Estimating the Cost of Unemployment to Uganda's Growth and Growth Trajectory 1980-2016: 'an auto-regressive distributed lag modelling approach'

Ssebulime Kurayish[1,*], Muvawala Joseph[2]

[1]Senior Manpower Planning Officer, National Planning Authority, Kampala, Uganda, Clement Hill Road, Plot 17B
[2]Executive Director, National Planning Authority, Kampala, Uganda, Clement Hill Road, Plot 17B
*Corresponding author: kssebulime@outlook.com

Abstract Over the years, there has been a considerable discourse around the cost as well as the nexus between unemployment and economic growth in both developing and developed countries. This relationship has remained an economic puzzle and to date, no conclusive position has been reached. The debate has continued to attract the attention of researchers, academicians and policy makers. From Uganda's context, less effort has been invested in trying to unpack this phenomenon. This paper therefore, investigates the cost that unemployment actually imposes on the country's growth performance as theoretically explained by the 'Okun's Law'. The study utilizes an Auto Regressive Distributed Lag (ARDL) Model on annual time series data for the period 1980-2016. The results reveal that Uganda loses approximately UGX 6.7 Trillion, an equivalent of USD 1.8 Billion annually due to the current unemployment rate. The cost is even higher when unemployment is re-estimated to exclude volunteers and unpaid family workers and adjusting the number of hours from one to five hours a week. In this case, the cost of unemployment rises to approximately UGX 60.3 Trillion, an equivalent of USD 16.3 Billion annually due to the current unemployment rate. In summary, the study finds that unemployment has a real cost to Uganda's economic growth and growth trajectory and confirms Okun's law in the country both in short and long run. In fact, the study reveals that, a one percentage point increase in unemployment rate costs Uganda's growth an average of 0.067 percentage points annually. Using these findings to estimate the growth trajectory, the study results indicate that Uganda will attain the per capita income goal of USD 9500 in the year 2070 not 2040 if the current unemployment trend remains on its current course. The conclusion from the study is that, addressing unemployment problem should remain core and top in the country's development agenda if the country is to achieve the targeted growth performance as signposted by the country's Second National Development Plan (NDPII) and the Uganda vision 2040. The recommends the need to ensure integration of unemployment or employment concerns into the national planning and budgeting frameworks. Indicators to track the labour market functionality especially in regard to employment generation should be included in the results framework of the country's national development plans (NDPs) and the national budgets; and more so, monitored and reported on an annual basis.

Keywords: Okun's law, unemployment, economic growth, national development plan, Uganda vision 2040

Cite This Article: Ssebulime Kurayish, and Muvawala Joseph, "Estimating the Cost of Unemployment to Uganda's Growth and Growth Trajectory 1980-2016: 'an auto-regressive distributed lag modelling approach'" *International Journal of Econometrics and Financial Management*, vol. 7, no. 1 (2019): 27-36. doi: 10.12691/ijefm-7-1-4.

1. Introduction

This paper investigates the cost that unemployment is likely to perpetrate on Uganda's growth trajectory as projected by the country's Second National Development Plan (NDPII 2015/16-2019/2020) and the Uganda Vision 2040. The debate and analysis of the likely impact of unemployment on economic growth in developing and developed economies has been on from the onset of the classical economists. The debate is considered an economics puzzle, since there is no conclusive position has been reached to-date. Accordingly, the debate is still enduring. This relationship was first recognized and empirically estimated by Okun, [1] which is now known as the 'Okun's law'. Precisely, Okun's law is an empirical relationship between changes in aggregate output relative to its potential trend and changes in the unemployment rate relative to its natural rate [2].

In other words, this law is intended to illustrate how much of a country's gross domestic product (GDP) may be lost when the unemployment rate is above its natural rate [3]. Hence, this gives room to examine the level of change in GDP considering the time frame of the change that takes place between economic growth and employment

from either the short run or long run perspective. Unemployment is often agreed to be an indicator of macro-economic infection and could be voluntary or involuntary [4]. Voluntary unemployment arises when labour chooses not to work because they have a means of support other than employment and a classic example is the idle rich man. On the other hand involuntary unemployment exists when persons are willing to work at the prevailing rate of pay but unable to find work [5]. Kvist [6] also defined unemployed as the percentage of the labour force that is without job, but is able and willing to work.

Analysis of Uganda's perspective indicates that, the current total population according to the Uganda Bureau of Statistics (UBOS) is estimated at 40 million people and is projected to grow to 46.7 million by 2025 [7]. The population growth rate between 2002 and 2014 was estimated at 3.0 percent; slightly lower than earlier projections at 3.4 percent [8]. The major push for population growth has been the high fertility rate, currently estimated at 5.8. Uganda boasts of a youthful population projected to be 8 million by 2014, and an estimated 78 percent of the population below 30 years of age [8]. The implication of this youthful population is that Uganda is poised to benefit from the demographic dividend, if the country invests in improving the quality of its human capital [9].

As the population has grown over the years, so has the total labour force. According to the 2012/13 Uganda National Household Survey (UNHS), the total labour force grew by 4.7 percent from 2009/10 [10]. Total labour force is estimated at 16.4 million people [10]. Over the last two decades from 1992 to 2012, according to the UBOS statistics, Uganda's total labour force grew at an annual average rate of 3.1 percent. Over the same period, growth in total employment averaged 2.96 percent [10]. A higher rate of labour force growth than total employment growth implies that there is an accumulation of unemployment according to the second National Development Plan [9].

Analysis of the key labour market performance statistics for Uganda documented in the UBOS National Household Survey reports shows that Uganda's total population, total labour force, total employment and total Gross Domestic Product (GDP) have been growing over the years but at varying rates. With the economy rebasing in 2014, GDP expanded by 17.3 percent at 2009/10 market prices. The rising rate of the population growth of the country is faster than the job opportunities, a situation in which birth rate is rising, death rate falling and the population growth rate is between 3.4% and 3.5% in which case unemployment is bound to exist [10].

High levels of unemployment are costly to individuals, the society and the economy as a whole [11]. For instance high and increasing unemployment increases fiscal costs, wastes economic resources, reduces the long run economic growth potential and is linked to private and social deprivation (which breeds unrest, crime, social dislocation and disrupting social order). It is therefore imperative that government devises strategies to curb high and increasing unemployment rates. Unemployment causes permanent losses of output of goods and services. The unemployed are faced with financial insecurity, resulting in poverty and indebtedness. Certain kinds of criminal activity are directly related to unemployment. Many studies have linked unemployment to family disruption, suicide, ill health (physical and mental), drug addiction, homelessness, malnutrition, poor prenatal care, school dropouts, racial and ethnic antagonism, and other social problems [12]. Unemployment also differentially affects certain sectors of the population, so that disadvantaged minorities, those with little education, and youth can suffer from rates of unemployment two to ten times the overall rate [12].

Unemployment also can destabilize business expectations, as fears of low demand crowds out private investment. Related to this, unemployment can also lead to technological stagnation. Pratten [13] suggests that high levels of employment stimulate technical innovation; unemployment would be associated with less innovation. Firms with high and stable levels of demand have the resources and the incentive to support going high tech; with high unemployment and thus cheap labour, firms lack the resources and the incentive to retool. It has also been shown that unemployment leads to deterioration in labour skills. All of this suggests that unemployment may lead to lower productivity and growth [13].

Since Keynes and Post Keynesians have dedicated significant attention to the problems of unemployment because it is the cause of so much social and human misery, it is of great interest whether capitalist economies tend to full employment or whether unemployment is a normal feature of capitalism, and thus should be a target for government intervention. In neoclassical economics, market systems tend to utilize all resources fully, including labour. Perfectly flexible wages, prices, and interest rates constitute the self-adjusting mechanism that will tend to eliminate unemployed resources in the long run [6].

With the implementation of the Second National Development Plan, Uganda's medium term target is to achieve the lower middle income status by 2020 with a per capita income of USD 1,033 while the overall target by 2040 is to attain a per capita income of USD 9,500. However, the country still faces a number of challenges ranging from economic, social and political spheres towards the realization of the desired target. It is necessary to estimate the likely cost that unemployment poses to the growth targets of the economy using recent time series data and a rich econometric methodology.

2. The Research Problem

The national unemployment rate according to the Uganda Bureau of Statistics (UBOS) (2017) is 9.2%, while the youth unemployment is 11.2% [14]. Unemployment is even higher for those with higher levels of education and those living in urban centers (UBOS Abstract, 2017). However, when unemployment is re-estimated to exclude volunteers and unpaid family workers, and also adjusting the number of hours from one to five hours a week from the definition of unemployment, national unemployment rises to 39.9% and youth unemployment rises to 38.9% [9], this implies that, unemployment is significantly understated by including the economically non-productive groups of workers such

the volunteers and nonpaid family workers. This is justified by the increasing number of people who are actually willing to work at any existing set of wage rate. Many people frustrated by lack of employment opportunities include those without work and those who have jobs but want to work longer hours or more intensively. This shows that Uganda's unemployment problem has become chronic and should be a matter of utmost national concern.

A report by the Ministry of Finance, Planning and Economic Development [15], indicates that, the key driver to the current unemployment is the insufficient demand for labour due to among others: the underdevelopment of the economy, a high population growth rate, sluggish or stagnant economy, small formal private sector, inadequate credit to SMEs, low literacy and numeracy rates, and skills gap mainly occasioned by the nature of education that is not directly linked to the needs of the world of work [15]. Several scholars have analyzed unemployment tragedy, however, from different angles. Many scholars have concentrated on analyzing the causes of unemployment in Uganda [5,16,17,18]. But few attempts have been made to estimate the cost of unemployment to Uganda's economic growth and the implications to the attainment of the estimated income status by 2020 and 2040. This study therefore estimates the cost of unemployment to Uganda's growth using time series data between 1980-2016 and a rich method of econometrics.

3. Literature Review

3.1. The Okun's Law and the Cost of Unemployment on Economic Growth

Okun's study remains an important theory in economics literature and has been discussed and updated by much economic research. The Okun's law states that, a 1 percent reduction in the unemployment rate would raise approximately 3 percent or more of output growth [1]. In fact, Okun postulated that a 1 percent increase in the growth rate above the trend rate of growth would lead to only 0.3 percent reduction in the rate of unemployment. Reversing the causality, a 1 percent increase in unemployment will mean roughly more than 3% loss in GDP growth [1]. This relationship implies that the rate of GDP growth must be equal to its potential growth just to keep the unemployment rate constant.

To reduce unemployment, therefore, the rate of GDP growth must be above the growth rate of potential output [19]. A number of studies have followed investigating empirically the relationship between output and unemployment [20,21,22,23]. These studies mostly revealed the validity of the relation between output and unemployment rate. However, the estimates of Okun's coefficient vary substantially across countries and regions. For example, [23] studied the validity of Okun's law in four Arab countries: Algeria, Egypt, Morocco and Tunisia. He found that output growth does not translate into employment gains for the four countries, which means that Okun's coefficient turn out to be statistically insignificant [23].

Keller and Nabil [24] suggest that economic growth in the Middle East and North Africa (MENA) rejoin has been insufficient compared to the region's labour force

and that high growth does not guarantee good labour market outcomes. On the other hand, the World Bank suggests that, high unemployment is viewed as a reflection of the problems of structural and frictional unemployment in MENA countries [25]. In this regard, it seems that the World Bank report suggested that Okun's coefficient is low or insignificant among MENA countries. It is noticeable that a significant correlation exists between growth and changing rates of unemployment. High rates of growth indicate that the market need additional labour to be employed from the surplus of the labour force [16]. On the other hand, financial recession increases rates of unemployment due to job loss. It has to be highlighted that there is a weak relationship between the growth rates and unemployment rates; if economic growth gets increased by, for example, 2.0 %, it does not mean that the unemployment rate gets decreased by 2.0% [22]. It is found that the same rates of economic growth do not have the same impact on unemployment in all countries [20].

The theoretical framework therefore, seeks to establish the relationship between unemployment and economic growth. Whether the rate of economic growth creates or destroys jobs and whether it affects jobs in the short or long-run still remains a matter of debate. The market search theory suggests that, increasing rate of job turnover is higher in natural rate of unemployment [19]. There are some empirical evidence to show that a negative long-run relationship been economic growth and unemployment exists. Davis, John, & Haltiwanger [26] show that period of unemployment are periods of high firm level job turnover. The source of unemployment in their model is the relocation of labour across firms. That is, unemployment is of transitory nature. Reallocation is triggered by the fixed overhead cost of human capital growth rate since technology of plan is fixed, and that at some point of plant shut down, a laid off worker cannot find job instantaneously due to search fictions [26].

3.2. Empirical Literature Review

There has been extensive literature on the issue of economic growth and unemployment. Gehrke & Kurz, [27] exposited that classical economists focused on the long run growth and paid a little attention to short run; Neoclassical economists also started with the same style but soon realized the problems and focused on inter-temporal analysis. Neoclassical economists focused on investment in physical and human capital. Lager [28] elaborated two main characteristics of growth theory. First, output expansion had outpaced the population growth in the two hundred years since the industrial revolution. Second, different countries had remained on seemingly different growth paths for relatively long periods of time. One strand of theory continues to see capital accumulation [28].

Others [27,29,30] stated that, firms frequently add to their stocks of capital in a perfectly competitive background with constant returns to scale. A second approach casts outer economies in a leading role in the growth process. When firms gather new capital, they unwillingly contribute to the productivity of capital seized by others. Such spillovers may take place in the course of investment in physical capital. Lower, [29] and Fuad, [20]

found that traditional factors of growth had no significant role in growth of transition economies.

However, Christopoulos [22] found efficiency and allocation of sources, in the short run, had major role in the growth process. In transitional and emerging economies unemployment is critical problem. Influential work is done by [31], Technological innovation had dual effects on the economy. Two different types of effects were elaborated by economists. Erdos & Molnar [30] found that technological progress helped to reduce unemployment due to capitalization effect. Rapid growth raised the return of firms and new firms were launched to share the profit and in turn more jobs were created. Quick innovation made the labourers unemployed [24].

But Lavoie & Stockhammer [2] found the impact of regional disparities on unemployment. Simple regression method was applied. The variables non-demographic labor market, industry product variable, regional factor endowments and demographic variables were used. The industry variable had significant impact in creating regional unemployment. Different factors had been evaluated to examine the reason of unemployment. Institutions had been used to reduce unemployment. Alani [16] found that institution had significant role in minimizing the unemployment. Real wage and unemployment relation had been analyzed; a rise in real wage increased the natural rate of unemployment [16].

Yet Gehrke & Kurz, [27] found unemployment causes and relation in the framework of macroeconomics model of U.K. A framework was designed to analyze the rise in Britain unemployment. Three main blocks were developed to study the relation. A wage equation was constructed from a bargain between the firm and its workers. Supply of jobs and the job search decision of the unemployed was the second and the third block of the model respectively. The study found out that, over the period of study, unemployment increased rapidly. Gradualism policy was not adopted in early 1980s to check the unemployment. Unemployment was due to demand side shock and remained high due to the persistence of supply side shock. Supply side policies like income policy and tax system would be implemented to reduce unemployment [27].

However, Sabur [32] found that growth rate in Pakistan was really good but the employment generation was not so high. Unemployment increased at high rate and manpower planning experience did not produce significant result to minimize unemployment in Pakistan. Paper by Piachaud [11] elaborated that the non-accelerating wage rate (NAWRU) as a tool of measurement in structural unemployment for Nordic countries for the period of 1964 to 1994. Structural unemployment had risen. In Nordic countries and most of the European countries, the NAWRU indicator had risen with the rise of actual unemployment. Malfunctioning of labor market would be given importance to see the unemployment horizon [11].

Another study [33] investigated the link between growth and unemployment of Nigeria. Structural change played significant role in job creation and job destruction of an economy. Fixed effects panel regression method was used. The result showed a robust and negative relation between unemployment and growth. Rapid growing economies would face structural unemployment though for a shorter period. Unemployment could be minimized through efficient planning and improvement in human capital [33].

Similarly, Ahmed & Ambreen [34] argues that democratic societies tend gradually to become more organized in strong pressure groups that for income distribution reasons have an interest in blocking the changes necessary for high growth. Relatedly, Akintoye [35] investigated the necessary condition for reducing the unemployment rate in Nigeria. Using the error correction model estimated by OLS instrumental variables, he found that in both long and short runs changes in Real Gross Domestic product (RGDP) and Real Average Earning (RAE) have a statistically impact on changes in the unemployment rate. While increase in GDP reduces the unemployment rate in both short and long terms but lower it in the short-run. Increase in real average earning increase the unemployment rate on the long-run [35].

In another study, Zaleha, Norashidah, & Judhiana [36] find that it is important but difficult to distinguish between desirable effects of unemployment insurance that are observationary equivalent when designing optimal unemployment insurance cause's permanently higher involuntary unemployment by raising the reservation wage. The paper avoids the problem by regarding the trade-off between the unemployment insurance replacement rate and unemployment as an intermediate relationship that matters only as far as it impacts economic growth. Using annual panel data finds that unemployment insurance replacement rate is associated with higher unemployment [36].

In a conference proceeding on Macroeconomic Policies and Pro-Poor Growth in Nigeria, Tokunbo [37] empirically evaluates macroeconomics policies vis-a-vis pro-poor economic growth in Nigeria using secondary data covering the period of 1960-2000. The study found among others that growth was actually weakly pro-poor. Also, those that are far below the poverty line have not really been enjoying the benefits of economic growth. In fact, the benefit getting to them has been decreasing or reducing at an increasing rate. And that economic growth in rural area will be slightly more pro-poor than in urban areas. Overall, economic growth in Nigeria is not necessarily always pro-poor [37].

4. Theoretical and Empirical Methodology

The theoretical underpinning of this paper is the Okun's law [1] which provides the basis for determining the relationship between unemployment and output growth. It is also backed by the framework used by Jayaraman, Choong, & Kumar [38] which was based on the neoclassical growth model developed by Solow [39]. According to Solow [39], the long-run output per worker grows at the rate of exogenous technological change which is equivalent to growth rate of total factor productivity. The frameworks starts from the Cobb-Douglas production function with the constant returns and Hicks– neutral technical progress stated as:

$$y_t = A_t k_t^{\alpha}, \, 0 < \alpha < 1 \qquad\qquad 1$$

Where y is the growth rate of output, A is the stock of technology and k is capital per worker. The Solow model assumes that the evolution of technology is given by:

$$A_t = A_0 e^T \qquad 2$$

Where A_0 is the initial stock of knowledge and T is time. According to Jayaraman, Choong, & Kumar [38], it is also plausible to assume that;

$$A_t = f(T, UNEMP) \qquad 3$$

Where, $UNEMP$ is the Unemployment rate. The effect of $UNEMP$ *rate* on total factor productivity (*TFP)* can be captured with $UNEMP$ as a shift variable into the production function. In the estimation procedure, to accommodate the likely impact of other variables, which are not included in the total factor productivity, Jayaraman, Choong, & Kumar [38] argued that one can include time trend to the production function.

$$A_t = A_0 e^T UNEMP_t^{\beta}. \qquad 4$$

Substituting equation 4 in to 1 we obtain the following equation that forms the basis of estimating the impact of unemployment on Uganda's economic growth;

$$y_t = (A_0 e^T UNEMP_t^{\beta}) k_t^{\alpha}. \qquad 5$$

Equation 5 is the final model upon which the estimation of the cost of unemployment on Uganda's output growth was based. According to [1], the unemployment rate and GDP growth rate are inversely related. To control for endogeneity, we augment gross capita capital formation and inflation to unemployment in model 5. Equation 5 is thus transformed to become:

$$y_t = f(UNEMP_t, GCF_t, INF_t) \qquad 6$$

Where GCF_t is Gross capital formation at time t and INF_t is inflation rate at time t. The variables inflation and gross capital formation are introduced in model 6 above to act as control variables and due to their strong theoretical foundation from both the classical and the neoclassical schools of thoughts [16]. The model presented in equation 7 is thus finally transformed into estimable econometric regression equation as below with the coefficient of interest being β:

$$y_t = \delta + \beta UNEMP_t + \gamma GCF_t + \rho INF_t \qquad 7$$

From 7, the parameter $\boldsymbol{\beta}$ is known as the Okun coefficient and indicates changes in real output caused by changes in unemployment rate. The estimated elasticity provides a measure of the relationship between unemployment and economic growth; where low estimates of Okun's coefficient suggest little impact of unemployment to economic growth and employment rate,

while high estimates of the slope coefficient provides support of Okun's law.

5. Data Sources and Analysis

The paper analyses the cost of unemployment on economic growth in Uganda using annual time series data. This data was sourced from the Bank of Uganda (BOU), UBOS statistical abstracts and the World Development Indicators (WDI). The data is analyzed using Eviews10 statistical package. The analysis involved standard quantitative analysis starting with data diagnostic checks to test for multicollinearity and the distribution of the data. Thereafter, an autoregressive distributed lag model was estimated to investigate the cost of unemployment on Uganda's economic growth and growth path.

6. Results

6.1. Multicollinearity Test Results

The term Multicollinearity is due to Ragnar Frisch. Originally it meant the existence of a "perfect" or exact, linear relationship among some or all explanatory variables of a regression model. The test was carried out using correlation matrix. According to William & Stanley [40] criteria; "multicollinearity is not a problem if no correlation exceeds 0.80".

The results presented in Table 1 reveal that, unemployment and GDP Growth are negatively related; that is, (-0.5233). This is in line with the study expectations; theoretically a rise in the rate of unemployment reduces GDP growth of the country [3]. The results show that unemployment and inflation are also negatively related (-0.6399) and this is in line with the study by Phillips [41] in Great Britain which illustrated that some degree of inflation is unavoidable with low rates of unemployment in the country. The correlation test results show that there is less multicollinearity problem since in all cases, the correlation coefficient does not exceed 0.8.

6.2. Descriptive Statistics

The descriptive statistics were also conducted so as to find out the economic behaviour of the variables before carrying out the econometric analysis of the model developed earlier in chapter three. Following the test of multicollinearity, the descriptive statistics of the variables under consideration are presented in Table 2.

Table 1. Correlation results

	GDP_GROWTH	UNEMPLOYMENT_RATE	GROSS_CAPITAL_FORMATION	INFLATION
GDP_GROWTH	1.0000	-0.5233	0.4765	-0.4589
UNEMPLOYMENT_RATE	-0.5233	1.0000	-0.7292	-0.6399
GROSS_CAPITAL_FORMATION	0.4765	-0.7292	1.0000	-0.6445
INFLATION	-0.4589	-0.6399	-0.6445	1.0000

Source: Computed by the authors using Eviews10.

Table 2. Descriptive Statistics

	GDP_GROWTH	GROSS_CAPITAL_FORMATION	INFLATION	UNEMPLOYMENT_RATE
Mean	5.654233	16.52520	36.99103	10.67090
Median	6.116283	16.63075	8.550000	9.570000
Maximum	11.52324	26.46980	200.0000	20.55000
Minimum	-3.306380	7.855974	-0.300000	3.250000
Std. Dev.	3.063609	5.734405	57.38921	5.407522
Skewness	-0.704178	-0.056434	1.913074	0.427684
Kurtosis	3.942142	1.766926	5.308191	1.900706
Jarque-Bera	4.067391	2.172049	2.286790	2.748474
Probability	0.130851	0.337556	0.258555	0.253033
Sum	192.2439	561.8567	1257.695	362.8106
Sum Sq. Dev.	309.7281	1085.152	108686.2	964.9627
Observations	37	37	37	37

Source: Computed by the authors using Eviews 10.

The results of the descriptive statistics indicate that for the period of study, the average growth rate for Uganda was 5.65 percent while the unemployment rate was 10.65 percent. The average inflation rate is 36.9 percent as measured by Consumer Price Index (CPI) while gross capital formation has averaged at 16.5 percent of GDP. During the same period of study, the economy experienced the highest level of unemployment of 20.5 and the lowest of 3.25 percent of the total labour force. The maximum growth rate was 11.5 percent and the minimum was -3.3. The descriptive statistics thus reveal a high level of volatility of growth rate and the unemployment in Uganda. The Jarque-Bera statistic is less than 5.99 in all cases. This is an implication that the all variables are normally distributed.

6.3. Unit Root Test Results

The ADF test was utilized to ascertain the order of integration of the series in order to avoid spurious results. The ADF test statistics for the variable both at level and first difference are presented in Table 3.

Table 3. The ADF Unit root test results

Variables in Levels	ADF_Statistic	P_Value
GDP_GROWTH	-3.100577	0.0363
GROSS_CAPITAL_FORMATION	-0.032853	0.9486
UNEMPLOYMENT_RATE	-1.482757	0.5293
INFLATION	-1.478157	0.5302
Variable in first Difference	ADF_Statistic	P_Value
GDP_GROWTH	-6.932982	0.0000
GROSS_CAPITAL_FORMATION	-6.931016	0.0000
UNEMPLOYMENT_RATE	-8.615170	0.0000
INFLATION	-4.871026	0.0005

Source: Computed by the authors using Eviews10.

Table 3 represents the unit root test results of the variables used in the analysis both at level and first difference; the results show that all the variables except the GDP growth are non-stationary at 5 percent level of significance and thus the null hypothesis of unit root existence could not be rejected for all the variables used in the analysis as evidenced by the probability value which exceeds 5 percent level of significance. However, after differencing the variables once, they all became stationary. This indicated that all the variables were integrated of different orders, that is, order zero (I (0)) and order one (I (1)). The existence of different orders of integration implied that the normal Johansen cointegrating test could not hold since variables were integrated of different orders.

The study thus adopted the Auto Regressive Distributed Lag (ARDL) bounds testing approach to cointegration. In this case, the null hypothesis of no co-integration is tested against the alternative hypothesis of co-integration.

6.4. Cointegration Test

Under the Auto Regressive Distributed Lag (ARDL) bounds testing approach to cointegration, the null hypothesis of no co-integration is rejected if the calculated F-statistic is greater than the upper-bound values. The test becomes inconclusive if the F-statistic falls between the lower and upper bounds. The ARDL modelling integrates the short-run dynamics with the long-run equilibrium without losing long-run information. The bound test results of cointegration are thereafter presented in Table 4.

Table 4. Bound Test Cointegration

Wald Test: Null Hypothesis: C(1)=C(2)=C(3)=C(4)=0			
Test Statistic	Value	df	Probability
F-statistic	6.31613	(4, 28)	0.03875
Chi-square	25.58477	4	0.04930

Source: Computed by the authors using Eviews10.

The bound test cointegration results presented in the Table 4 indicate that the computed *F*-statistic is 6.316 while the Pesaran lower and the upper asymptotic critical values are 4.94 and 5.73 respectively. Since the lower bound critical value assumes that all the regressors are I (0), while the upper bound critical value assumes that they are I (1). The null hypothesis of no cointegration is rejected since the computed. The conclusion from this analysis is that the variables are cointegrated.

6.5. Empirical Model Estimation

The existence of cointegration and different orders of integration implied that the Auto Regressive Distributed Lag (ARDL) model was the most suitable to analyze the phenomenon understudy to ascertain the short and long run cost/impact of unemployment on economic growth in Uganda. The study's main objective was to establish the impact/cost of unemployment on economic growth and the relationship between them in Uganda. Therefore, having established the nature and the order of integration of the variables, it was imperative to proceed and estimate the Auto Regressive Distributed Lag (ARDL) model and the results presented in Table 5.

Table 5. ARDL Model Results

Dependent Variable: GDP Growth (%)			
Variable	Coefficient	t-Statistic	Prob.
D(Unemployment)	0.042513	0.158881	0.8754
D(Gross_Capital_Formation)	0.276219	2.915203	0.0365
D(Inflation)	-0.041903	-2.183611	0.0411
D(Unemployment)(-1)	-0.067210	-4.497992	0.0447
D(Gross_Capital_Formation)(-1)	0.068880	-0.143224	0.8875
DInflation(-1)	0.005286	0.344573	0.7340
D(Unemployment)(-2)	-0.197920	-0.744032	0.4655
D Gross_Capital_Formation)(-2)	0.373675	-0.728382	0.4748
DInflation(-2)	0.019216	1.409603	0.1740
@TREND	0.061747	1.768623	0.0897
R-squared	0.852030	Mean dependent var	0.07931
Adjusted R-squared	0.760801	S.D. dependent var	17.6239
S.E. of regression	9.285923	Akaike info criterion	8.57928
Sum squared resid	11323.384	Schwarz criterion	7.12191
Log likelihood	-96.63386	Hannan-Quinn criter.	6.86070
F-statistic	6.618502	Durbin-Watson stat	2.13266
Prob(F-statistic)	0.000731		

Source: Computed by the authors using Eviews10.

7. Discussion

7.1. The Impact of Unemployment on Uganda's Economic Growth and Growth Trajectory

Theoretically, unemployment and economic growth are negatively related, thus the study's expectation was unemployment reduces the rate of economic growth. Following the results presented in Table 5, it is bald-faced that unemployment negatively and significantly affects Uganda's growth as well as the growth trajectory. However, the significant impact of unemployment on economic growth is not instant, suggesting that the impact occurs with lags. The coefficient of unemployment lagged one period back is -0.06721 with t-statistics of -4.4979 and P-value of 0.0447. This means that a 1 percentage point increase in unemployment reduces economic growth by approximately 0.06721 percentage points. This is in agreement with the apriori expectations of the study and in support of other works by [1,3,19,26,35]. The results imply that Uganda loses approximately UGX 6.7 Trillion or an equivalent of USD 1.8 Billion annually due to the current unemployment rate. However, when unemployment is re-estimated to exclude volunteers and unpaid family workers and adjusting the number of hours from one to five hours a week, the cost of unemployment rises to approximately UGX 60.3 Trillion an equivalent of USD 16.3 Billion annually due to the current unemployment rate. The loss in GDP due to unemployment in fact exceeds 16 percent of the current total budget. Such a loss would actually be adequate to enhance the productive capacity of the country if invested in productive areas of the economy. Addressing unemployment in Uganda should therefore remain top on agenda of Uganda's planning and budgeting instruments.

7.2. The Impact of Gross Capital Formation on Uganda's Economic Growth and Growth Trajectory

In order to avoid model misspecification and biasness of the results, gross capital formation was added to the model. This was meant to capture the impact of capital and physical infrastructures by both public and private on economic growth. The study's expectation was gross capital formation positively affects growth. The results presented in Table 5 show that the effect of capital formation on economic growth is instantaneous since the coefficients on the first and second lag of gross capital formation are statistically insignificant. The coefficient of gross capital formation (DGCF) is 0.276219 with t-statics of 2.9152 and P-value of 0.0365. This implies that a unit increase in gross capital formation results into approximately 0.28 unit increase in economic growth keeping other factors constant. The conclusion of the study corresponds to findings by [12,20,35], on the potential impact of gross capital formation on economic growth. This consequently necessitates government's input in physical capital formation due to the potential impact on economic growth through promoting domestic investment and attracting foreign investors.

7.3. The Impact of Inflation on Uganda's Economic Growth and Growth Trajectory

The apriori study expectation was, inflation and economic growth are negatively related. That is, a rise in GDP growth rate reduces inflation while a rise in inflation reduces economic growth. The results presented in Table 5 indicate that although past values of inflation (inflation lagged one and two periods back) have no impact on economic growth in the current year, the current

inflation do affect growth. The coefficient on inflation is -0.41903 which is negative and statistically significant. The t-statistic is 2.1836 in absolute terms thus significant at the conventional level with p value of 0.0411 which is less than 5 percent level of significance. The conclusion is that, a unit percentage point increase in inflation rate reduces the growth rate of GDP by roughly 0.041 percentage points in the same year. This finding is in support of similar studies' findings such as [4,35,36,42].

8. Conclusion

In conclusion, the study investigated the cost of unemployment on economic growth of Uganda for the period 1980-2016 using an Auto Regressive Distributed Lag (ARDL) model. The diagnostic checks revealed that the series are integrated on different orders and they exhibited weak multicollinearity. This was thus a go ahead to estimate the Auto Regressive Distributed Lag (ARDL) model since the long run regression would yield biased and inconsistent estimates that would otherwise be nonsense (spurious) results. Results of the Auto Regressive Distributed Lag (ARDL) demonstrated signs of convergence of economic growth towards equilibrium due to a shock to unemployment, inflation or gross capital formation.

The paper has showed that unemployment has a negative real cost on Uganda's economic growth. The conclusion is that, a one percent increase in unemployment reduces economic growth by approximately 0.06721 percentage points and this has precarious implications to Uganda's middle income status that is being pursued by the country. This is in agreement with the apriori expectations of the study and in support of other works by [1,3,19,26,35]. The conclusion concerning the relationship between unemployment and economic growth was ascertained negative and substantially high. Therefore, unemployment has a real cost on Uganda's economic growth directly and indirectly through other variables such as inflation and gross capital formation. This is an indication that variations in both inflation and gross capital formation also explain variation in economic performance of the Uganda's economy.

The main conclusion from the study findings is that, Uganda will attain the per capita income goal of USD 9500 in the year 2070 not 2040 if the current unemployment trend remains on its current course. The conclusion from the study is that, addressing unemployment problem should remain core and top in the country's development agenda if the country is to achieve the targeted growth performance as signposted by the country's Second National Development Plan (NDPII) and the Uganda vision 2040. The results also showed that other variables other than unemployment also affect economic growth in Uganda. These included gross capital formation and inflation.

9. Recommendations

The study recommends the need to ensure integration of unemployment or employment concerns into the national planning and budgeting frameworks. Indicators to track the labour market functionality especially in regard to employment generation should be included in the results framework of the country's National Development Plans (NDPs) and national budgets; and more so, monitored on an annual basis. In addition, government should design and implement an integrated national employment strategy with an efficient monitoring mechanism to ensure that government funds are put to optimal use in regards to employment creation. It is noted that, the government of the republic of Uganda has a number of programmes, policies and projects aimed directly and indirectly at employment generation; however, these are uncoordinated and there is lack of an effective and efficient mechanism to fully implement them with zero or minimal leakages.

In addition, there is need for the government to continue with the investment in physical infrastructures so as to add to the existing capital infrastructures and enhance the country's economic competitiveness that could also accelerate the pace of employment generation. This is because, the study finds that, gross capital formation is an important determinant of economic growth in Uganda. There is thus need to institute policies that enhance investment in capital and physical infrastructure since if these are combined with more self-aid projects and skilled labour force, output rises faster and thus spurs growth. This will increase productivity of economy and in the end more employment opportunities will be created. There is also need for a comprehensive policy package to deal with fluctuation in prices. This can take the form of monetary or fiscal policy such as adoption of a progressive taxation system or buffer stocking especially in the agriculture and agriculture related activities.

Declaration

Availability of data and material

This study covered the period 1980-2016 and it used secondary annual data. Data on gross domestic product growth (GDPG) and inflation was sourced from the Bank of Uganda available at https://www.bou.or.ug/bou/rates_statistics/statistics.html while data on on unemployment was sourced from different statistical abstracts published annually by the Uganda Bureau of Statistics (UBOS) available at https://www.ubos.org/explore-statistics/statistical-datasets/2468/ while data on gross capital formation was obtained from World Development Indicators (WDI) CD-ROM accessed at https://data.worldbank.org/country/uganda?view. All data analyzed during this study are available on request from the corresponding author.

Competing interests

The Authors declare that they have no competing interest in this publication

Source of funding

Not Available.

Authors' contribution

Acknowledgements

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