower than the market price p. It follows that the MRPL is lower than VMPL. This means there is exploitation of labour force by employers. The second important outcome under the imperfect market condition is that the marginal labour cost will above the labour supply. When the MRPL intersects the marginal factor cost, the employment of labour (Lm) is determined. However, this employment level is lower than the level of employment determined under perfect market condition (Lc).

Monopolist wants a high price for his own special product and it can get this only by reducing the amount created. In other words, restricted output will increase the rate of unemployment. Therefore, the market structure affects the magnitude of unemployment.

2.2. Empirical Evidences

2.2.1. Unemployment and Its Macroeconomic Determinants

Unemployment is a real matter of concern as it can yield devastating effect on economic welfare, crime, the erosion of human capital, misery and social instability. Hence, unemployment can affect the gross domestic product of the country. The output produced of a certain country is the function of employment level. To find the macroeconomic determinants of unemployment several studies have been conducted. Most of these studies were conducted out of Ethiopia, and however few studies based on microeconomic variables such as demographic factors and location of residence have been conducted which misses the macroeconomic determinants of unemployment. Some of these studies within and outside of Ethiopia are given below.

Dechasa (2014), has conducted a study on unemployment and labor market in urban Ethiopia: Trends and current condition by focusing on conceptual, theoretical and policy-relevant description of unemployment and labor market situation in urban Ethiopia. And he found that the employment creation of both public and private sectors were constrained by different factors, such as privatization, tax rate, lack of or inadequate finance /credit and infrastructure facilities. And the researcher recommend for the problem of low level of job creation, such as adoption of labour-intensive employment creation strategies for the growing young skilled labour force, and arranging access to market, credit institution, modern technology, formal training and providing institutional protection for informal sector. In addition, Abera (2013), conducted study on socio-economic and demographic determinants of unemployment in Ethiopia by using descriptive and binary logistic regression. The result reveals that age, sex, region, place of residence, educational level, economic status, marital status, sex of head of household and household size have significant effect on unemployment of an individual in Ethiopia. And, this study also recommends, empowering women and creating jobs that require manual work is important in the short run.

Fikre (2011), has examined the determinants of urban unemployment and impact on household welfare using binary probit model estimation. The result indicates that the urban unemployment in Ethiopia is determined by age, marital status, education beyond primary school and it also indicates that unemployment adversely affects household consumption expenditure and hence household welfare. The study indicates one more unemployed household member results in a 4.6 percent decline in per capital real consumption expenditure available to the household. Further, it also indicate, since unemployment negatively affects household welfare, efforts aiming at reducing unemployment will most likely improve welfare, in such a case quality in higher education has believed to reduce unemployment and there by improve welfare.

Assaad (2000) examined various determinants of unemployment of Egypt empirically using both binomial and multinomial logit model to explain the participation in the labour force and the allocation of labour force participation into unemployment. The result reveals that educated young women are more adversely affected than their male counterparts by the transition to a private sector economy. It also indicates there is no systematic link between youth unemployment among new entrants and poverty unless it is the head of the household who is unemployed. The study recommends that need of appropriate policy for labour intensive

techniques, experts oriented industries that would help to absorb the new applicants into the labour market, which is similar finding and recommendation of studies conducted by scholars in Ethiopia using microeconomic variables.

Kalim (2003) worked on determinants of unemployment in Pakistan by using a simple regression. The researcher analyzes the relationship between unemployment, population growth and real growth rate of GDP, over a period of 1986-1999 and found that the positive relationship between unemployment and population and an inverse relationship between unemployment and GDP. Highly significant results are obtained that implies population pressure can erode employment opportunities and a high growth rate in GDP can bring about a decline in unemployment rate. The study also recommend a strict population policy and a high rate of GDP could be targeted to generate employment opportunities in the economy. Similarly, Shahid, M.,M., Mahmood,T.,A.s,and M.N. Bhalli et al (2013), examined the determinants of unemployment in the same country over a period of 1976-2012 using autoregressive distributed lag (ARDL). They examined the empirical relationship among the unemployment, population, foreign direct investment, gross domestic product, inflation, and external debt which is more exhaustive determinants compared to Kalim's model. The empirical result shows that gross domestic product, population, inflation and foreign direct investment affect unemployment both in the short run and long run significantly in Pakistan during those periods. And they also found the existence of Phillips curve in both short run and long run. However, this existence of Phillips curve in the long run contradicts with the Friedman-Phelps hypothesis (1968) of unemployment and inflation relationship.

Eita and Ashipala et al (2010) examined the determinants of unemployment in Namibia for the period of 1971-2007. They employed macroeconomic variables and estimate the variables using the Engle-Granger two step econometric approaches. The results show that there is a negative relationship between unemployment and inflation in Namibia which is consistent with the Phillips curve analysis. They also found in their study, the positive relationship between wage rate and unemployment and negative relationship between investment and unemployment. It indicates increasing investment will reduce unemployment significantly. And they also found that the results were consistent with the Okun's law and the Harrod-Domar as well as the Phillips curve analysis. O'Nwachukwu and Chinedu et al. (2016) investigated that the determinants of

unemployment rate in Nigeria from 1980 to 2016 by using the ordinary least squares (OLS) method to estimate the model after using the Augmented Dickey-Fuller to test for unit root. The researcher employed five explanatory variables such as government expenditure, inflation rate, and first lag of unemployment, population and real gross domestic product. The result reveals that government expenditure, inflation rate and population are statistically significant in explaining changes in unemployment, however, first lag of unemployment and real gross domestic product are found not to be statistically significant in explaining unemployment in Nigeria. This is quite different from Kalim's et al.(2003) result obtained in Pakistan. From the above researches shows, the effect of country's gross domestic product (GDP) is significant in some countries and statistically insignificant in certain countries.

As indicated by Li Xuen C., Yun Bee C., et al. (2017) study conducted on macroeconomic factors affecting employment rate in China, over a period of 1982 to 2014. They used inflation, gross domestic product growth, population and foreign direct investment explanatory variables in their model. They applied the Autoregressive Distributed Lag (ARDL) approach, unit root test and Augmented Dickey Fuller (ADF) test. The result of the study reveals that Gross Domestic product growth and population are significant in explaining unemployment rate that implies long-run relation exists between the variables where as inflation and foreign direct investment are statistically insignificant in explaining unemployment. They indicate the significance of macro variables vary from country to country, from less developed countries to developing countries as well as between developed countries. Thus, categorization and country specific study is very important in order to know the significant factors affecting unemployment. And they also recommend that other macroeconomic variables such as interest rate, money supply, exchange rate and export are important in explaining unemployment (Asif, 2013; Bennett 2011, Dogan, 2012 et al.).

Gur (2015), examined the macroeconomic determinants of unemployment in BRIC countries (Brazil, Russia, India and China) using panel data analysis. The researcher took economic growth, population, inflation rate, interest rates, change in exchange rated and other factors that affect unemployment rate in those countries over the period of 2001-2013. The result shows that the most important cause of increasing unemployment in the BRIC countries is inflation followed by population growth. Gross domestic product growth, trade volume, total investment

and industrial product growth are the main economic factors that lead to the reduction of unemployment. This finding is consistent with the Friedman (1968) and Phelps (1967), meaning that inflation increases the impact of unemployment which is inconsistent with the Phillips curve theory. Population growth is the variable that increases unemployment which is similar to that Solow's growth model.

2.2.2. Inflation and Unemployment

Some economists argue that the two objectives (high income and low inflation) cannot be achieved at the same time, and there is an inevitable tradeoff between the two. Thus, the level of inflation is inversely related to unemployment rate. This inverse relationship was introduced by Phillips in 1958. In his analysis, he took nearly a century (1861-1957) of United Kingdom data and analyzed the relationship between unemployment and the rate of change of many wage rates. Using these two variables he explained his view using convex shaped Phillips curve.

The convex shape of the Phillips curve suggests that, on average, the economy will experience less inflation if the level of unemployment has narrow fluctuations about some average $\bar{U}$ than if the fluctuations are wider with the same mean $\bar{U}$. Thus, the broader the fluctuation, unemployment levels at any given average unemployment rate, the greater will be the cost-push inflationary pressure on the economy. The Phillips curve equation implies the rate of change of money wags is a function of the unemployment rate which is analogous to assuming that the extreme Keynesian model-money wage demands do not respond to expectations of price increase (Branson, pp 516). However, after 1970s due to oil price rise and war in the Middle East, the inverse relationship between inflation and unemployment became questionable. During this time both inflation and unemployment were raised. Hence, we can think of unemployment as determined by aggregate demand and the Keynesian cross model, while the Phillips curve determines inflation given the unemployment rate. And occurrence of a higher rate of inflation simultaneously with a higher rate of unemployment was introduced by Friedman. He challenged the concept of a stable downward-sloping Phillips curve view.

Friedman and Phelps argued independently that the existence of trade-off between rate of inflation and unemployment rates downward sloping Phillips curve is a short run phenomenon, but it is not stable and it often shifts both leftward and rightward due to the role of natural rate of

unemployment. Friedman concluded that there is no long-run stable tradeoff between rates of inflation and unemployment because he viewed as the economy is stable in the long run at the natural rate of unemployment and therefore, the long-run Phillips curve is a vertical straight line above the natural rate of unemployment.

Friedman‘s and Phelps‘s analyses provide a distinction between the ―short-run‖ and ―long-run‖ Phillips curves. So long as the average rate of inflation remains fairly constant, as it did in the 1960s, inflation and unemployment will be inversely related. But if the average rate of inflation changes, as it will when policymakers persistently try to push unemployment below the natural rate, after a period of adjustment, unemployment will return to the natural rate. He also introduced the concept of non-accelerating inflation rate of Unemployment (NAIRU) which refers to the specific level of unemployment that does not cause inflation to rise up. According to him, when actual unemployment exceeds the NAIRU, inflationary expectations rise, so that the inflation rate tends to increase and when actual unemployment less than the NAIRU, inflationary expectations fall, so that the inflation rate tends to disinflation.

Friedman also criticize that the misguided Keynesian expansionary fiscal and monetary policies, based on the wrong assumption that a stable Phillips curve, exists only result in increasing rate of inflation. According to Friedman’s theory of adaptive expectation, there may be a tradeoff between rates of inflation and unemployment in the short run, but there is no such tradeoff in the long run. Similarly, Edmund Phelps challenged the Phillips curve negative relationship between inflation rate and unemployment. There are some empirical research studies focusing on the relationship between inflation and unemployment.

Govera (2017) conducted study research on the relationship between unemployment and in inflation of South Africa using a hybrid version of the NKPC and Granger causality test to ascertain the nature of causality among the variables. The result obtained reveals that existence of a positive but insignificant long-run relationship between unemployment and inflation. As cited in Govera et al (2017) the study conducted by Kitov & Kitov (2013), inflation, unemployment and labour force dynamics in Japan over the periods 1980-2003 found that the negative relationship between inflation and unemployment which support the predictions of the Phillips curve.

Furuoka (2007) conducted study inflation and unemployment dynamics in Malaysia by using VECM for the period 1973-2004. The result reveals that the existence of a long-run trade-off relationship between the two variables.

Kasseh, P.,A.,(2018), conducted a research study on the relationship between inflation and unemployment in the Gambia by using the new Keynesian curve model on annual time series data sampled from 1991-2015 to test for the existence of Philips Curve. The finding confirms the existence of an inverse relationship between inflation and unemployment and statistically significant which indicates the existence Philips Curve hypothesis. However, Umaru & Zubairu (2012) empirically researched the Phillips curve relationship in Nigeria from 1977 to 2009 using the Engle-Granger co-integration test as well as the ARCH and GARCH techniques for testing volatility and the finding indicates no result that show the Phillips curve relationship in Nigeria for that period. Furthermore, Touny (2013) investigated the Phillips curve relationship in Egypt between 1974 and 2011 using the VECM and found that the two variables were co-integrated with a positive relationship between them.

As cited in Govera et al. (2017), Burger & Marinkov (2006) conducted a research study on inflation gap and output gap for the period between 1976 and 2002 and the result reveals that no evidence of inflation and unemployment trade-off.

2.2.3. Foreign Direct Investment and Unemployment

Developing countries like Ethiopia needs finance in terms of investment from the rest of the word in the process of structural transformation. So far, It has been received massive foreign direct investment (FDI) for economic growth as well as its contribution to a higher employment rate. Higher employment leads to a better living standard among people through increasing its gross domestic product (GDP). According to the classical theory, production is a function of labour. There are also many studies that examine the relationship between FDI and unemployment and most of them indicate, decreasing FDI affects employment rate negatively and significantly. FDI has significant impact on unemployment reduction in some countries while insignificant in some other countries. The effect of FDI has been controversial issue for hosting economies. Many empirical finding and theoretical results are not supporting each other on host economies.

Chang, 2007 and Asiedu & Elizabeth, 2004; states that FDI can activate economic development through positive economic spillover effects such as new technologies, capital formation, enhancement of human capital creation and expanded international trade. However, some studies found trade-off between FDI and economic growth and hence raise unemployment rates in host countries or at least have no obvious effect on unemployment rates (Change, 2005).

Irpan, Saad, MdNor and Ibrahim (2016) examined the relationship between FDI and unemployment over a period of 1980 to 2012 of Malaysia, using autoregressive distributed lag (ARDL) model. In their model they were incorporate other variables such as number of foreign workers, gross domestic product (GDP) and exchange rate and they found that; FDI, number of foreign workers, and GDP significantly influence the unemployment rate in Malaysia. Zeb, Qiang and Sharif (2014) also examined the relationship between foreign direct investment and unemployment reduction in Pakistan by incorporating some other explanatory variables such as corruption, population size and inflation over the period 1995 to 2011. They used multiple regression analysis to examine the effects of those variables on unemployment. Their result reveals that foreign direct investment has a significant role in unemployment reduction in Pakistan.

In addition, Jayaraman and Singh (2007) examined the relationship between foreign direct investment and employment in Fiji by using a multivariate model. In their analysis, they found that both GDP and FDI have positive and significant impact on employment in Fiji. Unidirectional causality running from foreign direct investment to employment in the long run and unidirectional causality running from FDI to GDP in the short run was checked in this study. This implies foreign direct investment has positive impact on level of employment in the long run rather than in the short run. However, Mucuk and Demirsil (2013) examined the relationship between FDI and unemployment of seven developing countries such as Argentina, China, Colombia, Philippines, Thailand, Turkey and Uruguay over the period of 1981-2009. They employed panel unit root, panel co-integration and panel causality tests to show the relationship between FDI and unemployment. The result showed that foreign direct investment and unemployment have positive relationship in the long run and the relationship varies from country to country. They also found that FDI increases unemployment in Turkey and Argentina while reduces in Thailand. They also concluded that negative effects of FDI on unemployment are due

to brown field investment which is composed of acquisitions and mergers, so policy makers should focus on green field investment to create more job opportunities. This kind of intervention is very important for most developing countries which the economy is dominated by agriculture.

Rizvi and Nishat (2009) also investigated the impact of FDI on employment opportunities in Pakistan, India and China over the period 1985-2008 by using the Im-pesaran-shin (IPS) unit root test for order of integration and Pedroni (1999) for panel co-integration. And they also employed Seemingly Unrelated Regression (SUR) method to estimate impact of foreign direct investment on employment of those countries. Their result reveals that FDI does not create a direct impact on employment opportunities in India, China and Pakistan. They also suggested that, in addition to FDI enhancement policies, other measures should be taken to encourage employment growth.

Furthermore; Johnny, Timipere, Krokeme and Markjackson (2018) examined the impact of foreign direct investment on employment rate in Nigeria form 1980 to 2015 using unit root test, co-integration test and ordinary least square analysis. The result reveals that there is negative and insignificant relationship between foreign direct investment and unemployment rate in Nigeria. They recommended that, government should implement policies that will attract foreign investors in Nigeria in order to make more investments that would ensure that all resources for productive activities are fully employed before going into any form of savings.

Aktar and Ozturk (2009) conducted a study on the inter relationship between foreign direct investment, export, unemployment and gross domestic product over a period of 2001 to 2007 in Turkey. They employed VAR technique of variance decomposition and impulse response function. The result reveals that foreign direct investment does not have any impact on unemployment rate in Turkey.

Wei, Y., (2013) conducted study on the effect of FDI on employment in China by categorizing FDI inflow into primary, secondary and tertiary economic sectors. The result reveals that the correlation between FDI and employment is positive and significant only in the primary economic sectors; but in secondary, there is no significant relationship. For the tertiary sector, FDI has significant negative relationship with unemployment. From this we conclude FDI has

more effect in reduction in unemployment when foreign domestic investment is invested in primary sectors and it may be related to the skill of labour in the hosting country.

In addition, the efficiency seeking FDI may cause more unemployment due to export substitution and re-imports than employment through additional exports to host countries (Agarwal, Prasad, J., 1996). FDI inflows and outflows are not determents of the aggregate unemployment. Palåt (2011), examined the relationship between foreign direct investment and unemployment and found the positive and significant relationship between FDI and unemployment. ILO (2011) study shows that investment growth has a strong and positive effect on employment creation. This study results indicates, a one percentage point increase in the investment growth rate would produce a 0.12 percentage point increase in employment growth. In addition, ILO (2012c) study again shows that both private and public investment rates positively and strongly affect employment.

In the literature, the views about the impact of FDI on host countries can be classified into unconditional view and conditional view. In unconditional case, scholars are viewed as the positive impact of FDI on many macroeconomic variables including unemployment without any precondition whereas the conditional viewer argues that FDI might improve the host countries' economies through its positive spillover effects when certain economic conditions including certain level of technological development and infrastructure are fulfilled (Haddad, Mona and Ann Harrison,1993).

Both unconditional and conditional studies focusing on the effect of FDI on macroeconomic variables is unclear and conflicting. For instance Lichtenberg and Potterie (2001) (cited in Haddad, Mona and Ann Harrison et al, 1993) who support unconditional view illustrate zero or negative correlations between FDI and growth which implies a positive correlation between FDI and unemployment due to Okun's Law. On the other hand, for the conditional viewers FDI are determined by absorptive capacity factors. Meaning that host country's ability to absorb FDI that maximize both its direct benefits (increased growth rate and capital formation) and indirect benefits (such as technology transfer and increased trade) through its spillover effects (UNCTAD, 2007). Furthermore, many empirical studies indicating that the effect of FDI on host economies depend on their absorptive capacities which include four factors such as (1) human capital quality, (2) the level of technology development, (3) the level of infrastructure

development, and (4) the degree of openness (Todoroski and Hristijan ,2008).However, studies conducted in Ethiopia shows poor infrastructure; low level of technology development, very low human capital quality, hence the country ranked 174 from 188 countries in 2015 and classified as low human development category (UNDP, 2018).Thus, from the above empirical analysis on the impact and relationship between foreign direct investment and unemployment vary from country to country. Therefore, does net foreign direct investment in Ethiopia affect unemployment negatively or positively? It is the concern of this study.

2.2.4. Unemployment and External Debt

External debt is part of a country's total debt that was borrowed from foreign leaders, including international financial institutions such as World Bank (WB) and International Monetary Fund (IMF). The external debt comprises the outstanding amount of those actual current and not contingent liabilities owed to non-residents of country which require the debt or to pay principal and/or interest at some point(s) in the future. External debt is also referred to as foreign debt. Theoretical models on debt and growth have indicated a positive link between a reasonable amount of debt inflows and economic growth. The implication of these models is that capital scale countries benefit in the weak capital inflow. However, the literature also links larger inflows of debt leading with lower economic growth. The famous debt overhang hypothesis is a case in point. It indicates that the expected debt service is an increasing function a country's output level. The returns from investing in a country, therefore, face a high marginal tax by the external creditors, and both domestic and foreign direct investment discouraged. In addition, there are many debatable empirical studies regarding the impact of debt accumulation and unemployment reduction.

Among the few empirical studies, Ohwofasa,Nana, and Kumapayi (2012), Shahid, M.,M., Mahmood,T.,A.s, & M.N. Bhalli et al (2013) and Shem (2015) include external debt as a macroeconomic variable into their analysis to identify the determinants of unemployment. Ohwofasa et al (2012) employs an ordinary least squares (OLS) technique to determine the influence of external debt, debt service payment, balance of payments and foreign direct investment of Nigeria. The result of the analysis shows that impact of external debt on unemployment is positive while foreign direct investment has a negative influence on unemployment. However, Otoi and Pokhariyal (2016) tests the long run effects of economic

determinants of youth unemployment in Kenya and the result of analysis indicates the negative relationship of foreign direct investment and external debt. By contrast, Shahid, M.,M., Mahmood,T.,A.s, and M.N. Bhalli (2013) et al (2013) examined the relationship between external debt and unemployment. The result shows that there is no statistical significant effect of external debt on unemployment in Pakistan. He further suggested that money borrowed from lenders were not utilized appropriately in the process of economic activity and indicates some are lost through corruption.

Furthermore, Argaw (2013) has also examined the impact of external debt on economic growth in Ethiopia using macro econometric model over the period of 2000-2010. She found that external debt service payment and foreign exchange reserve have positive impact on GDP of Ethiopia which implies that external debt in Ethiopia has positive impact on economic growth rather than depress it. By contrast, Ramakrishan (2002) showed the negative as well as non-linear relation between debt and growth. And the researcher also recommends more and more debt relief to Ethiopia along with fiscal consideration and efficient investment utilization.

Krugman (1988), Sachs (1989) and Salih (1994), present evidence from Africa that is consistent with the debt overhang literature. The studies provide evidence of a negative relationship between per capita debt and per capita growth of African countries, including Ethiopia.

Cecchetti, Moharity and Zampoui (2011) examined the real effects of debt in 18 OECD countries from 1980 to 2010 by including the level of government, non-financial corporate and household debt. In their analysis they indicate, debt is important for growth when it is below threshold (below 85% of GDP) otherwise it drag on growth.

Nisar, khawar and khan (2014) examined the effect of public debt on economic growth, investment and unemployment in Pakistan since 1980s to 2014 by using ordinary least square (OLS). The causality test was also conducted between public debt and each of the variables. Thus, their regression analysis with unemployment as the dependent variable and public debt and GDP growth rate as the explanatory variables shows that unemployment increases as debt increases and significant.

Another researchers, such as Clements, Bhatlacharaya and Nguyen (2003) examined the external debt, public investment, and growth in low income countries and found that the per capital

income of highly indebted countries rises by 1% points if the total stock of external debt is decreased by a considerable amount. They also indicated that, if the debt servicing reduced in highly indebted countries and the finance are directed towards public investment, this would increase by an additional 0.5% per annum. On the other hand they showed, debt seems to be a problem of it passes a certain threshold (an average figure for external debt of 50% of GDP) and the substantial decrease in the external debt would increase the GDP growth by 0.8 to 1.1%.

Isaev and Masih (2017) have examined the nexus of private sector foreign debt, unemployment, trade openness of Australia as a case study over the period 1988 – 2016. They employed the autoregressive distributed lag (ARDL) co integrate technique to explore the presence of theoretical long-run relationship among these variables. The result indicates the presence of long-run equilibrium among variable and the accumulation of private sector share of foreign debt is associated with the growth in Australia's unemployment rate. The researcher also recommends for the policy makers that improvement of the private sector's foreign debt is likely to reduce the unemployment rate.

Nguyen (2018) examined the relationship between external debt, economic growth, unemployment and national expenditure in Vietnam using a vector auto regressive (VAR) model approach over a period of between 1987 and 2016. The result revels that there are directional relationship between GDP and external debt and GDP and national expenditure. It also shows that there are directional relationship between unemployment and external debt, GDP, and national expenditure. The researcher recommended that, external debt should be effectively managed by the government because increase in external debt leads to reduce unemployment of the country. Similarly, Ijirshar, Joseph, Godoo (2016) showed external debt stock had a positive impact on economic growth, while external debt service negatively affects the annual growth rate of Nigeria both in the long run and short run. However, Shkolnyk and Koilo (2018) investigated the relationship between external debt and economic growth in emerging economies over the period 2006-2016. They found that there is a negative relationship between external debt and economic growth for emerging economies. Gur et al., (2015) is examined unemployment determinants, in BRIC countries over a period of 2001-2012, using Panel data.

Thus, the effect of debt can be seen in two dimensions, such as at low levels it helps the economy to grow and provide welfare but if debt is taken excessively it can destroy the

economy. Debt is not a bad thing, but up to a certain limit. If this limit is surpassed then the government has to bear the burden of high levels of debt which can harm the domestic economy. Hence, the impact of Ethiopia's debt accumulation on unemployment could be the focus issue of this research study.

2.2.5 Unemployment and Foreign Exchange

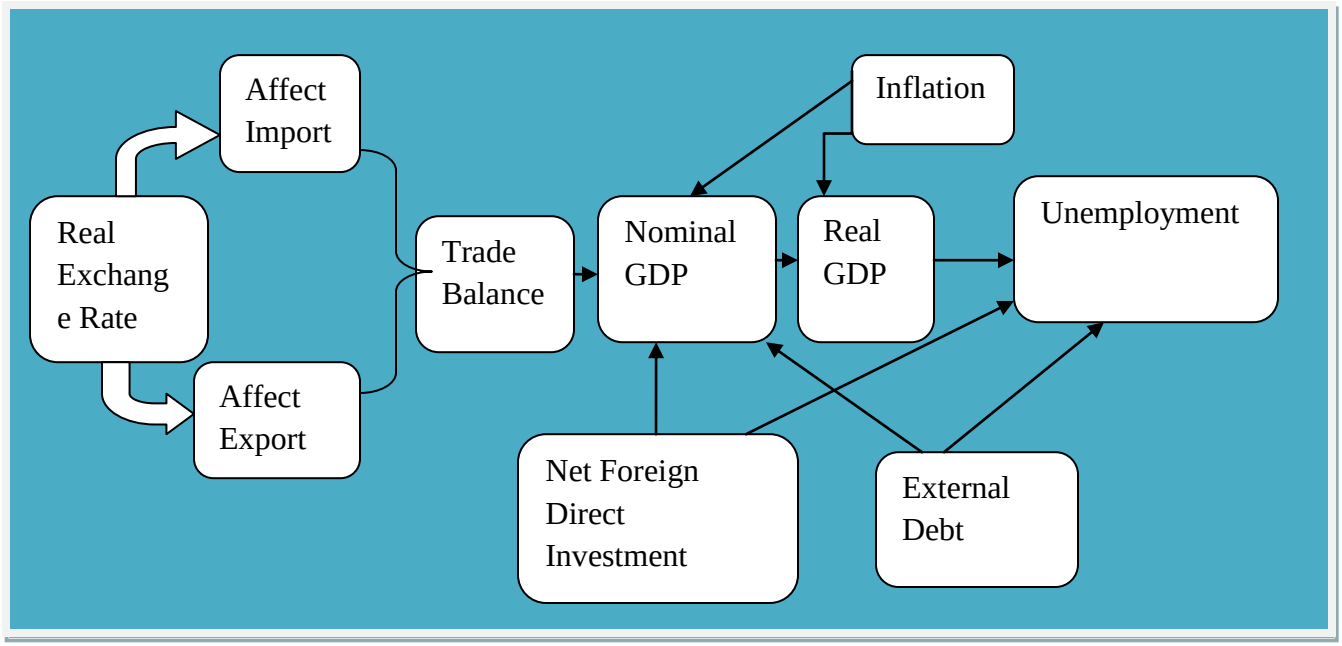
Cakrani (2015) examined the impact of the real exchange rate on employment in Albania using the Johansen procedure and vector error correction approach. The result of the study indicates that the impact of real exchange rate has no statistically significant on the level of employment of Albania and the researcher recommended that other strategies are important than changing the real exchange rate to increase the level of unemployment. However, it is inconsistent with the other researcher study's result (Asif, 2013; Bennett, 2011); Dogan, 2012 et al).

Furthermore, Chimnani, Ahmad, Butt, Shaika and Devi (2006) have examined the effect of exchange rate on unemployment rate in ASIAN countries using unbalanced paned data set of ten countries such as Pakistan, India, China, Japan, Bangladesh, Argentina, Algeria, Brazil, Colombia and Sri Lanka over the period of 1995 to 2005. And they found that exchange rate volatility has positive and significant effect on unemployment rate in ASIAN countries. Dogan, Islam and Yazici (2018) examined the relationship between real exchange rates and job flows in Turkish manufacturing industries between 2006 and 2015 using dynamic panel data models, they believed that a real appreciation increase gross and net job creation rates and that the effect of appreciation is result in the exposure to international competitiveness of industries increase. And the result of their study reveals that an appreciation creates more jobs because lower imported input costs enable firms to outcompete foreign procedures. In addition, Hua (2007) has conducted study in 29 Chinese provinces indicate that whenever the other currency appreciates it create negative effect on employment through three channels such as technological channel, export volume channel and efficiency channel. Further, Faria and Ledesma (2004) examined the impact of real wages and real interest rate on employment and found positive relationship between real wage and real interest rate and employment while negative of real exchange rate. Therefore, does the impact of exchange rate is positive or negative on unemployment in Ethiopia or not is the concern of this study.

2.3 Conceptual Framework

Based on the above theoretical and empirical evidences, the conceptual framework is used to examine the variations in unemployment due to many macroeconomic factors that influence it in Ethiopia.

Conceptual Framework



The above chart describes the list of all variables with their direction of impacts on the target variable (unemployment). Real exchange rate affects both export and import which in turn affect trade balance of the economy. On the other side, Net foreign direct investment, external debt and inflation affect Nominal GDP and Real GDP directly. Moreover, Real GDP, the net foreign direct investment and external debt directly affect unemployment.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Sources of Data and Type

This study has employed secondary data. The data were collected on the identified macroeconomic variables. The explanatory macroeconomic variables include real gross domestic product (RGDP), net foreign direct investment (NFDI), external debt (ED), net foreign direct investment (FDI), real effective exchange rate (REER), inflation rate (INFR)and dummy variable (DM_LM) . Data on these variables are from the latest world development indicators data of (2018), generated by national Bank of Ethiopia (NBE), African economic outlook (2018), world bank, ILO year book of labour statistics (1989-90, 1991), IMF reports, international financial statistics (IFS), UNCTAD report (2002), published articles and MoLSA's annual labour market statistics. The periods for the collected data cover from 1978 to 2018.

3.2. Method of Data Analysis

The methodological framework employed to examine the relationship between unemployment and its determinants are discussed in this chapter. The analysis of this study will be presented in two ways. The first analysis method is descriptive analysis which overviews the trends of unemployment. The second is the econometric analysis in which the relationship between identified macroeconomic variables and unemployment were examined. In the analysis, diagnostic tests were used to be sure that the functional form of the model was appropriate.

3.2.1. Descriptive Analysis

In the descriptive analysis which shows the overviews the trends of unemployment against some variables. Bar and line graphs are employed to demonstrate the trend of unemployment with sex, age, education, RGDP of the country.

3.2.2 Econometric Analysis

A) Pre and Post Estimation Diagnostic Tests

In order to select appropriate model, it must go through certain steps such as Pre-estimation test (including Unit root test, maximum lag length). Dickey-Fuller (DF) or Augmented Dickey Fuller

(ADF) test will be conducted for stationary. In some cases the white noise error term is not appropriately described by first order autoregressive process, we should add lagged values which leading to the Augmented Dickey Fuller (ADF) test. In addition, before estimation identification of maximum lag length is important. Thus the maximum lag length selection identification is conducted.

There are a number of diagnostic tests conducted for normality of data, autocorrelation between error terms, omitted variables or functional forms, as well as the stability between dependent and independent variables. The normality of data can be tested by Jarque- Bera test. It is one of the consistent assumptions for many statistical tests, such as t-test or F-test. If the assumption is violated, it may produced in accurate inferences and hence produce misleading results. The Lagrange Multiplier Test (LM test) was applied to prove whether there is autocorrelation between error terms or not. Regression specification error test which was proposed by Ramsey (1969) was used to check whether there is omitted variables or not in the model besides, the specification error of correct functional form and correlation between explanatory variables and error term were tested using Ramsey's RESET Test (Spara, 2005).

CUSUM test will be applied to determine the systematic movements of coefficient values shows that there is a possible instability in the structure. Thus, the stability of the coefficients checked by using CUSUM test or CUSUM square Test.

B. Model Selection

There are several estimation techniques in the analysis of multivariate time series data. Some of these techniques are residual based approach proposed by Engle and Granger (1987) and maximum likelihood-based approach proposed by Johansen and Julius (1990) and Johansen (1992).

However, many econometricians prefer this model in estimating multivariate time series data analysis for many advantages. One of the important advantages of ARDL procedure is that the estimation is possible even when the explanatory variables are endogenous (Alan and Quazi, 2003). Furthermore, as long as the ARDL model is free of residual correlation, endogenaty is less of a problem. Pesaran and Shin (1999) showed that the appropriate lags in the ARDL are corrected for both residual correlation and endogeneity. The other advantage of ARDL against

the single equation co-integration analysis such as Engle and Granger (1987) is that Engle and Granger suffer from problems of endogeneity while the ARDL method can distinguish between dependent and explanatory variables. According to Pesaran et al. (1999), the ARDL method has additional advantage of yielding consistent estimates of the long run parameters that are asymptotically normal irrespective of whether the variables are I(0), I(1) or mutually integrated.

In addition, Pesaran, Shin, and Smith (2001) have developed autoregressive distributed lag (ARDL) co integration approach. This technique was applied for the investigation of long-run relationships and dynamic connections among variables in Ethiopia, such as unemployment rate, Real Gross Domestic product, net foreign direct investment, external debt, real exchange rate, inflation and dummy variable that represent policy instrument.

Hence, this study adopts autoregressive distributed lag model (ARDL) to show the relationship of unemployment in relation with real gross domestic product, net foreign direct investment, external debt, real exchange rate, inflation rate and Proclamation No.104/1998 as dummy variable by approaching short and long-run effect. ARDL is used because all variables are stationary at level and one lag level mix.

Therefore, based on the above conceptual framework links *(chapter two)* the simplest functional form of the model is as follows:

UN=f (RGDP, NFDI, ED, RER, INFR, DM_LM)

Where UN = Unemployment

RGDP = Real Gross Domestic Product in US dollars (millions)

NFDI = Foreign Direct investment in US dollars

ED = External Debt

RER=Real Exchange Rate

INFR = Inflation Rate

DM_LM= Dummy variable

The dependent and explanatory variables can be explained as follows:

Unemployment (UN): It is the dependent variable which is influenced by real gross domestic product, population growth, inflationary pressure, capital inflow, external debt, the ratio of

export and import in gross domestic product and interest ratio unemployment occurs when a person is able and willing to work but is currently without work.

Real Gross Domestic Product (RGDP): The total market value of all final good and services produced annually within the territory of Ethiopia with a constant price of 2010. This study expects that the negative relationship between RGDP and unemployment and significant. Meaning that as economy expands; many job opportunities are available for unemployed people. Thus, it reduces unemployment.

Net Foreign Direct Investment (NFDI): The difference between inflow and out flow of capital to establish enterprises. Ethiopia is the top destination of FDI African countries recently, which may create many job opportunities for the citizens. Hence it affects unemployment negatively.

External Debt: is the accumulation of money borrowed from international institution. Since in the short run motivates the economic growth of the country it is expected to have negative value in affecting unemployment of the country. However, the benefit of the borrowed country depends on the ratio of Gross Domestic product of that country.

Real Exchange Rate: is the relative value between two currencies. Exchange rates are the amount of one currency in exchanges for another. The currency exchange rate has an impact on unemployment because it affects the competitiveness of local firms and cost of imported goods and services. As currency depreciate it is believed that export volume of the country increases as a result many job opportunities would be opened. Thus, it has negative impact on unemployment rate of the country.

Inflation Rate (INFR): Is an increase in the average price of goods and services in terms of money. Alternate in the short run inflation and unemployment has expected to be negatively related.

Dummy variable (DM_LM) which represents Proclamation No.104/1998 of FDRE: It encourages the participation of private employment Agencies that provide labour market services for jobless people.Between1978 to 1997=0 (No proclamation that encourage private employment Agencies) and =1, otherwise (After issued and implemented). This is because labour market institutions particularly private employment service provider have a great role in reducing

unemployment. Skill matching in its purest form is filling jobs with employees whose skills and competencies match the job requirements. Labour market is not perfect for a number of reasons: employers and job seekers do not have perfect information to hand when making decisions; and some employers are not successful in finding employees and they need to realize their business objectives. Thus, this kind of labour -job mismatch needs existence of private employment agency that is why proclamation No.104/1998 included in to the model as dummy variable.

Based on the theoretical frame work the determinants of unemployment will be examined using Autoregressive Distributed Lag (ARDL).The ARDL approach to co integration involves estimating the unrestricted error correction model version of the ARDL model for unemployment and its determinants. The ARDL model deals with single co integration and it was introduced by Pesaran and Shin(1999) and further explained by Pesaran et al.(2001).The general form of ARDL(p,q) is as:

$$\boldsymbol{Y_t = \beta_0 + \sum_{j=0}^{q} \beta J\ \ LjXt + \sum_{j=0}^{p} \gamma j Lj\ Yt + \varepsilon t} \text{..... Eq(1)}$$

Where L= stands for lag operator

Lj= Xt-j is a dynamic model in the level of the variable and their lags

ARDL approach to co-integration provides the error correction version of ARDL model. Thus the model is given as:

$$\Delta lnUN_t = \beta o + \sum{}_i \Delta lnUN_{t-i} + \sum \alpha_i \Delta lnRGDP_{t-i} + \sum{}_i \Delta lnNFDI_{t-i} + \sum \mu_i \Delta lnED_{t-i} + \psi i \Delta RERt-i + \rho i \Delta INFRt-i + \eta \Delta DM_LMt-i + \beta 1 lnUNt-1 + \beta 2 lnRGDPt-1 + \beta_3 lnNFDI_{t-1} + \beta_4 ED_{t-1} + \beta_5 RER_{t-1} + \beta_6 INFR_{t-1} + \beta_7 DM_LM_{t-1} + \varepsilon_t \text{ ...Eq(2)}$$

Where $, \alpha, , \mu, \psi, \rho$ & η shows short run dynamics of the model and all β's shows the long run relationship. The ARDL approach consists of two steps for estimation of the long run relationship among variables. In the first step F-statistics is employed to cheek whether co-integration exists or not. F-statistics is compared with critical value of F-tabulated by pesaran (1997) or pesaran et al. (2001).

C) Hypothesis Testing

In this case, we need to examine existence of long run relationship in unrestricted equilibrium correction model using Wald F-Statistic. The null hypothesis and alternative hypothesis are:-

The null hypothesis that there is no co-integration is defined as

$$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$$

(No long run relationship the alternative hypothesis)

Against the alternative hypothesis (long run relationship)

$$H_1: \beta_1 \neq 0, \beta_2 \neq 0, \beta_3 \neq 0, \beta_4 \neq 0, \beta_5 \neq 0, \beta_6 \neq 0, \beta_7 \neq 0,$$

C) Short Run (ECM) and Long Run Dynamics Estimation

The error correction equation is applied to find the adjustment speed to the equilibrium. Thus, the ECM equation is as follows:

$$\Delta \ln UNt = \beta_o + \sum \alpha_i \Delta \ln RGDP_{t-i} + \sum {}_i \Delta \ln NFDI_{t-i} + \sum \mu_i \Delta \ln ED_{t-i} + \sum \psi_i \Delta RER_{t-i} + \sum \rho_i \Delta INFR_{t-i} + \sum \eta \Delta DM_LM_{t-i} + ECM + \varepsilon_t \quad \text{..... Eq (3)}$$

From the above equation real gross domestic product, net Foreign Direct Investment, real effective exchange rate, inflation rate are probably to have negative relationship with unemployment.

D) The ARDL Bounds Tests for Co-integration

In this study ARDL bound test approach is applied to examine the existence of long run relationship in unrestricted equilibrium correction model. Autoregressive Distributed Lag (ARDL) is used in this study because the unit root is stationary at level and 1st difference and level mix. To identify the long run relationship between variables coefficient diagnostic test Bound Test, ARDL co integrating is conducted.

CHAPTER FOUR

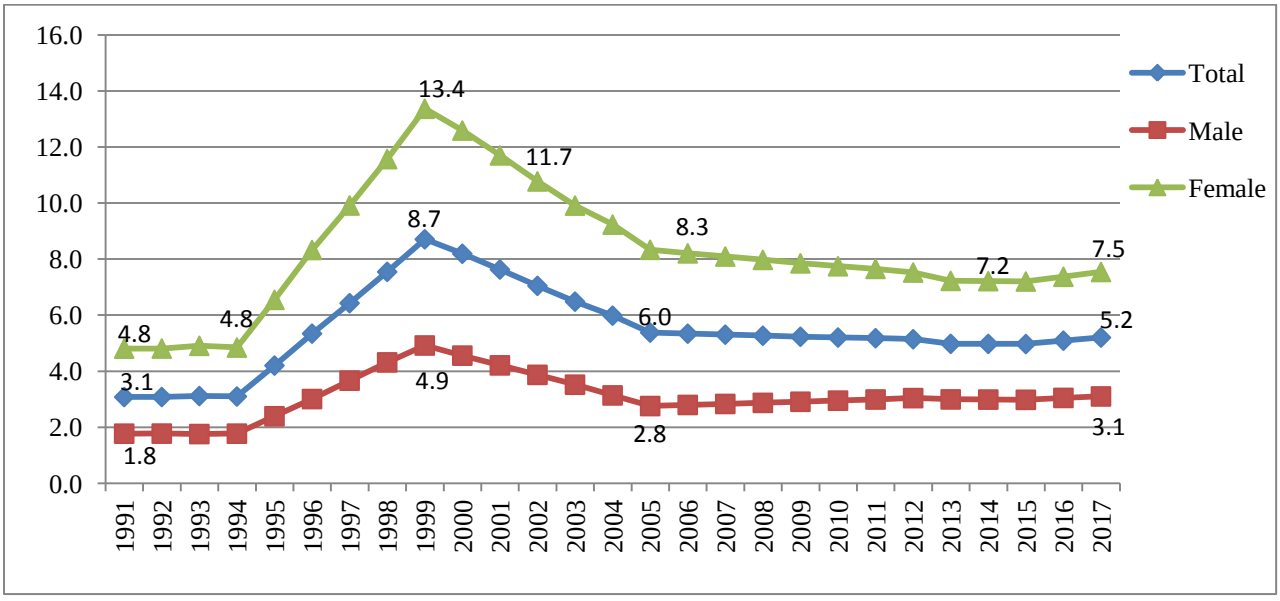
DATA PRESENTATION, ESTIMATION AND ANALYSIS

4.1. Descriptive Analysis

4.1.1. Unemployment rate in Ethiopia

Despite strong economic growth, labour supply surpassed demand as the number of trained labour force graduating from dramatically expanded universities in Ethiopia. The contributions of private and public sectors in employment of labour forces are weak. The number of educated unemployment rate, in the country ever is increasing. In Ethiopia agricultural sector even could not absorb unskilled labours and nor did the industrial sector. The employment challenge for Ethiopia is rooted in its inability to diversifying its economy and promoting productive employment along with fast-growing labour force. As a consequence, there is a growing interest for pro-employment sectoral policies within integrated policy frameworks aimed at generating employment and have more inclusive growth paths.Unemployment trend by sex since 1991 is shown in below figure.

Figure 4.1 Unemployment Rate by Sex



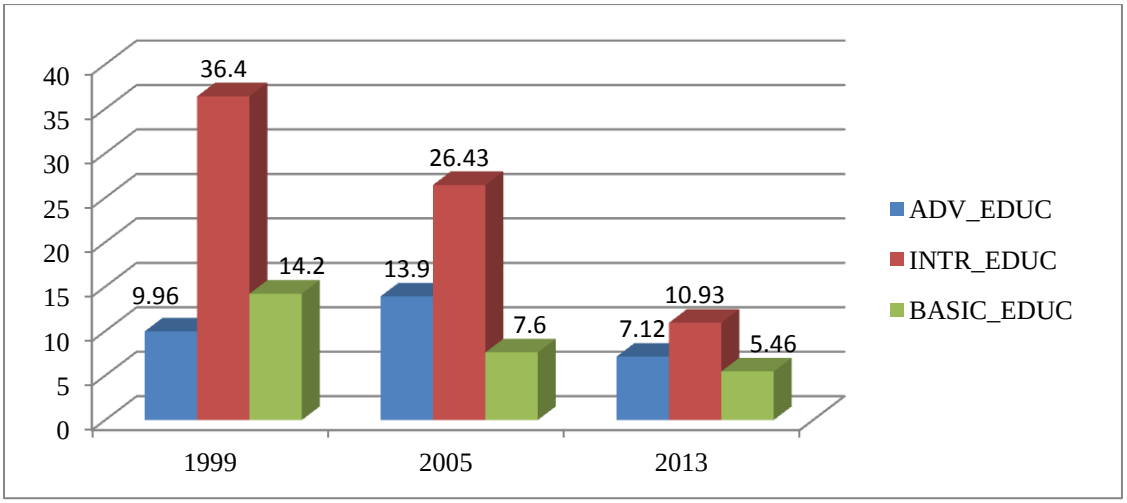
Source: Author's Computation from World Bank data, 2018

As shown in Figure 4.1, the total unemployment rate depicts that an increasing trend from 3.1 percent in 1991 to 8.7 percent in 1999 and thereafter decreases to 5.2 percent in 2017.The

highest unemployment rate was registered in 1999 compared to other years. In between year 2005 to 2017 unemployment rate has constant trend. As regards by sex, females are more affected by the incidence of unemployment than males counter parts over all the periods.

In Figure 4.2 below indicates, unemployment rate by education in three categories (advanced, intermediate and basic education) have a decreasing trends. People with an intermediate education are more unemployed compared to other categories of education.

Figure 4.2: Unemployment Rate by Education

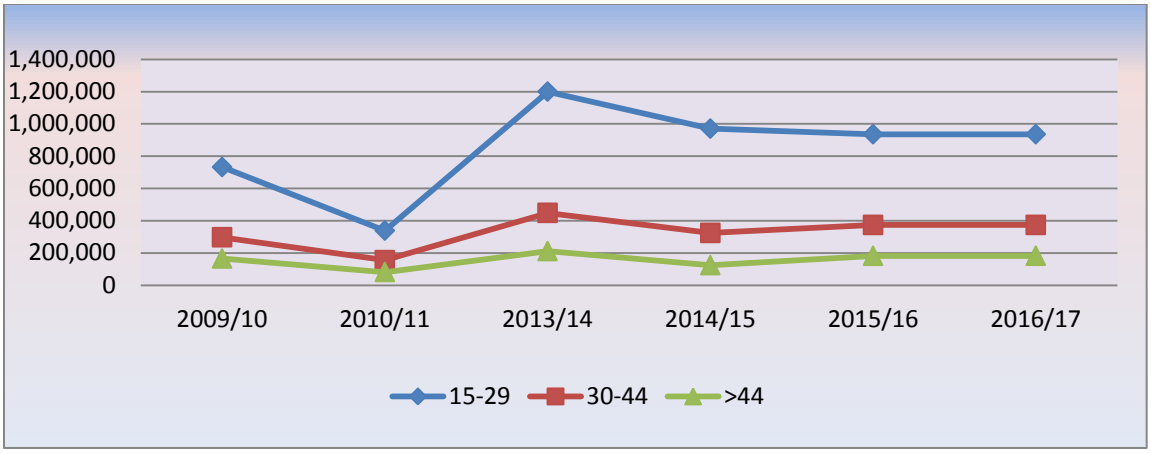


Source: Own computation from World Bank data, 2018

Unemployment rates with advanced education (ADV_EDUC) in 1999, 2005 and 2013 are 9.96%, 13.9% and 7.12% respectively. Similarly, unemployment rate with intermediate education (INTR_EDUC) in 1999, 2005 and 2013 are 36.4%, 26.4% and 10.93%, respectively. Furthermore, unemployment with basic education (BASIC_EDUC) was 14.7%. in 1999, 7.6% in 2005 and 5.46% in 2013. Unemployment with intermediate education was the highest share in the total unemployment rate in three national labour surveys and it decline from 36.4% in 1999 to 10.93% in 2013.It implies higher school dropout rate and consequently, higher share of low level or unskilled labour force in labour market. Similarly, unemployment with basic education has declined from 14.7% (1999), to 5.46% (2013). In general, the unemployment of three categories has decreasing trend from1999 to 2013.

People with different age categories are affected not in the same way.As indicated in Figure 4.3 people with age from 15-29 are highly unemployed compared to other age categories.

Figure 4.3: Unemployment by Age

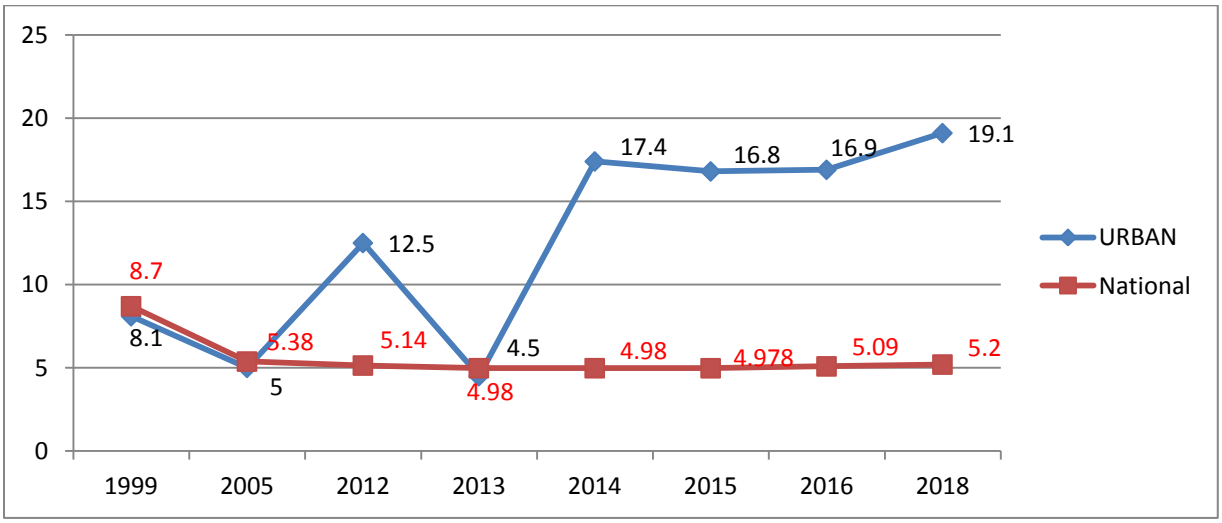


Source: Author's computation from MoLSA's Yearly Labour Market Information Bulletin

That means, among the three age category, youth unemployment has higher share in total unemployment. This implies youths are more vulnerable for unemployment particularly in urban areas of Ethiopia. As age increases unemployment rate decreases implies that the country is characterized by youth (15-29 ages) unemployment.

As shown by figure 4.4 below the urban unemployment is higher than the national unemployment rate in general.

Figure 4.4: Urban and National Unemployment Rate (1999-2018)



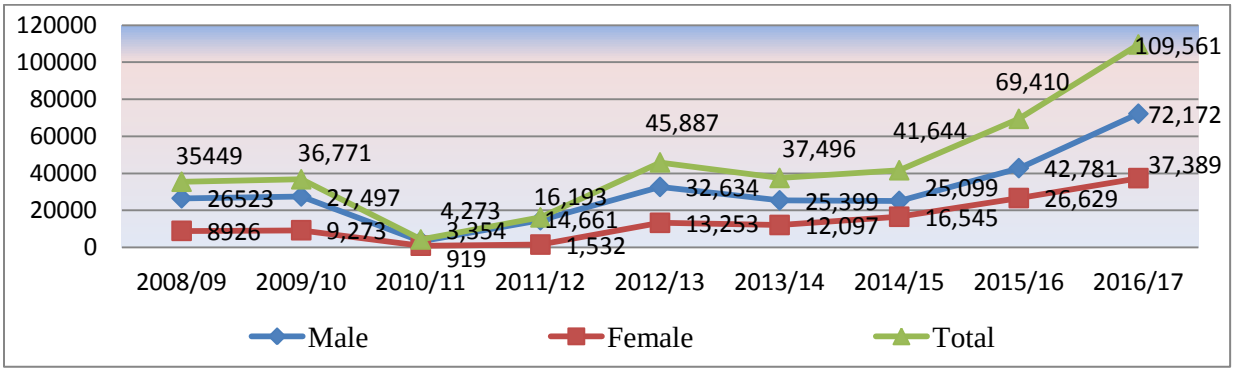
Source: Author's computation from National Labor Survey (2013) and CSA (2018)

The urban unemployment rate had decreasing trend as well as lower than the national unemployment rate between year 1999 to 2005 and then increased to 12.5 percent in 2012.Urban unemployment gets its lowest point in 2013 and lower than the national unemployment by 0.58 percent in between year 2005 and 2014. After year 2013, the urban unemployment has an increasing trend while the national unemployment rate trend looks constant, consequently the gap between urban unemployment and national unemployment increasing from time to time and reaches 13.8 percent difference in 2018. So, this implies that urban people have been affected by unemployment problem over the period. However, the national unemployment rate was fluctuating between 8.7 percent and 4.98 percent over the period (1999 to 2018).

4.1.2 Impact of Private Employment Agencies in Reducing Unemployment

Currently, Ethiopia has a national employment policy and strategy (FDRE, 2016) and legal frameworks which include ratified ILO conventions. Among 21 ratified ILO conventions, one is private employment agencies convention, No.181 of 1997. Following this ratification of this convention, Ethiopia also issued its private employment agency proclamation No.104/1998, based on the principles laid down in this convention. This proclamation aimed to encourage the participation of individuals and private entities in the employment services in the country. Private Employment agencies are aimed to provide employment services for job seekers that include registration, job matching and training services. So, job-seekers who are legally registered and placed through local private employment agencies (LPEA) were increasing. The following figure shows job seekers placed by LPEA.

Figure 4.5: Job-seekers placed by LPEA



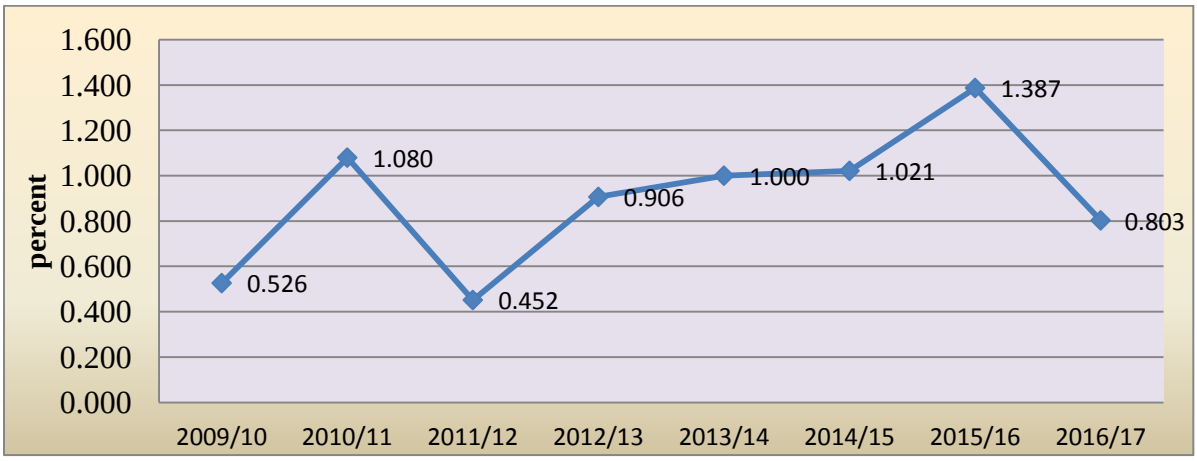
Source: MoLSA's Yearly Labour Market Information Bulletin

Figure 4.5 shows, the number of job seekers placed by private employment agencies from 2008/09 to 2016/17. Placed male job seekers were higher than female counter parts. The trend of placed job seekers decline from 35,449 in 2008/09 to 4,278 in 2010/11, afterwards it has increasing trend and highest job seekers were placed in 2016/17 which accounts 109,561.This implies that large number of unemployed people have got employment services and employed by private employment agencies, hence they have impact on unemployment reduction.

4.1.3 Impact of foreign Work Permit on Employment opportunity

Foreign work permits have impact on domestic employment opportunities. The share of permitted foreign workers is increasing compared to total unemployment since 2011/12. However, it was decreasing for the last three years. Through FDI, investors request work permit for foreign experts to be employed in their company. Ethiopia permits for foreign workers more than thirty thousand every year. Foreign employment has its own impact on domestic employment.

Figure 4.6: Percent of Foreign workers to work force of Ethiopia



Source: Author's Computation from MoLSA's Yearly Labour Market Information Bulletin,

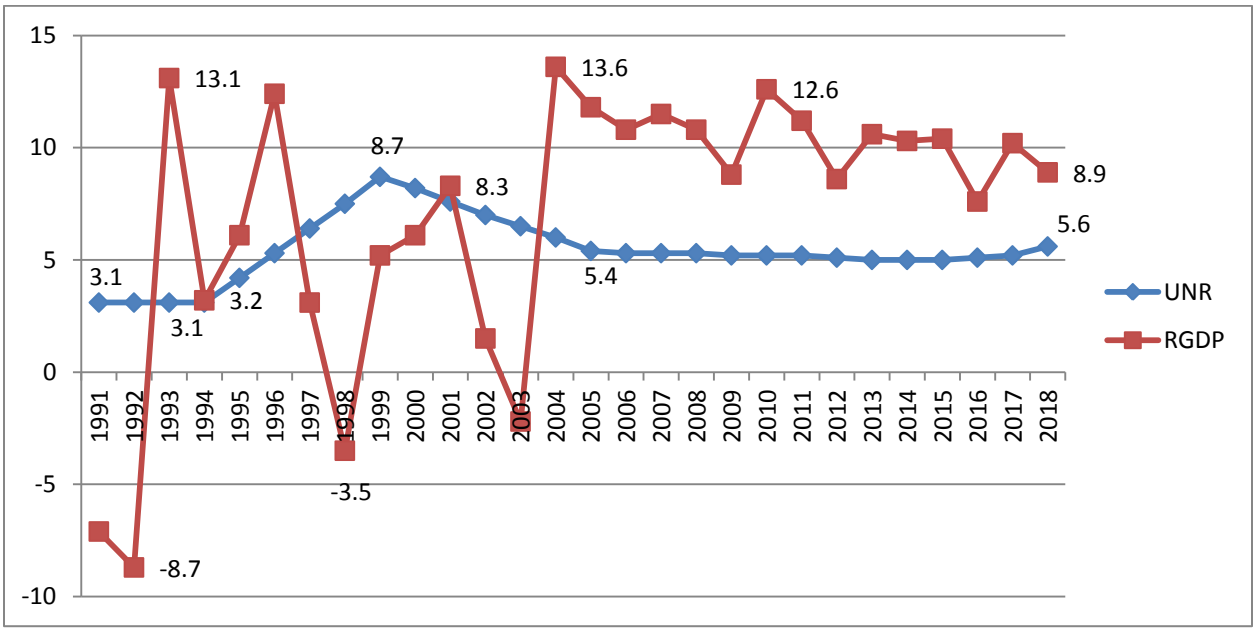
As the number of foreign workers work permits increase, its impact on domestic employment increases. For instance, in 2015/16 about 1.387% of labour force have got work permit which result in raise unemployment in Ethiopia by the same amount. Hence, domestic employment for advanced educated people would be affected by FDI inflow into the country.

4.1.4 Unemployment and Economic Growth trends in Ethiopia

Ethiopia is one of Africa countries that registered rapid economic growth rate in the past decade. For instance, the average growth rate was recorded at 11 percent between 2003/04 and 2015/16, higher than the average growth rates of Sub Saharan countries (NPC, 2015/16). Development strategies and sectoral targeting in Ethiopia need to take employment generation and labor-intensity into account as key factors in determining which sectors to prioritize in policy interventions.

Ethiopia, like most developing countries, is endowed with large labour force. It is now a widely accepted that labour is an indispensable resource, if properly mobilized and used efficiently and effectively.

Figure 4.7: Unemployment rate and Economic Growth Trends (1991 to 2018)



Source: Author's Computation from World Bank, 2018

As shown by Figure 4.7, unemployment rate (UNR) is fluctuating along with the performance of RGDP growth. Unemployment rate in Ethiopia has been up and down trend between the years 1991 to 2018. When the real gross domestic product increases unemployment rate become decline, for instance in 1999 the RGDP growth has gets its lowest value on one hand and highest unemployment rate was registered on the other hand. Relatively after this period

economic growth has rising trend which brought unemployment rate down. In between year 1993 to 2000, the economy had fluctuate between the range 13.14 in 1993 and -3.5 in 1998; while unemployment rate rose to 7.5 percent in 1998.

From 2004 to 2018, real GDP had consistently been growing on average with the same rate and unemployment rate growth too. Real gross domestic product growth rate and unemployment rate are moving in parallel. Thus, real gross domestic product determines the unemployment rate in Ethiopia.

4.2. Econometric Analysis

4.2.1. Pre-Estimation Test

A) Unit Root Test

There are a number of models to determine the determinants of unemployment. Some of them are Simple Regression, Auto Regression Unrestricted Model and ECM Distributive Lag Model (ARDL), Co-integration and Auto Regressive Model. Appropriate model selection is based on data unit root test. There are different methods for unit root testof data, which include DF, ADF & PP test. Thus, this study used Augmented Dickey Fuller (ADF) test. The summary of the Augmented Dickey Fuller (ADF) for unit root test result is presented in Table 1 below.

Table 4-1: Summary of Unit Root Test (ADF)

Macroeconomic variables	Unit Root Test Results			
		t-Statistic	Prob*	Integration Level
lnUN	ADF test Statistic	-7.443305	0.0000	I(1)
	Test critical values: 1% level	-3.610453		
	5% level	-2.938987		
	10% level	-2.607932		
lnRGDP	ADF test Statistic -	-4.338790	0.0014	I(1)
	Test critical values: 1% level	- 3.610453		
	5% level	-2.938987		
	10% level	-2.607932		
lnFDI	ADF test Statistic	-4.414602	0.0069	I(0)
	Test critical values: 1% level	-4.262735		
	5% level	-3.552973		
	10% level	-3.209642		
lnED	ADF test Statistic	-4.344224	0.0014	I(1)
	Test critical values: 1% level	- 3.610453		
	5% level	-2.938987		
	10% level	-2.607932		
RER	ADF test Statistic	- 5.800828	0.0000	I(1)
	Test critical values: 1% level	-3.610453		
	5% level	-2.938987		
	10% level	-2.607932		
INFR	ADF test Statistic	-4.881106	0.0003	I(0)
	Test critical values: 1% level	3.605593		
	5% level	- 2.936942		
	10% level	-2.606857		
DM_LM	ADF test Statistic	-6.171070	0.0000	I(1)
	Test critical values: 1% level	-4.211868		
	5% level	-3.529758		
	10% level	-3.196411		

Source: Author's own computation on World Bank and ILO data eview 9

The null and alternative hypotheses for the unit root test are:

H_o: the variable being tested contains a unit root

H_1: the variable being tested has no unit root/ is stationary

When data is stationary at level, Simple Regression is applicable and ARDL can be used when data is stationary at level or at first difference or mix. VAR model is important when at least one variable in the regression is stationary at second difference, I (2) and more. The results in Table 1 show that all variables are stationary after the first difference is taken except Net Foreign Direct Investment (lnNFDI) and inflation rate which are stationary at level, I(0). Therefore, reject the null hypothesis and accept the alternative for each case. Thus, variables are stationary at level, I(0) and at first difference, I(1) and hence, Autoregressive Distributive Lag (ARDL) model is applicable for the estimation of the determinants of unemployment in Ethiopia.

B) Maximum Lag Length Selection

In order to estimate the determinants of unemployment first identify the maximum lag length of each variable. The three criteria used to identify maximum lag are Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ). In each criterion, the Astrix (*) indicates lag order that are selected by criterion at 5% level of significance. Most of the variables (lnUN, lnED, RER and DM_LM) have maximum lag length of one whereas net foreign direct investment (NFDI) and inflation rate are at level (zero). Only the real gross domestic product (RGDP) has a maximum lag length of two. Therefore, the maximum lag length helps to decide the maximum lag length that could be considered in Autoregressive Distributed Lag (ARDL) estimation. Hence, the dependent variable could take maximum lag length of one where as the regressors could take maximum lag length of two in ARDL estimation (See Appendix B2) .

4.2.2 Auto Regressive Distributive Lag (ARDL) Estimation

This study uses the Autoregressive Distributive lag (ARDL) to estimate the macroeconomic determinants of unemployment in Ethiopia. In this model, macroeconomic variables such as Real Gross Domestic product (RGDP), net foreign direct investment (NFDI), external debt (ED), real exchange rate (RER), inflation rate (INFR)and Proclamation No.104/1998 (that encourage

private employment participation in the labour market) as a dummy variable) (DM_LM) are employed for estimation. The estimation of these determinants is shown in table below which is estimated using Eview version 9.

Table 4.2: ARDL Estimation (1, 0, 2, 1, 2, 2, 1) based on AIC

Regressors	Coefficient	Std. Error	t-statistic	Prob.
ln UN (-1)	0.800719	0.038579	20.75530	0.0000
ln RGDP	-0.701672	0.060978	-11.50699	0.0000
lnNFDI(-2)	0.073115	0.011058	6.612143	0.0000
lnED(-1)	0.135777	0.063666	2.132641	0.0511
RER(-2)	-0.000572	0.067123	-1.985358	0.0671
INFR(-2)	0.001608	0.000288	2.369653	0.0327
DM_LM(-1)	-0.060753	0.031541	-1.926181	0.0746
C	4.794084	0.587734	8.156896	0.0000
R-Squared	0.998803	Adjusted R2	0.997520	
AIC	-4.2368181	SBC	-3.4620876	
HQ	-4.129112	F-Statistics	778.5326	
DW stat	2,342494			
Prob (F-Statistic)	0.000000			

Source: Author's own computation on World Bank and ILO data eview 9

As indicated in the Table 4.2, the overall macroeconomic variables considered in this study significantly explain unemployment of Ethiopia. Six explanatory variables are incorporated in log form except real exchange rate, inflation rate and dummy variable in the ARDL model. They are Real Gross Domestic Product (lnRGDP), foreign direct investment (lnFDI), external debt(ED), real exchange rate (RER), inflation rate (INFR) and dummy variables (DM_LM). From these exploratory variables real gross domestic product, real effective rate and labour market affect aggregate unemployment negatively. The value of R-square of the model is 0.998 which indicates about 99.8% variation in the dependent variable is explained by explanatory variables incorporated in to the model. The value of F-statistics is also significant at 1% level of significance which implies the model is good fit as a whole.

The previous level of aggregate unemployment affects unemployment positively, which is logical and validate theory of unemployment. This means, the pervious years aggregate unemployment stock push up the current unemployment by about 80% and significant at 1% level. It implies the long term unemployment is higher than the new labour force entering into the labour market.

4.2.3. Post-Estimation Diagnostic Test

To accept this model as a good one, it has to meet the required criteria of the post estimation test such as normality, serial correlation, heteroscedasticity and stability tests. And their respective null and alternative hypotheses are as follow:-

Normality H_o: The residual is normally distributed

H_1: The residual is not normally distributed

Serial-Correlation H_o: No serial correlation

H_1: Existance of serial correlation

Heteroscedasticity H_o: Homoscedastic and H_1: Heteroscedastic

Stability H_o: the function is stable and H_1: H_o is not true

The post-Estimation diagnostic test results are presented in the following table.

Table 4-3: Diagnostic Tests

Type of Test	Type of Test Applied	CHSQ (X^2)	Prob.	Significance.	Reject/Accept Null hypothesis
Normality	Jarque-Bera		0.885512	insignificant	Accept
Serial correlation	Lagrange multiplier test	0.1272	0.4118	insignificant	Accept
Heteroscedasticity	Breusch-Pagan-Godfrey	0.7386		insignificant	Accept
functional form	Ramsey's reset test		0.5504	insignificant	Accept

Source: Author's own computation on World Bank and ILO data eview 9

As shown in table 4.3, serial correlation is tested by Lagrange multiplier test (LM) and obtained the F- statistic p-value and obs. R-squared Chi-square of 0.4118 and 0.1272, respectively. It is statistically insignificant which leads to accept the null hypothesis, hence residuals are not correlated. In addition, the residuals are normally distributed because the F-statistics (0.885512) is insignificant and hence, we fail to reject the null hypothesis. Similarly the existence of homoscedastic is checked by Breusch-Pagan Godfrey test. The stability of functional form also tested using Ramsey's reset test of F-static p-value of 0.5504 and we fail to reject the null hypothesis that indicates stable functional form. Therefore, residuals have no normality, serial correlation and heteroscedastic problems and functional form ensures dynamically stable model. Hence, the ARDL estimation passes necessary tests and hence, it is a good model to explain the dependent variable.

4.2.4 Long Run Co-integration Test

I) Bound Test

To test for the presence of co-integration for long run form, bound test is conducted. The F-statistics value is used to check for the existence of long-run co integration of the model. The value of F-statistics is either less than lower bound (I_0) or between lower and upper bound or greater than upper bound (I_1). When the value of F-statistic is below lower bound (I_0), we fail to reject the null hypothesis and inconclusive when it is between the lower and upper bounds. However, we reject the null hypothesis when it is above the upper bound (I_1). The null hypothesis and alternative hypothesis are: H_o: No long run relationship

H_1: Existence of long run relationship

Table 4-4: Bound Test Result for Co-integration

Test Statistic	Value	K
F-statistic	31.62555	6
Critical Value Bounds		
Significance	I_0 Bound	I_1 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Source: Author's own computation on World Bank and ILO data eview 9

As indicated in Table 4.4, the F- statistic value is estimated to be 31.62555 which is evidently greater than the upper bound, (I_1). Thus, we clearly reject the null hypothesis in favor of the other alternative. Therefore, it shows the existence of long run relationship between dependent and explanatory variables.

II) Wald Test

In this case, we need to examine existence of long run relationship in unrestricted equilibrium correction model. The null hypothesis and alternative hypothesis are:-

H_o: There is no long run co integration between variables.

$$H_o: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$$

H1: There is long run co integration between variables

$$H_1: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 \# 0$$

Table 4.5: Wald Test

Test Statistic	Value	Df	Probability
F-statistic	295.5697	(7, 14)	0.0000
Chi-square	2068.988	7	0.0000

Null Hypothesis: C(1)=C(2)=C(5)=C(7)=C(10)=C(13)=C(15)=0

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	0.800719	0.038579
C(2)	-0.701672	0.060978
C(5)	0.073115	0.011058
C(7)	0.135777	0.063666
C(10)	0.001608	0.000679
C(13)	-0.000572	0.000288
C(15)	-0.060753	0.031541

Source: *Authors own computation on World Bank, ILO data eview 9*

As indicated in the above table, the prob (chi-square) is statistically significant at 1%. Therefore, we reject the null hypothesis in favor of the other alternative. The value of the coefficients of C(1), C(2), C(5), C(7), C(10), C(13) and C(15) cannot be zero. Correspondingly, their respective

coefficient are the coefficient of β_1, β_2 , β_3 , β_4 , β_5 , β_6 and β_7. So, it implies that there is long run co integration between macroeconomic determinants of unemployment.

4.2.5. ARDL Short-run (ECM) and Long-run Dynamics

I) Short Run Dynamics (Error Correction Model Estimation)

Since the model is co-integrated, implies that the existence of long run relationship between variables. It is important to estimate the speed of adjustment between short run and long run dynamics using error correction model (ECM).The error correction model is estimated using equation3 (*chapter three*). ARDL short run dynamics of macroeconomic variable in explaining unemployment is shown by the following table.

Table 4.6: Short Run Dynamics (ECM Estimation: ARDL) (1, 0, 2, 1, 2, 2, 1)

Variables	Coefficient	Std. Error	t-statistic	Prob.
D(lnRGDP)	-0.701672	0.060978	-11.506995	0.0000
D(lnNFDI(-1))	-0.073115	0.011058	-6.612143	0.0000
D(lnED)	0.182025	0.054871	-3.317308	0.0051
D(RER(-1)	0.000572	0.000288	1.985358	0.0671
D(INFR(-1))	-0.001608	0.000679	-2.369653	0.0327
D(DM_LM)	0.014273	0.035633	0.400549	0.6948
ECM(-1)	-0.199281	0.038579	-5.165522	0.0000
R-Squared	0.97172	Adjusted R-Square	0.960954	
AIC	-4.834848	DW-Statistic	2.342494	
SBC	-4.414489			
HQC	-4.700371			

Source: Author's own computation on World Bank and ILO data eview 9

As shown in Table 4.6, the short run dynamics equilibrates to the long run dynamics with the speed of adjustment (ECM). The ECM (-1) is the lag value of one period of error terms that find out from the long run relationship. The value of ECM implies the process of adjustment is about 19.93% of the last year disequilibrium in the dependent variable from its equilibrium path will be corrected in the current year. As expected, the sign of the ECM term is negative implies that about 19.93% of any movements into disequilibrium are corrected within one period. It confirms the convergence of short run equilibrium to long run (because the sign of speed of adjustment

(ECM) negative and significant). Thus, the result obtained confirms what Samargandi, Fidrmuc, and Ghosh, 2013 predicts. The ECM equation is shown below.

ECM=lnUN-(-3.5210*lnRGDP+0.4224*lnNFDI+1.5947*lnED-0.0115*RER+0.0143*INFR –
[0.0385] [0.0609] [0.011] [0.05487] [0.0003] [0.00067]
0.2332*DM_LM+24.0569)
[0.0356]

II) Long run coefficients

The long run dynamics indicates the relationship between dependent variable & independent variables and their impact magnitude over time. It is estimated based on Autoregressive distributive lag (ARDL) method that establishes the long run relationship among variables. The estimated result is shown by the following table.

Table 4.7: Long-Run Dynamics

Independent Variables	Coefficient	Std. error	t-statistic	Prob.
lnRGDP	-3.521022	0.532037	-6.617999	0.0000
lnNFDI	0.422431	0.132811	3.180699	0.0067
lnED	1.594742	0.318105	5.013251	0.0002
RER	-0.011545	0.002770	-4.167777	0.0009
INFR	0.014305	0.006594	2.169535	0.0477
DM_LM	0.233239	0.196524	-1.186822	0.2550
C	24.056927	3.131696	7.681758	0.0000

Source: Author's own computation on World Bank, ILO data eview 9

The long run estimation can be represented by the following equation.

$$\ln UN = 24.057 \underset{[3.1316]}{-\mathbf{3.5210}} * \mathbf{lnRGDP} \underset{[0.5320]}{+\mathbf{0.4224}} * \mathbf{lnNFDI} \underset{[0.1328]}{+\mathbf{1.5947}} * \mathbf{lnED} \underset{[0.3181]}{-\mathbf{0.0115}} * \mathbf{RER} \underset{[0.0027]}{+\mathbf{0.0143}} * \mathbf{INFR} \underset{[0.0066]}{-\mathbf{0.2332}} * \mathbf{DM_{LM}} \underset{[0.1965]}{}$$

As indicated in Table 4.7, the long run elasticities are higher than the short run elasticities implies that in the long run determinants are relatively more responding in explaining unemployment than in the short run.

4.2.6. Relationship between Unemployment and Macroeconomic Variables

I) Unemployment and Real Gross Domestic product

The estimation result shows a negative relationship between unemployment and economic growth. As real Gross domestic product increases by one percent, unemployment is reduced by 0.70% in short-run and by 3.52% in the long run and highly significant in both cases. The relationship between gross domestic product and unemployment is also confirmed (see Figure 4.7). An increase in employment leads to high production and high production in turn leads to high economic growth which brings unemployment down. In the long run, the effect of economic growth is highly significant on unemployment which implies real gross domestic product growth has a greater impact on unemployment. Hence, the main important macroeconomic determinant of unemployment in Ethiopia is economic growth.

This result confirms the validity of Okun's law and real business cycle theories. In addition, studies conducted by Kalim et al (2003), Shahid, M.,M., Mahmood,T.,A.s,and M.N. Bhalli et al (2013) had confirmed that the negative relationship between real gross domestic product and unemployment.

II) Unemployment and Foreign Direct Investment

As seen in the Table 4.6 and 4.7, foreign direct investment (FDI) and unemployment are related negatively in the short run; while positive relation in the long run. In both cases FDI is statistically significant at 1% level. A percentage increase in foreign direct investment leads to decrease unemployment by 0.073% in the short run. This result is similar with the finding of Zeb, Qiang and Sharif et al (2014). However, in the long run, unemployment increases by 0.42% as FDI increases by 1%. In the case of Ethiopia there are some factors that affect the negative relationship between them.

These are; (1) FDI inflow in Ethiopia is relatively very low compared to other African countries such as Nigeria, Mozambique, Ghana, Tanzania, Zambia, Uganda and Cote D'ivoire (JICA and GRIPS, 2016). In addition, the positive impact of NFDI on unemployment is also associated with the illicit capital flight to abroad. On average, each year the country has lost around half a billion dollars annually under the 'Derg' regime and more than doubled to over 1 billion per annum during the EPRDF regime (Geda and Yimer,2016); (2) low level of labour productivity in

Ethiopia. As indicated in many literatures, the labour productivity is very low in Ethiopia compared to other developing countries (Lenhardt, Rogerson, Guadagno and Berliner, 2015 and Berhe, K.H.,(2017)). This low level of labour productivity results in foreign investors to bring foreign citizens to the hosting countries and each year (Figure 4.6). On the other hand, impact of foreign direct investment on infant domestic firms that may lead to increase their cost of production, hence minimization of labour force which exacerbates the unemployment rate of the country; (3), skill- industry mismatch. In Ethiopia huge number of unemployment particularly in urban areas is characterized by low level of skill which cannot produce goods in technology intensive factories. And most unemployed person is a migrant from agricultural sector which has limited or no knowledge and skills in manufacturing sector (UNDP, 2018).

The positive impact and significance of net foreign direct investment is also confirmed by some empirical evidences such as Palat et al (2011) and Mucuk and Demirsil et al (2013).

III) Unemployment and External Debt

As expected external debt has positive impact on unemployment both in short and long run and statistically significant at 1% level. A one percent increase in external debt leads to an increase in unemployment by 0.18% in the short run and 1.59% in the long run. Empirical results suggest that Ethiopia has long history in debt revenue. Since Ethiopia has been borrowed huge dollars from different institutions in the world and it is classified in as high indebted country in Africa (Fekadu, 2014). Every year, the country is obliged to pay many dollars to the external institution with its interest which retards the growth of the economy. Over the period, the average external debt to gross domestic product of Ethiopia is about 56% which exceeds the threshold proposed by Clements, Bhatlacharaya and Nguyen et al (2003), thus the external debt that exceeds the threshold (50% of GDP) affects economic growth negatively and hence increases unemployment of the country. In addition, it may also associate with the illicit capital flight. For instance; according to some officials, in 2004 alone, Ethiopia was granted $4 Billion in loans but a whopping $5.6B has left the country in illicit financial flight which is greater than the amount obtained in foreign loan that year. Money that the country received as development assistance for mega projects was kickbacks by government officials in return for exaggerated quotes, which had been deposited in foreign accounts (Woldie, 2018). The positive impact of external debt on

unemployment is also confirmed by Ohwofasa et al (2012). Hence, the stock of external debt affects unemployment positively and significantly in Ethiopia.

IV) Unemployment and Real Exchange Rate

As shown in Table 4.6 and 4.7, the real effective exchange rate affects unemployment positively, but statistically insignificant at 5% level in the short run; however, negative relationship and significant at 1% level in the long run. A one unit increase in real exchange rate will increase unemployment by 0.000572 units in the short run, but it reduces unemployment by 0.0115 units in long term.

Theoretical and empirical evidences indicate that there is a positive relationship between economic growth and exchange rate. The main objective of exchange depreciation is to improve trade balance of the country through encouraging export and reducing import provided that Marshall Learner condition fulfills (i.e. the sum of the price elasticity of demand export and import greater than one) and, hence increase economic growth. In the short run, demand for exporting goods and services are inelastic, thus depreciation in exchange rate can cause a deterioration of the trade balance. However, in the long run, demand become more price elastic and therefore, the trade balance begins to improve and enhance the growth of the economy, hence improving job opportunities because through time many factories can be encouraged and established to increase their profit by exporting more products. Thus, the positive and negative relationship in the short run and long run are caused by deterioration and improvement of trade balance. Therefore, the result obtained is resulted from the J-curve effect. In addition, trade liberalization affects unemployment negatively, in labour abundant countries compared to capital abundant countries (Dutt, Mitra and Ranjan, 2007). The negative relationship between real exchange rate and unemployment in this study validates the above empirical evidence.

On the other hand, currency depreciation creates relative wage differential; when foreign currency is overvalued compared to domestic currency; it pushes some unemployed persons to migrate into developed and Arab countries. For instance, on average, more than 100,000 citizens were migrated to different Arab countries legally between year 2010/11 to 2014/15 (MOLSA report, 2014/15) which can improve unemployment problem of the country.

V) Unemployment and Inflation

The relationship between unemployment and inflation rate is negative in the short run, but positive in the long run. As in the tables (4.6 and 4.7), a unit increases in inflation result in 0016 units decline in unemployment in the short run and statistically significant at 5% level. However, in the long run they have positive relationship, as inflation raised by one unit it induces high unemployment which accounts about 0.0143 units and statistically significant at 5%. This implies, the existence of trade -off relationship between inflation and unemployment in short run, but not in the long run that indicates Phillips curve exists only in the short in Ethiopia. Thus, the inverse relationship between unemployment and inflation (Phillips curve) in general is disproved by the result obtained. In addition, some empirical evidences indicate the positive relationship between unemployment and inflation (Gur, et al. 2015,Touny et al. 2013 and Umaru & Zubairu et al. 2012).

VI) Unemployment and Private employment Agency's Proclamation

As indicated in Table 4.6 and 4.7, in the short run proclamation No.104/98 or existence of private employment agencies affect unemployment positively; but it improves in the long run compared to absence of such proclamation or private employment agencies. In both cases highly insignificant because of the rigidity and unresponsiveness of labour market in Ethiopia. However, regardless of ILO's proposition of the importance of private employment Agencies, to my knowledge there are no empirical evidences both internationally and nationally that assure their impact on unemployment reduction.

4.2.7. Cumulative Sum (CUSUM)

CUSUM and CUSUM square test are applied to determine the systematic movements of coefficient values that show stability in structure. Thus, the stability of the coefficients tested by using CUSUM test or CUSUM square Test are shown by figure 4.8 and Figure 4.9.

Figure 4.8: Plot of CUSUM of Recursive Residuals

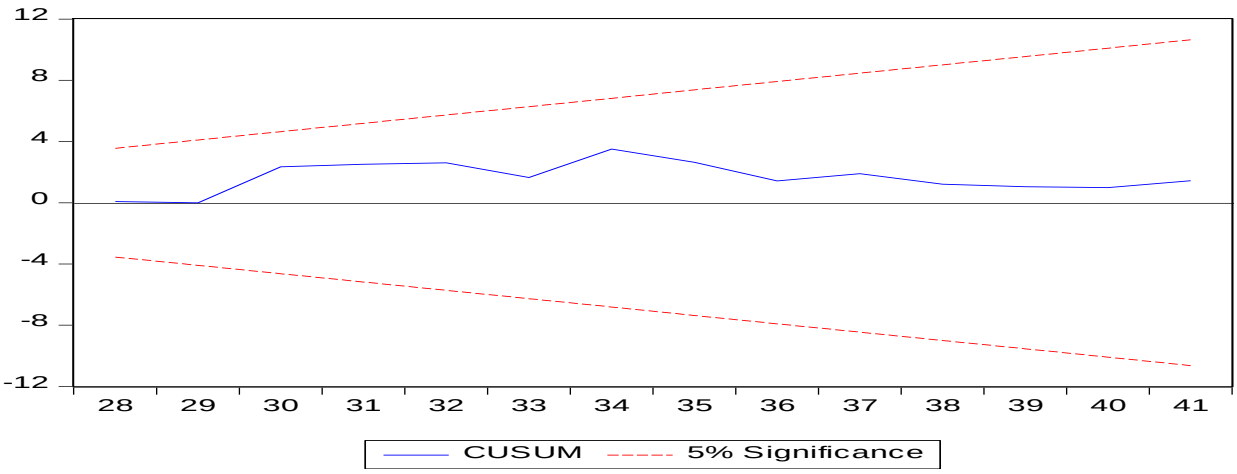
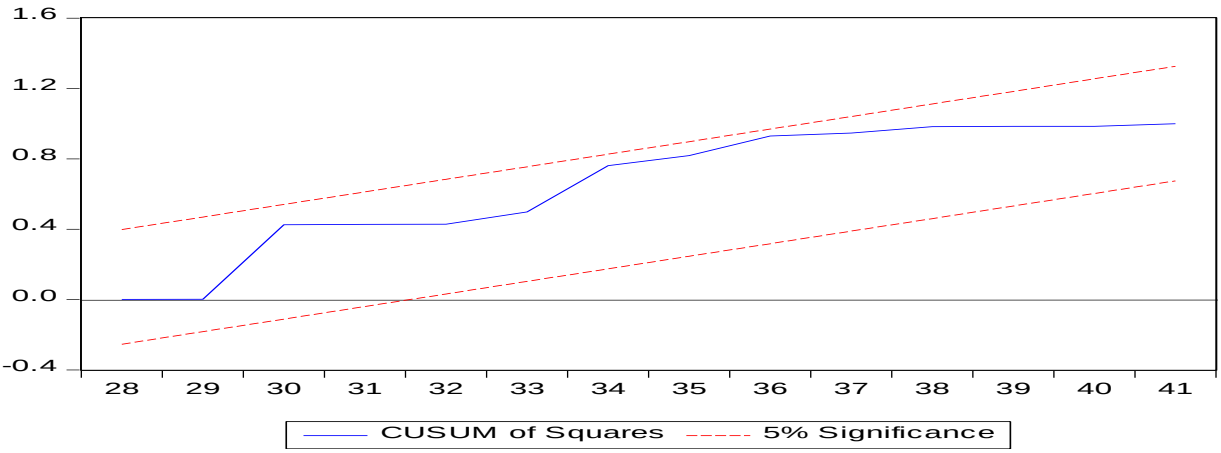


Figure 4.9: Plot of CUMUM Squares of Recursive Residuals



Source: Own Estimation from ARDL Estimation

As indicated below the CUSUM plot graph is found between the lower and upper boundaries, at 5% level of significance which indicates stable movement of coefficients. Moreover, in the case of CUSUM squares the trend is also moving in between the lower and upper critical bounds of 5%, hence, so it reveals that the model is structurally stable.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

Unemployment is vital challenges of many developed and developing countries. In Ethiopia, unemployment problem is being manifested in various social problems, such as migration, displacement, political instability and crime. The fastest Economic Growth has been registered for two decade in Ethiopia in one hand; high unemployment (specifically high youth and female unemployment) in the other hand. Thus, the aim of this study is to examine some macroeconomic determinants of unemployment in Ethiopia. The macroeconomic determinant variables are real gross domestic product (RGDP), net foreign direct investment (NFDI), external debt (ED), real exchange rate (RER), inflation rate (INFR) and Private employment agency's proclamation (as a dummy variable). Hence, this study focuses only on the macroeconomic determinants of unemployment but not demographic characteristics.

To examine the impact of macroeconomic variables that determine unemployment in Ethiopia, secondary data of 41 years were collected. And, data is analyzed by both descriptive and econometric methods. Unemployment in Ethiopia in terms of sex, age and education level are described in graphs. Furthermore, the trend between real gross domestic product growth rate and unemployment rate also shown in graph. In addition, econometric analysis with ARDL model was used. In order to specify this model for estimation; unit root test and maximum lag selection criterion were conducted. Augmented Dickey Fuller (ADF) for unit root test is applied to verify the stationarity of the data of each variable. As indicated in Table 4.1, some variables are stationary after first difference, I (1), and some are stationary at level, I (0). This is clearly indicates that ARDL model which was proposed by Pesaran and Shin et al (1999) is an appropriate model for estimation. In addition, post estimation diagnostic tests were also conducted, as indicated (in Table 4.3), all post estimation tests are failed to reject the null hypothesis. It clearly shows that there is no normality, serial correlation, heteroscedasticity and

instability in its functional form problems. Thus, the model (ARDL) is applied to estimate the macroeconomic determinants of unemployment.

In the finding, the ARDL estimation model reveals that the overall macroeconomic variables explain the dependent variable (unemployment) and highly significant at 1%. All variables, except external debt, real exchange rate and the dummy variables are statistically significant at 5% level. The previous level of aggregate unemployment, inflation, external debt and foreign direct investment affects unemployment positively. The last year aggregate unemployment stock push up the current unemployment by about 0.80% and which is significant at 1% level. This implies the existence of long term unemployment in Ethiopia.

The bound test co-integration shows the existence of long run relationship between dependent and independent variables. In the short run, real gross domestic product (RGDP), net foreign direct investment (NFDI) and inflation rate (INFR) are negatively affect unemployment by the value of 0.70%, 0.073% and 0.0016 units, respectively and they are statistically significant at 5% level. But external debt, real exchange rate and dummy variable affect unemployment positively with the magnitude of 0.18%, 0.00057 units and 0.0142 units, respectively. In addition, the coefficient of error correction term equilibrates the short run dynamics to long run dynamics by the speed of 19.93%.

In the long run, economic growth and real exchange rate have negative impact on unemployment of the country. A one percent increase in real gross domestic product leads to 3.52% unemployment rate reduction. As the real exchange rate increases by one unit, unemployment declines by 0.115 units. As net foreign direct investment, external debt and inflation increase by one unit, the unemployment raises by 0.42%, 1.59% and 0.0143 units respectively. The CUSUM and CUSUM square are indicating that the model is structurally stable within the 5% of critical bounds.

5.2. Conclusion

In Ethiopia, female unemployment rates in both rural and urban areas are high. Most unemployed labour forces (both in urban and rural) have primary and high school education levels (intermediate education).The youth,15-29 of ages, are highly unemployed in Ethiopia compared to higher ages. In all cases, urban unemployment is getting worsened compared to

rural counterpart of unemployment in Ethiopia. This indicates high number of unskilled/ or low level of skilled labour forces of which the market may not absorb them. Owing to this fact, the relationship between unemployment and net foreign direct investment is positive in the long run. The reason is that the foreign investors prefer to hire expatriate skilled workers, and moreover, foreign direct investment deteriorates domestic infant industries that result in lay-off of many workers. The positive effect of external debt both in the short and long run, may be caused by huge illicit capital flight to abroad.

Unemployment and Economic growth rates have negative relationship in the short and long-runs, which is clearly validate theories, considerably economic growth reduce unemployment rate but unemployment did not reduced One of fundamental reasons is illicit capital flight was high in Ethiopia before the recent reform. Empirical evidences show that, on average, Ethiopia has been lost huge money every year. In addition, the relationship between unemployment and inflation is negative in the short run and positive in the long run. This implies that Phillips curve exists only in the short run.

In Ethiopia, the coordination between higher institutions and labour market institution is very weak, in creating conducive environment for young graduates. And, the labour market information system is also very weak and not accessible in each part of the country that is why unemployed people migrate to the urban areas that exacerbate urban unemployment. Currently, the reality is more of classical thinking which means supply creates its own demand but this kind of approach distorts labour market in Ethiopia. Furthermore, the roll of labour market institution (private employment agencies) has weak effect or insignificant effect in reducing unemployment both in the short and long run. This is because low level of absorptive capacity of the economy, existence of a number of low skilled/unskilled labour forces in the labour market. This means, the impact of private employment agencies in reducing unemployment is insignificant because of the rigidity, unresponsiveness and limited labour market information in the country. In addition, poor coordination among labour market institutions and lack clear directions affect the efficiency of employment service provision.

The long run coefficients are higher than the short run coefficients that imply that regressors are more responsive (elastic) in reducing unemployment in the long run than in the short run. Real gross domestic product, real exchange rate and dummy variable improve employment

opportunities in Ethiopia; whereas foreign direct investment, external debt and inflation rate distort unemployment problem.

The trends of unemployment over the periods under the study fluctuates till 2005 and then it has a constant trend up to 2018 (see Figure 4.7). The estimation results also reveal that some macroeconomic variables affect unemployment negatively; whereas other variables influence unemployment positively in the long run. The impact of real gross domestic product is higher than other determinants which imply unemployment is highly affected by economic growth. Hence, economic growth is the main determinants of unemployment in Ethiopia which has been challenged by huge illicit money flight to foreign accounts. However; proclamation related to private employment agencies has insignificant impact on unemployment due to the fact that the labour market rigid.

5.3 Recommendation

Currently, despite positive economic growth trends, unemployment is the major challenging problem in Ethiopia. To balance the supply and demand of labour in labour market of a country the following recommendations are proposed.

- The government must create conducive environment for expansion of modern and broad based agricultural activities that creates high absorptive capacity of low skilled level of labour force. Rising agricultural productivity and promoting agri-business in each corner of the country that ensure high economic growth and hence expansion of employment opportunity.
- Enhancing infant domestic industry has broad advantage in the short run and long run rather than attracting foreign direct investment. Encouraging firm's creation that promotes jobs for non-graduates with a special focus on service and manufacturing sector.
- Since external debt exacerbates unemployment rate in Ethiopia, borrowing decisions must be linked to a general policy framework that will guarantee profitability of invested funds. The country should introduce effective debt management as a major policy concern to achieve the benefits of external finance.

- Government should take measures to control inflationary pressures. Since the real exchange rate has negative impact on unemployment, hence measures (such as encouraging export) should be taken to improve trade balance of the country.
- The government must take urgent action to fight capital outflow; and the government should also get restored the capital accumulated in foreign banks and block such illegal action in the future which affects unemployment indirectly. In addition, the government should ensure that aid money is used for the purpose of the loans were taken for.
- Improving the labour market information system is a critical in improving unemployment rate. Hence, investing in labour market information system, frequent data analysis, establishing data bank of unemployed people etc are an important steps in designing policy and program to reduce unemployment.
- Increasing labour productivity of the low-skilled segment by addressing constraints faced by firms in accessing capital (financial and physical) to ensure that the marginal product of labour. Investing further on job and technical training programs to build the skills of those in the job market, both for low skilled workers and at higher levels of education in order to increase their productivity.
- The supply side intervention should be based on the demand side. Furthermore, continuous skill development centers are crucial which need establishment of business incubator centers. These centers can equip the new graduates with necessary knowledge and skill for both creating own job and employment options.
- The government should take actions in promoting overseas employment opportunity that helps to increase remittance inflow result in enhancing economic growth of Ethiopia.

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Appendices

Appendix A: Pre Estimation Results

A1. Unit Root Test for Stationarity:

UN is Stationary at I(1), Intercept

Null Hypothesis: D(lnUN) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.443305	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(lnUN,2)
Method: Least Squares
Date: 05/29/19 Time: 23:30
Sample (adjusted): 3 41
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(lnUN(-1))	-1.120654	0.150559	-7.443305	0.0000
C	0.032942	0.033588	0.980742	0.3331

R-squared	0.599579	Mean dependent var	-0.013725
Adjusted R-squared	0.588757	S.D. dependent var	0.321345
S.E. of regression	0.206073	Akaike info criterion	-0.271254
Sum squared resid	1.571241	Schwarz criterion	-0.185944
Log likelihood	7.289462	Hannan-Quinn criter.	-0.240646
F-statistic	55.40278	Durbin-Watson stat	1.655907
Prob(F-statistic)	0.000000		

RGDP isStationary at I (1), Intercept

Null Hypothesis: D(lnRGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.338790	0.0014
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(lnRGDP,2)
Method: Least Squares
Date: 05/29/19 Time: 23:32
Sample (adjusted): 3 41
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(lnRGDP(-1))	-0.677532	0.156157	-4.338790	0.0001
C	0.014894	0.005868	2.538179	0.0155

R-squared	0.337216	Mean dependent var	0.000335
Adjusted R-squared	0.319303	S.D. dependent var	0.036436
S.E. of regression	0.030061	Akaike info criterion	-4.121224
Sum squared resid	0.033437	Schwarz criterion	-4.035913
Log likelihood	82.36387	Hannan-Quinn criter.	-4.090616
F-statistic	18.82510	Durbin-Watson stat	2.024155
Prob(F-statistic)	0.000106		

NFDI is Stationary at I(0), Trend and Intercept

Null Hypothesis: lnNFDI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.414602	0.0069
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNFDI)
Method: Least Squares
Date: 05/29/19 Time: 23:34
Sample (adjusted): 2 41
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnNFDI(-1)	-0.765367	0.173372	-4.414602	0.0001
C	3.982376	0.907161	4.389932	0.0001
@TREND("1")	0.088406	0.022024	4.013986	0.0004

R-squared	0.393871	Mean dependent var	0.088333
Adjusted R-squared	0.353462	S.D. dependent var	0.704276
S.E. of regression	0.566291	Akaike info criterion	1.787091
Sum squared resid	9.620565	Schwarz criterion	1.923137
Log likelihood	-26.48700	Hannan-Quinn criter.	1.832866
F-statistic	9.747190	Durbin-Watson stat	1.823227
Prob(F-statistic)	0.000548		

ED is Stationary at I(1), intercept

Null Hypothesis: D(lnED) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.344224	0.0014
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNED,2)
Method: Least Squares
Date: 05/29/19 Time: 23:38
Sample (adjusted): 3 41
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(lnED(-1))	-0.674278	0.155212	-4.344224	0.0001
C	0.028460	0.020210	1.408184	0.1674

R-squared	0.337775	Mean dependent var	-0.000967
Adjusted R-squared	0.319877	S.D. dependent var	0.144189
S.E. of regression	0.118912	Akaike info criterion	-1.370948
Sum squared resid	0.523181	Schwarz criterion	-1.285638
Log likelihood	28.73350	Hannan-Quinn criter.	-1.340340
F-statistic	18.87229	Durbin-Watson stat	2.085178
Prob(F-statistic)	0.000105		

INFR is Stationary at I(0), Intercept

Null Hypothesis: INFR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.881106	0.0003
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INFR)
Method: Least Squares
Date: 05/29/19 Time: 23:23
Sample (adjusted): 2 41
Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFR(-1)	-0.769172	0.157582	-4.881106	0.0000
C	6.926659	2.215724	3.126138	0.0034

R-squared	0.385364	Mean dependent var	-0.040203
Adjusted R-squared	0.369189	S.D. dependent var	13.49549
S.E. of regression	10.71861	Akaike info criterion	7.630546
Sum squared resid	4365.764	Schwarz criterion	7.714990
Log likelihood	-150.6109	Hannan-Quinn criter.	7.661078
F-statistic	23.82520	Durbin-Watson stat	1.972611
Prob(F-statistic)	0.000019		

RER isStationary at I(1), Intercept

Null Hypothesis: D(RER) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.800828	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RER,2)
Method: Least Squares
Date: 05/29/19 Time: 23:19
Sample (adjusted): 3 41
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RER(-1))	-0.952479	0.164197	-5.800828	0.0000
C	-3.143491	4.522641	-0.695057	0.4914

R-squared	0.476289	Mean dependent var	-0.016823
Adjusted R-squared	0.462134	S.D. dependent var	38.23676
S.E. of regression	28.04258	Akaike info criterion	9.555246
Sum squared resid	29096.30	Schwarz criterion	9.640557
Log likelihood	-184.3273	Hannan-Quinn criter.	9.585854
F-statistic	33.64960	Durbin-Watson stat	1.975506
Prob(F-statistic)	0.000001		

DM_LM isStationary at I(1), Intercept

Null Hypothesis: D(DM_LM) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.244998	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DM_LM,2)
Method: Least Squares
Date: 05/29/19 Time: 23:27
Sample (adjusted): 3 41
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DM_LM(-1))	-1.026316	0.164342	-6.244998	0.0000
C	0.026316	0.026316	1.000000	0.3238

R-squared	0.513158	Mean dependent var	0.000000
Adjusted R-squared	0.500000	S.D. dependent var	0.229416
S.E. of regression	0.162221	Akaike info criterion	-0.749789
Sum squared resid	0.973684	Schwarz criterion	-0.664478
Log likelihood	16.62088	Hannan-Quinn criter.	-0.719180
F-statistic	39.00000	Durbin-Watson stat	2.001422
Prob(F-statistic)	0.000000		

A2: Lag length Selection Criteria (Summary of lag length selection)

Macroeconomic variables	Lag	LogL	LR	FPE	AIC	SC	HQ
lnUN	0	2.341323	NA	0.07747	0.27404	0.588291	-0.381208
	1	17.18184	22.69727*	0.034424*	-0.540109*	-0.180965*	-0.417630*
	2	17.25647	0.10974	0.036493	-0.485675	-0.081638	-0.347887
	3	17.26716	0.015099	0.038873	0.42748	-0.021449	-0.274382
lnRGDP	0	35.93841	NA	0.010736	-1.702259	-1.388008	-1.595091
	1	84.73984	74.63748*	0.000647*	-4.514108	-4.154964	-4.39163
	2	86.76299	2.975229	0.000612	-4.574294*	-4.170257*	-4.436506*
	3	87.04873	0.403394	0.000641	-4.532278	-4.083349	-4.37918
lnNFDI	0	-8.898435	NA*	0.184252*	1.135603*	1.468654*	1.237420*
	1	-8.796536	0.145571	0.197549	1.199753	1.580382	1.316115
	2	-7.585093	1.644101	0.196007	1.18465	1.612858	1.315557
	3	-6.835968	0.963161	0.201417	1.202569	1.678356	1.348022
lnED	0	17.31339	NA	0.03211	-0.60667	-0.292419	-0.499501
	1	35.27472	27.47027*	0.011875*	-1.604395*	-1.245251*	-1.481917*
	2	35.92838	0.961265	0.012168	-1.584022	-1.179986	-1.446234
	3	36.17099	0.34252	0.012785	-1.53947	-1.090541	-1.386372
RER	0	-159.0108	NA	1026.01	9.76534	10.07959	9.872508
	1	152.6313	9.756840*	749.9510*	-9.4489	9.808044*	9.571378*
	2	151.6079	1.504986	751.8671	-9.447524*	9.851561	9.585312
	3	-150.9479	0.931719	770.8929	9.467526	9.916456	9.620624
INFR	0	-121.8925	NA*	115.5848*	7.581911*	7.896161*	7.689079*
	1	-121.8814	0.016946	122.8778	7.640082	7.999226	7.762561
	2	-120.9805	1.324841	124.0826	7.645912	8.049949	7.7837
	3	-119.437	2.179067	120.7793	7.613941	8.062871	7.767039
DM_LM	0	7.642443	NA	0.056716	-0.037791	0.27646	0.069378
	1	17.61348	15.24983*	0.033561*	-0.565499*	-0.206355*	-0.443021*
	2	17.67962	0.097254	0.035596	-0.510566	-0.106529	-0.372778
	3	17.69704	0.024601	0.037902	-0.452767	-0.003838	-0.299669

Source: Author's own computation on World Bank and ILO data eview 9

Appendix B: Autoregressive Distributive lag (ARDL) Estimation

Dependent Variable: lnUN
Method: ARDL
Date: 05/29/19 Time: 23:00
Sample (adjusted): 3 41
Included observations: 30 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): lnRGDP lnNFDI lnED RER INFR DM_LM
Fixed regressors: C
Number of models evalulated: 729
Selected Model: ARDL(1, 0, 2, 1, 2, 2, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
lnUN(-1)	0.800719	0.038579	20.75530	0.0000
lnRGDP	-0.701672	0.060978	-11.50699	0.0000
lnNFDI	-0.028089	0.017421	-1.612372	0.1292
lnNFDI(-1)	0.039156	0.015958	2.453636	0.0278
lnNFDI(-2)	0.073115	0.011058	6.612143	0.0000
lnED	0.182025	0.054871	3.317308	0.0051
lnED(-1)	0.135777	0.063666	2.132641	0.0511
RER	-3.39E-05	0.000307	-0.110710	0.9134
RER(-1)	-0.001694	0.000272	-6.218716	0.0000
RER(-2)	-0.000572	0.000288	-1.985358	0.0671
INFR	0.000640	0.000633	1.010411	0.3294
INFR(-1)	0.000603	0.000615	0.980653	0.3434
INFR(-2)	0.001608	0.000679	2.369653	0.0327
DM_LM	0.014273	0.035633	0.400549	0.6948
DM_LM(-1)	-0.060753	0.031541	-1.926181	0.0746
C	4.794084	0.587734	8.156896	0.0000

R-squared	0.998803	Mean dependent var	6.120798
Adjusted R-squared	0.997520	S.D. dependent var	0.469724
S.E. of regression	0.023394	Akaike info criterion	-4.368181
Sum squared resid	0.007662	Schwarz criterion	-3.620876
Log likelihood	81.52272	Hannan-Quinn criter.	-4.129112
F-statistic	778.5326	Durbin-Watson stat	2.342494
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Appendix C: Post Estimation Test

C1 Stability Test

Ramsey RESET Test
Equation: UNTITLED
Specification: lnUN lnUN(-1) lnRGDP lnNFDI lnNFDI(-1) lnNFDI(-2) lnED lnED(-1) RER RER(-1) RER(-2) INFR INFR(-1) INFR(-2) DM_LM DM_LM(-1) C
Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	0.613077	13	0.5504
F-statistic	0.375863	(1, 13)	0.5504

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	0.000215	1	0.000215
Restricted SSR	0.007662	14	0.000547
Unrestricted SSR	0.007446	13	0.000573

Unrestricted Test Equation:
Dependent Variable: LNUN
Method: ARDL
Date: 05/29/19 Time: 23:03
Sample: 3 41
Included observations: 30
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic):
Fixed regressors: C

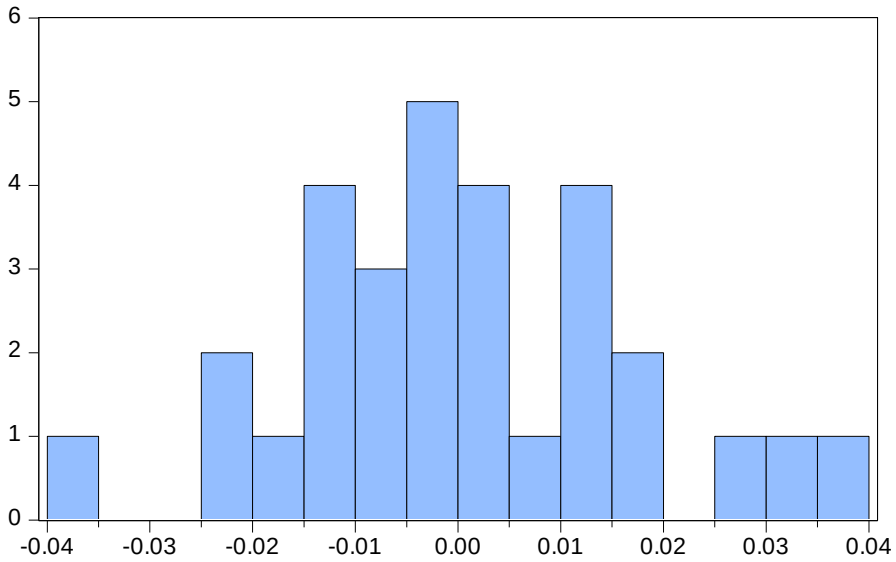
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
lnUN(-1)	1.305849	0.824870	1.583096	0.1374
lnRGDP	-1.132092	0.704831	-1.606189	0.1322
lnNFDI	-0.049138	0.038684	-1.270256	0.2263
lnNFDI(-1)	0.062664	0.041675	1.503639	0.1566
lnNFDI(-2)	0.124434	0.084467	1.473162	0.1645
lnED	0.293622	0.190487	1.541426	0.1472
lnED(-1)	0.226834	0.162180	1.398657	0.1853
RER	6.24E-05	0.000351	0.177886	0.8616
RER(-1)	-0.002819	0.001856	-1.519221	0.1526
RER(-2)	-0.001029	0.000801	-1.284850	0.2213
INFR	0.000830	0.000718	1.155490	0.2687
INFR(-1)	0.000736	0.000665	1.105914	0.2888
INFR(-2)	0.002569	0.001715	1.498045	0.1580
DM_LM	0.043135	0.059543	0.724445	0.4816
DM_LM(-1)	-0.099472	0.070921	-1.402567	0.1842
C	5.998053	2.053805	2.920459	0.0119
FITTED^2	-0.058289	0.095077	-0.613077	0.5504

R-squared	0.998836	Mean dependent var	6.120798
Adjusted R-squared	0.997404	S.D. dependent var	0.469724
S.E. of regression	0.023933	Akaike info criterion	-4.330017

Sum squared resid	0.007446	Schwarz criterion	-3.536005
Log likelihood	81.95025	Hannan-Quinn criter.	-4.076006
F-statistic	697.3591	Durbin-Watson stat	2.258353
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

C2. Normality Test



Series: Residuals	
Sample 3 41	
Observations 30	
Mean	8.29e-16
Median	-0.001307
Maximum	0.037738
Minimum	-0.039119
Std. Dev.	0.016254
Skewness	0.156492
Kurtosis	3.310779
Jarque-Bera	0.243179
Probability	0.885512

C3. Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.956295	Prob. F(2,12)	0.4118
Obs*R-squared	4.124157	Prob. Chi-Square(2)	0.1272

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 05/29/19 Time: 23:04
Sample: 3 41
Included observations: 30
Presample and interior missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnUN(-1)	0.034482	0.046039	0.748981	0.4683
lnRGDP	0.004125	0.061617	0.066950	0.9477
lnNFDI	-0.020752	0.023153	-0.896283	0.3877
lnNFDI(-1)	-0.019645	0.021438	-0.916342	0.3775
lnNFDI(-2)	-0.001868	0.011480	-0.162717	0.8734
lnED	0.014013	0.056406	0.248438	0.8080
lnED(-1)	0.023837	0.067020	0.355669	0.7283
RER	2.21E-05	0.000334	0.066166	0.9483
RER(-1)	-0.000149	0.000299	-0.498080	0.6274
RER(-2)	-0.000137	0.000306	-0.446998	0.6628
INFR	-3.02E-05	0.000646	-0.046709	0.9635
INFR(-1)	-0.000361	0.000697	-0.518408	0.6136
INFR(-2)	-0.000363	0.000735	-0.493833	0.6303
DM_LM	0.040278	0.047276	0.851983	0.4109
DM_LM(-1)	0.000628	0.035047	0.017920	0.9860
C	-0.288666	0.625522	-0.461480	0.6527
RESID(-1)	-0.545354	0.425285	-1.282325	0.2239
RESID(-2)	-0.415820	0.403579	-1.030331	0.3232

R-squared	0.137472	Mean dependent var	8.29E-16
Adjusted R-squared	-1.084443	S.D. dependent var	0.016254
S.E. of regression	0.023467	Akaike info criterion	-4.382735
Sum squared resid	0.006608	Schwarz criterion	-3.542017
Log likelihood	83.74103	Hannan-Quinn criter.	-4.113782
F-statistic	0.112505	Durbin-Watson stat	2.253276
Prob(F-statistic)	0.999960		

C4.Heterosecdasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.555712	Prob. F(15,14)	0.8645
Obs*R-squared	11.19600	Prob. Chi-Square(15)	0.7386
Scaled explained SS	2.817118	Prob. Chi-Square(15)	0.9997

Test Equation:

Dependent Variable: RESID^2
Method: Least Squares
Date: 05/29/19 Time: 23:06
Sample: 3 41
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001768	0.011304	0.156431	0.8779
lnUN(-1)	0.000663	0.000742	0.893859	0.3865
lnRGDP	-0.000467	0.001173	-0.398458	0.6963
lnNFDI	0.000158	0.000335	0.471417	0.6446
lnNFDI(-1)	-0.000246	0.000307	-0.802399	0.4357
lnNFDI(-2)	-3.87E-05	0.000213	-0.181806	0.8583
lnED	0.000560	0.001055	0.530596	0.6040
lnED(-1)	-0.000545	0.001224	-0.444726	0.6633
RER	1.06E-06	5.90E-06	0.179985	0.8597
RER(-1)	3.56E-06	5.24E-06	0.679578	0.5079
RER(-2)	-4.33E-06	5.54E-06	-0.780963	0.4478
INFR	2.84E-06	1.22E-05	0.233568	0.8187
INFR(-1)	-6.92E-06	1.18E-05	-0.585609	0.5675
INFR(-2)	-4.42E-06	1.31E-05	-0.338677	0.7399
DM_LM	-0.000459	0.000685	-0.669767	0.5139
DM_LM(-1)	0.000650	0.000607	1.072088	0.3018

R-squared	0.373200	Mean dependent var	0.000255
Adjusted R-squared	-0.298371	S.D. dependent var	0.000395
S.E. of regression	0.000450	Akaike info criterion	-12.27045
Sum squared resid	2.83E-06	Schwarz criterion	-11.52314
Log likelihood	200.0567	Hannan-Quinn criter.	-12.03138
F-statistic	0.555712	Durbin-Watson stat	3.171259
Prob(F-statistic)	0.864529		

Appendix D: ARDL Bound Test

ARDL Bounds Test
Date: 05/29/19 Time: 23:10
Sample: 3 41
Included observations: 30
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	31.62555	6

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Appendix E: Short Run (ECM) and Long Run Dynamics

ARDL Cointegrating And Long Run Form(Output of Eviews version 9)
Dependent Variable: LNUN
Selected Model: ARDL(1, 0, 2, 1, 2, 2, 1)
Date: 05/29/19 Time: 23:07
Sample: 1 41
Included observations: 30

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(lnRGDP)	-0.701672	0.060978	-11.506995	0.0000
D(lnNFDI)	-0.028089	0.017421	-1.612372	0.1292
D(lnNFDI(-1))	-0.073115	0.011058	-6.612143	0.0000
D(lnNED)	0.182025	0.054871	3.317308	0.0051
D(RER)	-0.000034	0.000307	-0.110710	0.9134
D(RER(-1))	0.000572	0.000288	1.985358	0.0671
D(INFR)	0.000640	0.000633	1.010411	0.3294
D(INFR(-1))	-0.001608	0.000679	-2.369653	0.0327
D(DM_LM)	0.014273	0.035633	0.400549	0.6948
CointEq(-1)	-0.199281	0.038579	-5.165522	0.0001

Cointeq = lnUN - (-3.5210*lnRGDP + 0.4224*lnNFDI + 1.5947*lnED
-0.0115*RER + 0.0143*INFR -0.2332*DM_LM + 24.0569)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnRGDP	-3.521022	0.532037	-6.617999	0.0000
lnNFDI	0.422431	0.132811	3.180699	0.0067
lnED	1.594742	0.318105	5.013251	0.0002
RER	-0.011545	0.002770	-4.167777	0.0009
INFR	0.014305	0.006594	2.169535	0.0477
DM_LM	-0.233239	0.196524	-1.186822	0.2550
C	24.056927	3.131696	7.681758	0.0000

ARDL Error Correction Regression(Output of Eviews version 10)

Dependent Variable: D(lnUN)
Selected Model: ARDL(1, 0, 2, 1, 2, 2, 1)
Case 2: Restricted Constant and No Trend
Date: 06/01/19 Time: 12:39
Sample: 1 41
Included observations: 30

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(lnRGDP)	-0.701672	0.060978	-11.506995	0.0000
D(lnFDI)	-0.028089	0.007060	-3.978656	0.0014
D(lnNFDI(-1))	-0.073115	0.007397	-9.884027	0.0000
D(lnED)	0.182025	0.032472	5.605639	0.0001
D(RER)	-3.39E-05	0.000143	-0.237103	0.8160
D(RER(-1))	0.000572	0.000155	3.700663	0.0024
D(INFR)	0.000640	0.000322	1.990206	0.0665
D(INFR(-1))	-0.001608	0.000315	-5.104516	0.0002
D(DM_LM)	0.014273	0.022049	0.647324	0.5279
CointEq(-1)*	-0.199281	0.008286	-24.05014	0.0000

R-squared	0.971725	Mean dependent var	0.001435
Adjusted R-squared	0.960954	S.D. dependent var	0.096664
S.E. of regression	0.019101	Akaike info criterion	-4.83488
Sum squared resid	0.007662	Schwarz criterion	-4.414489
Log likelihood	81.52272	Hannan-Quinn criter.	-4.700371
Durbin-Watson stat	2.342494		

* p-value incompatible with t-Bounds distribution.

Appendix F: Model Selection Criteria -Graph

