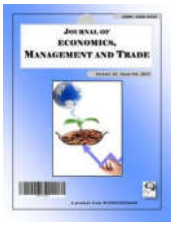

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Impact of Disagregated Public Expenditure on Unemployment Rate of Selected African Countries: A Panel Dynamic Analysis

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Authors' contributions

This work was carried out in collaboration between both authors. Author MOA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author FCO managed the analyses of the study. Author MOA managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

The study examined the impact of disaggregated public expenditure on unemployment rate in Angola, Benin, Botswana, Cameroun, Central African Republic, Chad, Egypt, Equatorial Guinea, Ethiopia, Ghana, Kenya, Mauritius, Morocco, Namibia, Nigeria, South Africa, Sudan, Tanzania, Togo and Tunisia with panel data spanning from 2000 to 2017. The data were majorly sourced from the World Bank Indicator. The study employed Generalized Method of Moments (GMM) techniques for empirical analysis. The findings of two-step system GMM showed that expenditure on infrastructure and education reduce unemployment rate, while expenditure on defense and health increase unemployment rate in the region. The short-run elasticity estimate showed that infrastructure and education expenditures reduce unemployment rate by 9% and 1.83%. A unit rise in defense and health expenditure increase unemployment rate by 5.2% and 84.5%. The long-run elasticities of infrastructure and education expenditure reduce unemployment rate by 3.8% and 7.89%, while the long-run defense and health expenditure elasticities increase unemployment rate by 22.22% and 364.58% in Angola, Benin, Botswana, Cameroun, Central African Republic, Chad,

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Egypt, Equatorial Guinea, Ethiopia, Ghana, Kenya, Mauritius, Morocco, Namibia, Nigeria, South Africa, Sudan, Tanzania, Togo and Tunisia. The policy implication is that, the positive relationship between expenditure on health and unemployment could be attributed to mismanagement of government funds due to corruption, while that of defense and unemployment could be high rate of insecurity and crimes in the region.Therefore, the study recommended among others a drastic measure to further improve the education sector through adequate investment in education that will help in skills, development and training.

Keywords: System GMM; health; defense; education; infrastructure; unemployment.

1. BACKGROUND TO THE STUDY

Public expenditure plays an important role in aggregate economy in multiple dimensions and has remained a crucial issue in economic development, and most especially in the less developing countries of Sub-Saharan Africa [1]. Public expenditure has occupied a strategic position in various economies of the world and it is an important instrument in public sector policy. No economy exists without incurring public spending for the benefit of its citizens and to stimulate economic activities. In an underdeveloped country, public expenditure has an active role to play in reducing regional disparities, developing social overheads, creation of infrastructure of economic growth in the form of transport and communication facilities, education and training, growth of capital goods industries, basic and key industries, research and development, reducing unemployment rate and so on [2].

Government role in the economy has been subjected to series of debate over the years. Some argue against large governments others believe that without government's participatory role to guides the economy, countries could be endangered with unstable growth which may lead to prolonged recessions and massive rates of unemployment. Nwosa [3] opined that the role of government includes the financial bail-outs of the entire economy or a particular sector of the economy which is to increase the government expenditure. But challenges still remain, despite increase in government spending especially for the structural transformations to create more jobs and reduce poverty by deepening investment in agriculture and developing agricultural value chains to spur modern manufacturing and services in African countries.

African Economic Outlook [4] portrayed that African countries growth rate have not been accompanied by high job growth rates, employment grew at an annual average of 2.8 percent between 2000 and 2008 roughly half the rate of economic growth. Algeria, Burundi, Botswana, Cameroon, and Morocco experienced employment growth of more than 4 percent. Between 2009 and 2014, annual employment growth increased to an average of 3.1 percent despite slower economic growth. But this figure was still 1.4 percentage points below average economic growth. Slow job growth has primarily affected women and youth (ages 15–24). Africa is estimated to have had 226 million youth in 2015, a figure projected to increase 42 percent, to 321 million by 2030. The lack of job growth has retarded poverty reduction. Although the proportion of poor people in Africa declined from 56 percent in 1990 to 43 percent in 2012, the number of poor people increased. Inequality also increased, with the Gini coefficient rising from 0.52 in 1993 to 0.56 in 2008.

The effect of government expenditure on employment generation has been subject to considerable interest in recent years. There has been growing concern about the extent to which government expenditure has impacted the unemployment rate in African countries. The rising cost of governance remained a challenge by African countries; the public expenditure size has expanded which has generated interest in both developed and developing world to optimize the size of government. The need to provide and expand the tentacles of public goods becoming too obvious and unavoidable recognized, mismanagement and misappropriation of public expenditure in the economy cannot be underestimated, coupled with the pressing demand to expand and cater for the rising population via provision of employment opportunities. Employment is generated when job opportunities are provided by the government through their expenditure arm of the provision of social and economic infrastructural amenities in the economy. Hence, Jhingan [5] opined that the provision of infrastructural facilities through public funds has dual purpose of generating employment opportunities directly while at the

same time using the amenities towards encouraging the productive sectors in order to produce and provide employment opportunities for the populace/labour force [6]. Although, high rate of unemployment is not peculiar to less developed countries but also developed ones. The macroeconomic problem is severe in LDCs' including African countries.

Lack of employment opportunities aggravates unemployment situation in which some employable persons, in the labour force, with requisite qualifications, skills and ability are willing and seeking to work but cannot get jobs [7]. In related terms, deficiency in employment opportunities [5] leads to involuntary idleness of persons who are willing to work at the prevailing wage rate but unable to find work. The level of employment [3] measures the proportion of the available labour force that is employed in the economy. Amidst the unresolved foregoing controversies, most African countries are still faced with rising rate of unemployment where employable persons, in the labour force, with required qualifications, skills and ability are willing and seeking to work but cannot get jobs [7]. Therefore, the policy makers emphasized on the roles of public sector expenditure as important instrument which the government can apply to restore some economic problems such as reduction in inequality, poor living standards, high rate of unemployment, dwindling oil price and the desire to restore the economy on the part of full employment, increase in economic growth etc. However, it has been argued that, the rising state of public expenditure contributed to employment generation, this has continued to generate series of debate among scholars, the empirical and theoretical positions on the subject is quite diverse and still remain mixed.

According to empirical evidences of [8,9,10,11] government expenditure can enhance the level of employment and reduce unemployment in both developed and developing countries. However in spite of the huge government expenditure being spent on productive sectors such as infrastructures, defense of the citizenry, education and healthcare in Africa, there has been continuous rise in the level of unemployment in the continent. Therefore, it is against these issues raised above that this study examine whether gross public expenditure has any impact on unemployment rate in Angola, Benin, Botswana, Cameroun, Central African Republic, Chad, Egypt, Equatorial Guinea, Ethiopia, Ghana, Kenya, Mauritius, Morocco, Namibia, Nigeria, South Africa, Sudan, Tanzania, Togo and Tunisia. Hence, the study provides answers to the impact of public expenditure of selected African countries on the unemployment. The study is structured to the following arrangement, section one captures the background to the study, section two focuses on detailed theoretical propositions and empirical review. Section three explains the method adopts to analyze the data while section four shows outcome of results and interpretations. Finally, section five entails summary, conclusion and policy recommendations.

2. LITERATURE REVIEW

2.1 Theoretical Review

The theory of employment has always centered on two major arguments and strand of literature, among them are classical and Keynesian theories of employment. At the forefront of this theory, the classical economists assumed a full employment of labour and the flexibility of prices and wages to bring about the full employment in the case of any deviation. The classical assumption of full employment is based on the belief that over-production and general unemployment are impossible. In case of any unemployment, it is believed to be abnormal and will not continue for long since there are economic factors (self-adjusting mechanism) that inherently work towards bringing it back to equilibrium [12]. To this end therefore, the economy does not need government intervention through spending to achieve full employment since there is the existence of full employment.

Another strand of argument follows the Keynesian theory of employment which states that in the short run, economic growth through full employment is strongly influenced by total spending in the economy. Hence, the economy is being regarded as inherently unstable and required active government intervention through spending to achieve full employment. He is also of the view that public expenditures can contribute positively to economic growth by increasing government consumption through increase in employment, profitability and investment. This theory believes that active government intervention in the market place through government expenditure was the only method for ensuring full employment by ensuring efficiency in resources allocation and regulation of markets [13].

In support of this theory, Abu and Abdullahi [14] asserted that in the Keynesian model, an increase in government expenditure leads to a higher economic growth. Hence, fiscal policy is a technique to attain and maintain the level of full employment by manipulating public expenditure and revenue in such a way so as to keep equilibrium between effective demand and supply of goods and services. In like manner, Dewett and Navalur [15] posit that if depression occurs, fiscal policy should help in increasing demand and an increase in demand leads to increase in output. As such, the government can increase its expenditure and spend more on public works which will provide employment to more people. And a budget deficit during a depression they believe is a positive help in fighting unemployment and stimulating output growth.

This work will adopt Keynesian theory of employment just like [6], because (a) most empirical evidence revealed that government intervention is inevitable in every economy around the world today. This was demonstrated during the recent economic recession that lead government providing funds to bail out some failed banks in UK, USA, Nigeria, etc.(b) Government intervention is required in providing basic social and economic infrastructural facilities such as roads, schools, hospitals, etc. for the development of the economy(c) Government expenditures in capital public projects bring about the development of infrastructural facilities which can improve productive sectors of the economy and as such create employment opportunities for the populace, to mention but a few.

2.2 Empirical Review

2.2.1 Studies on the relationship between unemployment and government expenditures in Non-Africa

Holden and Sparrman [9] empirically analyzed the effect of government purchases on unemployment in 20 OECD countries from 1980 to 2007. Using ex post factor methodology, the findings revealed that an increase in government purchases reduced unemployment by about 0.3 percentage point in the same year. The effect was also observed to be greater in downturns than in booms, while greater under a fixed exchange rate regime than a floating regime. Faramarzi et al. [10] examined the long run impact of government expenditure and tax on liquidity and employment in Iranian economy with time series data spanning 1976-2009. Employing Vector Auto regressive model (VAR), Vector Error Connection (VECM) and co-integration techniques, the results indicate that government expenditure have positive impact on both employment and liquidity while tax has negative effect on employment.

Monacelli and Perotti [16] analyzed the effect of fiscal policy on labour market variables in the United States. Using a VAR model, the result showed that hour and employment also rise significantly in response to a government spending stock. Also, increase in government spending of 1 percent of GDP generated output and unemployment multiplier around 1.3 and 0.6 respectively, implying that each percentage point increase in GDP produces an increase in employment of about 1.3 million jobs. Kasau et al. [17] examined the effect of government spending and investment towards job opportunities in Eastern and at the KBI both direct and indirect as well as the total influence in both regions from 2007 to 2013. The panel data was analyzed using SEM (Structural Equation Modeling) and the result revealed that government spending has significant positive effect on the Investment and Employment either indirectly or in total.

Aziz and Leruth [18] analyzed the effect of changes in the composition of government expenditure between consumption and investment goods on the long run and short run fluctuations of the U.S economy. Using quantitative research methodology, the result revealed that the effects of changing the composition of government spending through government purchases can have efficiency effects as well as affect short run volatility of macroeconomic variables such as output and employment. Anthanasios [19] using the SVAR methodology to analyze unemployment effects of fiscal policy in Greece, found a negative relationship between unemployment and government purchases and a positive relationship between tax and unemployment. In like manner, Tagkalakis [20] examined the unemployment effects of fiscal policy changes in Greece from 2000-2012. Adopting the [21] SVAR methodology, he found that unemployment reduced when there was an increase in government purchases, government consumption, the government wage bill and government investment, but it increased when there was a cut in government purchases and its components.

Mahmood et al. [22] investigated the causes of unemployment in Pakistan. They discovered that budget deficit significantly increased unemployment. The study had employed variance inflation factor analysis and Stepwise regression. Their results were similar to his conclusion as they found out that fiscal expansion increased output, private consumption and private investment and reduced unemployment. Battaglini and Coate [23] explored the interaction between fiscal policy and unemployment in OECD countries with panel data from 2006 to 2010. Using OLS of fixed effect technique, the result revealed that government spending has positive relationship with unemployment. Laokulrach [24] examined the effect of fiscal policies on service sector employment in Thailand. Adopting multiple regression method, he found out that fiscal policy had no significant relationship with employment rate.

Umut [25] examined the effect of fiscal policy in Netherland, adopted a VAR technique. The result showed that fiscal shocks exert significant impact on GDP, Unemployment rate, Consumption and Investment. Hence, unemployment rises in response to a fiscal contraction and falls to fiscal expansion. Samira and Khalil [26] studied the effect of government civil expenditures on unemployment rate in Iran from 1997-2013. Employed Johansen co-integration test, (VAR) and VECM techniques. The result showed long run relationship and a negative impact on unemployment rate.

2.2.2 Studies on the relationship between unemployment and government expenditures in Africa

Nwosa [3] explored the impact of government expenditure on unemployment and poverty rates in Nigeria for the period 1981 to 2011. Employing the OLS estimation technique, he observed that government expenditure significantly and directly influences unemployment rate but inversely and insignificantly affects poverty rate. Okoye et al. [27] investigated the effect of fiscal deficit on unemployment in Nigeria from u used the vector error correction model (VECM) and granger causality test and found a significant negative and causal relationship. The study also applied the Ordinary Least Square econometric technique. Araga [6] examined the implications of public expenditure pattern particularly in road infrastructure, agriculture sector, road construction, and education sector on employment rate in Nigeria from 1980-2014 by adopting the VECM andCo-Integration. The result revealed that agriculture expenditure (AGREX) and road construction expenditure (RCEXP) have significant negative effect on employment (EMPR) while transport expenditure (TREXP) and education expenditure (EDEXP) have positive significant effect on rate of employment (EMPR).

Emeka [28] analyzed the Budget Deficit and Unemployment Nexus in Nigeria with a time series data spanning1997 - 2017. Employing linear regression and Vector Error Correction Mechanisms (VECM), the findings revealed that Government Annual Deficit has a significant positive effect on the Unemployment Rate in Nigeria. Murwirapachena et al. [29] investigated the effect of fiscal policy on unemployment in South Africa from 1980 to 2010. Employing vector error correction model and co-integration techniques, the findings showed that government recurrent expenditure and tax has positive relationship on unemployment whereas capital expenditure had a negative effect.

Chimeziri [30] examined the Effect of Federal Government Expenditure on Unemployment in Nigeria from 1981 to 2014. Using OLS technique, the result indicated that federal government expenditure variables (Expenditure on Administration, economic service, social and community service, and transfer) jointly have positive and significant impact on unemployment in Nigeria. Individually, only government expenditure on economic services affected unemployment significantly and negatively. Ubi and Inyang [31] analyzed the fiscal deficit and its implication on Nigeria's economic development from 1980 to 2016. Using quantitative technique, they observed that fiscal deficit did not reduce unemployment rate.

Egbulonu and Amadi [32] investigated the relationship between fiscal policy and unemployment rate in Nigeria for the period 1970 to 2013. Using co-integration test and a parsimonious Error Correction Model (ECM), the result showed a long run relationship between unemployment rate and fiscal policy tools(Government Expenditure, Government Debt Stock and Government Tax Revenue). Also there existed a negative relationship between expenditure and government debt and unemployment rate in Nigeria while government tax revenue indicated a positive relationship with unemployment rate. However, the granger

causality test showed that there was no causality running from either of government expenditure or unemployment.

Wosowei [33] empirically studied the link between fiscal deficit and unemployment rate in Nigeria with time series data spanning 1980-2010. Using Ordinary Least Square and co integration techniques, the findings revealed a bi-directional causal relationship between unemployment and deficit. In a similar study employing the same method of analysis, Egbulonu and Amadi [32] analyzed the fiscal policy and unemployment rate association in Nigeria from1970 to 2013. Their findings revealed a negative relationship between unemployment and fiscal policy in long-run. Onodugo et al. [34] empirically examined the impact of public sector expenditures (CEXP and REXP) together with private sector investment (PINV) on unemployment in Nigeria from 1980 to 2013. Using a regression model Capital expenditure and private sector investment have negative effect on unemployment in the medium and long-run.

Abubakar [35] investigated the effect of fiscal policy shocks on output and unemployment in Nigeria under the Keynesian framework from 1981-215. Using the Structural Vector Auto regression (SVAR) methodology and co-integration, the result revealed that shocks to public expenditure have a long-lasting positive effect on output growth. Also revenue is found to reduce unemployment in the short run, while public expenditure is found to produce no significant effect on unemployment. Finally, there exist long run equilibrium relationships among the variables. Fagbohun [36] examined the impact of budget deficit on economic performance in Nigeria from 1970 to 2013. Employing the least square method, he found that budget deficits did not increase the employment rate in Nigeria. In same manner a study carried out by Ayoguez and Anidiobu [37] revealed that government budget deficit had had a positive and insignificant impact on unemployment rate in Nigeria within1986 – 2015. The methodology used was Ordinary Least Square Method.

3. DATA AND METHODOLOGY

3.1 Data and Measurement

The selection of the sample period and countries are based on the availability of annual data, ranging from 2000 to 2017. The countries investigated were classified by World Bank. Hence this work makes use of a balanced panel data of 20 African countries (four from each sub-region); Angola, Benin, Botswana, Cameroun, Central African Republic, Chad, Egypt, Equatorial Guinea, Ethiopia, Ghana, Kenya, Mauritius, Morocco, Namibia, Nigeria, South Africa, Sudan, Tanzania, Togo and Tunisia.

The study considered panel series data on real unemployment rate, defense expenditure, health expenditure and education expenditure obtained from World Development Indicator (WDI) online database which was published by the World Bank. The variables above are measured as follows; Unemployment Rate (UNEMP): Unemployment refers to the condition of having no job. The International Labour Organization (ILO) defines the unemployed as numbers of the economically active population who are without work but available for and seeking work, including people who have lost their jobs and those who have voluntarily left work [38]. Unemployment rate is the percentage of the working population that is not currently employed. The percentage only takes into account the number of unemployed persons who are actively seeking employment. Those who are unemployed and not seeking jobs are considered to be “voluntarily” unemployed. Annual growth of gross fixed capital formation (GFCF) based on U.S dollar. This includes plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Defense expenditure (DEXP) measured in U.S dollar, this is the military expenditure (% of general government expenditure). This includes all current and capital expenditures on the armed forces, including peacekeeping forces, defense ministries and other government agencies engaged in defense projects. Health expenditure (HEXP), this is the general government expenditure on education (current, capital, and transfers), is expressed as a percentage of total general government expenditure on all sectors (including health, education, social services, etc.). It includes expenditure funded by transfers from international sources to government. General government usually refers to local, regional and central governments [39].

3.2 Model Specification

Given that the goal is to investigate the dynamic relationship between public expenditures and

unemployment rates in Africa. Building on the works of [3] and [6], we exploit the cross section and time series dimension of our data by using the Generalized Method of Moments (GMM) estimation. The GMM developed by Hansen [40], provides a convenient framework for obtaining asymptotically efficient estimators in this context, and first-differenced GMM estimators for the AR(1)panel data model were developed by Holtz-Eakin et al. [41] and Arelleno [42]. Hence, unemployment rate (unemp) depends on expenditure variables (expenditure on infrastructures-gfcf, defense expenditure-dexp, health expenditure-hexp and education expenditure-edexp). The initial dynamic model which is autoregressive in nature is specified as;

$$Y_{it} = \phi Y_{it-1} + \beta X'_{it} + (\eta i + \varepsilon it) I = 1,2\ldots\ldots\ldots,N, t=1,2\ldots\ldots, T. \quad (1)$$

Re-writing with our variables, we have;

$$UNEMPit = \phi\, UNEMPit-1 + \beta i1GFCFyit + \beta i2DEXPpit + \beta i3HEXPdit + \beta i3EDEXP + ditvi + \psi t + \varepsilon it \quad (2)$$

Wherei denotes the country (i=1,y,…….20) and t denotes the time period (t=2000, y, 2017). Eq. (1) is a fairly general specification which allows for dynamic macroeconomic (unemp) effect, individual fixed country effects (v), fixed time effects (ψ), and a stochastic error term (ε).

By *apriori,*

$$B_1, \beta_2, \beta_3, \beta_4<0$$

Eq. (1 and 2) are examples of linear dynamic panel model [42]. This model contains unobserved panel-level effects which may be either fixed or random. By construction, the unobserved panel-level effects are correlated with the lag(s) of the dependent variable and this makes most standard estimation approaches inconsistent [42].

From the aforementioned details, to handle the econometric issues and control for the potential endogeneity of unemployment rate we have applied the dynamic panel estimator of Arelleno and Bover [43] and Blundell and Bond [44]. Although we could use an instrumental variable estimator for this purpose, this dynamic panel estimator also allows us to control for the endogeneity of all the other regressors in the model and at the same time control for the econometric problems that arise from the inclusion of the initial selected unemployment rate variables as an explanatory variable. This estimator involves estimating the equations in levels and in differences.

For the levels equations lagged values of all explanatory variables are used as instruments while for the differenced equation we use the lagged values in levels of all explanatory variables as instruments. The two equations levels and differenced are then combined to give the GMM system estimators. These instrumental variables are called internal instruments because they rely on previous realizations of the explanatory variables and we test their validity using the Sargan test and their consistency using the second-order serial correlation test.

3.3 The Long-Run GMM Estimates

The mathematical computation of the long run elasticity coefficient for the K^{th} parameter is specified as;

$\beta it \div (1-\phi)$ where β is the short run coefficient of the explanatory variables, ϕ is the coefficient of the lagged dependent variable.

3.4 Justification of the Use of the Model

The method of GMM is chosen because our panel is of N>T (N=20, T=18) size. However, two-step system GMM was chosen over one-step system GMM for the following reasons:

i. It is the augmented two-step difference GMM.
ii. It is more robust to one-step system GMM.
iii. It is more efficient and robust to treating heterosckedasticy and autocorrelation.

Following Blundell [45] rule of thumb for selection between Difference GMM or System GMM, decision is based on the following criteria:

i. Pooled OLS->ϕ estimate biased upwards.
ii. FE->ϕ estimate biased downward.
iii. Diff.. GMM->ϕ estimate lies below or close to FE estimate. It is biased downward and
iv. Use system GMM estimator.

Our model indicate that system GMM is preferable for analyzing our dynamic model.

4. EMPIRICAL RESULTS

4.1 Selection between Difference GMM and System GMM

Based on Blundell [45] rule of thumb, the estimated one-step and two-step difference GMM are both less than fixed effect estimate. This implies that difference GMM is downward biased and as such Blundell and Bond [44] proposed use of system GMM. The study used Eview 10 and STATA 15.

4.2 Two-Step System GMM Estimation Regression Results

The results of the two-step system GMM estimation is considered more appropriate as indicated by the bound test result in Table 1 proposed by Blundell [45]. The result indicates that a unit increase in gfcf and edexp bring about 0.009 and 0.0183 decrease in unemp respectively. Also, a unit increase in dexp and hexp bring about 0.0515 and 0.8451 increase in unemp respectively. Statistically, all the explanatory variables significantly influenced unemp (unemployment rates) in the selected countries of Africa. This implies that expenditure on infrastructure (gfcf) and education (edexp) reduce unemployment rates rate in the region under study, while expenditure on defense and health increase unemployment rate. The overall statistics is significant which implies that the variables are stable. In like manner, number of groups is greater than the number of instruments which means that the model is good.

However, Sargan and Hansen tests of over identification restrictions indicate that p-values are not significant (0.78 and .803). This implies that we will not reject the null hypothesis and so we conclude that all instruments as a group are pure exogenous. Hence, the instruments used in the model are desirable.

Table 1. Bound test estimators (Involving Pool, FE, Diff. GMM and Sys. GMM)

Estimators	Coefficients
Pooled OLS	0.97345
Fixed Effects	0.88352
One-step Diff.GMM	0.72452
Two-step Diff. GMM	0.60144
One-step Sys. GMM	0.78624
Two-step Sys. GMM	0.76818

Source: Author's computation

Finally, the Arellano-Bond tests for AR (2) in second order autocorrelation tests is insignificant (0.129). This means acceptance of null hypothesis and we conclude that error term of the differenced equation is not serially correlated at 2nd order.

4.3 Unemployment Rate Variable Elasticity Estimate Calculated Using the Estimates of Table 2

The short-run unemployment rate variability was depicted in Table 2.

4.4 Analysis of Short and Long-run Elasticity

The short-run unemployment rate elasticity indicates that a 1% increase in gfcf and edexp reduced unemp by a value of 9% and 1.83% respectively. Also, the short run dexp and hexp elasticicies are 0.0515 and 0.8451 which implies that a 1% increase in dexp and hexp increase unemp by a value of 5.2% and 84.5%respectively. The long-run elasticities are obtained by dividing the short-run elasticities by one minus the estimated coefficient on the lagged UNEMP variable. The long-run gfcf and edexpelasticitiesare 0.0388 and 0.0789 indicatingthat a 1% increase in gfcf and edex preduced unemp by a value of 3.8% and 7.89 %respectively**.** Also, the long-run dexp and hexp elasticities are 0.2222 and 3.6458 which indicate that a 1% increase in dexp and hexp increased unemp by 22.22% and 364.58% respectively.

4.5 Discussion of Findings

The short-run unemployment rate elasticity indicates that a 1% increase in gfcf and edexp reduced unemp by a value of 9% and 1.83% respectively. The finding corroborates with the study of [27]. Also, the short run dexp and hexpelasticicies are 0.0515 and 0.8451 which implies that a 1% increase in dexp and hexp increase unemp by a value of 5.2% and 84.5% respectively, this finding is in line with the work of [30]. Also, the long run effects of gfcf and edexp on unemp are 0.0388 and 0.0789**.** This means that a percent change in infrastructural expenditure (gfcf) and education expenditures (edexp) are associated with 0.0388% and 0.0789% reduction in unemployment rate in the long run. This finding is in agreement with the studies of [22] and [26] but against the work of [6] in terms of infrastructural expenditure. Hence,

infrastructural and educational expenditures have larger inverse effect on unemp in the long run (0.0338 and 0.0789) than in the short run (0.009 and 0.0183). On the other hand, the long run effects of dexp and hexp on unemp are 0.2222and 3.6458**.** This means that a percent change in defense expenditure (dexp) and health expenditures (hexp) are associated with 0.2222% and 3.6458% increase in unemployment rate in the long run, as established by [10] study. Hence, defense and health expenditures have larger positive effect on unemp in the long run (0.2222 and 3.6458) than in the short run (0.0515 and 0.8451), this result is in line with the studies of [28,29].

Table 2. Comprehensive GMM results

Variable	Pool Regression	Fixed Effect	One-step D.GMM	Two-step D.GMM	One-step sys. GMM	Two-step System GMM
unemp(-1)	**0.9734*** **	**0.884*** **	**0.7245*** **	**0.6014** **	**0.7862*** **	**0.7682*** **
	(0.0000)	(0.0000)	(0.005)	(0.041)	(0.000)	(0.000)
Gfcf	**-0.0086*** **	**-0.0089* **	**-0.0067**	**-0.0049**	**-0.008* **	**-0.009** **
	(0.001)	(0.07)	(0.176)	(0.318)	(0.076)	(0.044)
Dexp	**0.0053**	**0.0182**	**0.0062**	**0.0102**	**0.046**	**0.0515** **
	(0.331)	(0.257)	(0.657)	(0.459)	(0.135)	(0.043)
Hexp	**0.1679*** **	**0.1338*** **	**-0.2525** **	**-0.2514** **	**0.8068* **	**0.8451*** **
	(0.012)	(0.008)	(0.024)	(0.037)	(0.07)	(0.002)
Edexp	**-0.0072* **	**-0.0099**	**0.0184**	**0.0096**	**-0.0181** **	**-0.0183*** **
	(0.076)	(0.432)	(0.185)	(0.451)	(0.054)	(0.010)
Diagnostic test						
AR(1)			0.126	0.205	0.004	0.004
AR(2)			0.075	0.091	0.092	0.129
Sargan test			0.316	0.316	0.780	0.78
hansen test			0.335	0.335	0.803	0.803
Obs	323	323	304	304	323	323
Prob>F	0.000		0.000	0.0015	0.000	0.000
No of Groups			19	19	19	19
No of instruments			6	6	8	8

****Designate the significance at 1% significance level, **Designate the significance at 5% significance level while *designate the significance at 10% significance level. The regression coefficients are estimated using the Arellano and Bover (1995) and Blundell and Bond (1998) Two-step System GMM estimation approach. AR(1) and AR(2) are Arellano and Bond (1991) tests for autocorrelation indifferences. Sargan test (Arellano and Bond (1991)) and Hansen test for over-identification restrictions. p values for these tests shown in parenthesis. Estimation uses the xtabond2 (Roodman, 2009) and* two-step robust nodiffsargan *in stata 15. GMM type instruments for the difference equation include fourth and fifth lags of unemployment rate and collapse. Standard-type instruments for the difference equation include the first differences of gfcf, dexp, hexp, edexp, variables. GMM-type instruments for the level equation include the lagged first difference of unemployment rate variable and collapse option; Source: Authors Computations*

Table 3. Long run GMM elasticity estimates

	Unemp	prob*
Short run		
Gfcf	-0.009**	(0.044)
Dexp	0.0515**	(0.043)
Hexp	0.8451***	(0.002)
Edexp	-0.0183***	(0.010)
Long run		
Gfcf	-0.0388	
Dexp	0.2222	
Hexp	3.6458	
Edexp	-0.0789	

****Designate the significance at 1% significance level, **Designate the significance at 5% significance level while *designate the significance at 10% significance level; Source: Author's computation*

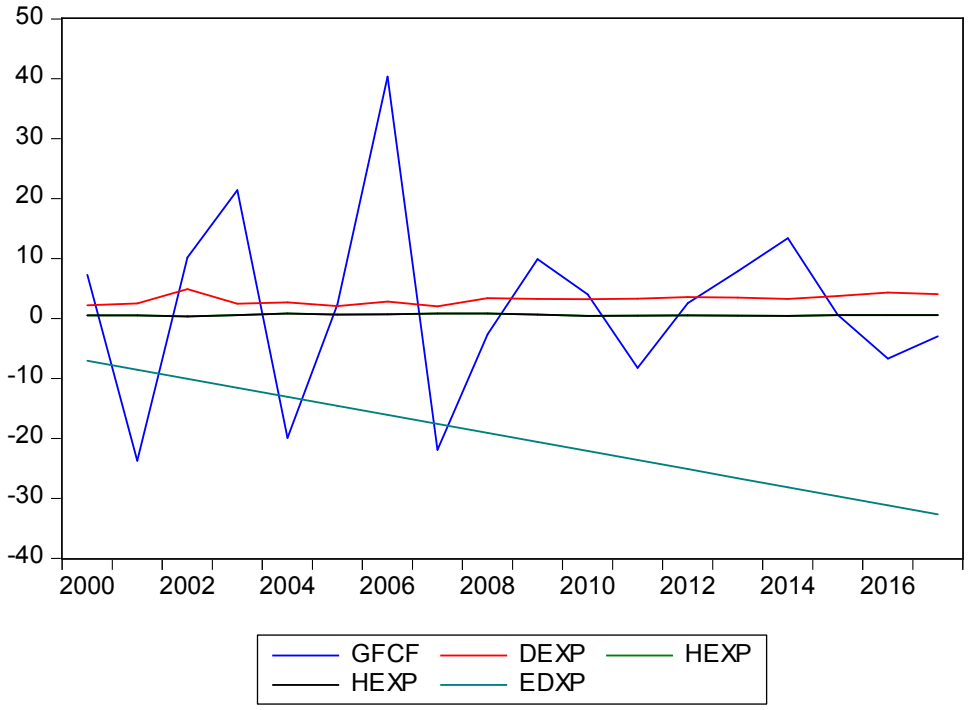

Fig. 1. Nigeria trend analysis of disaggregated public expenditure

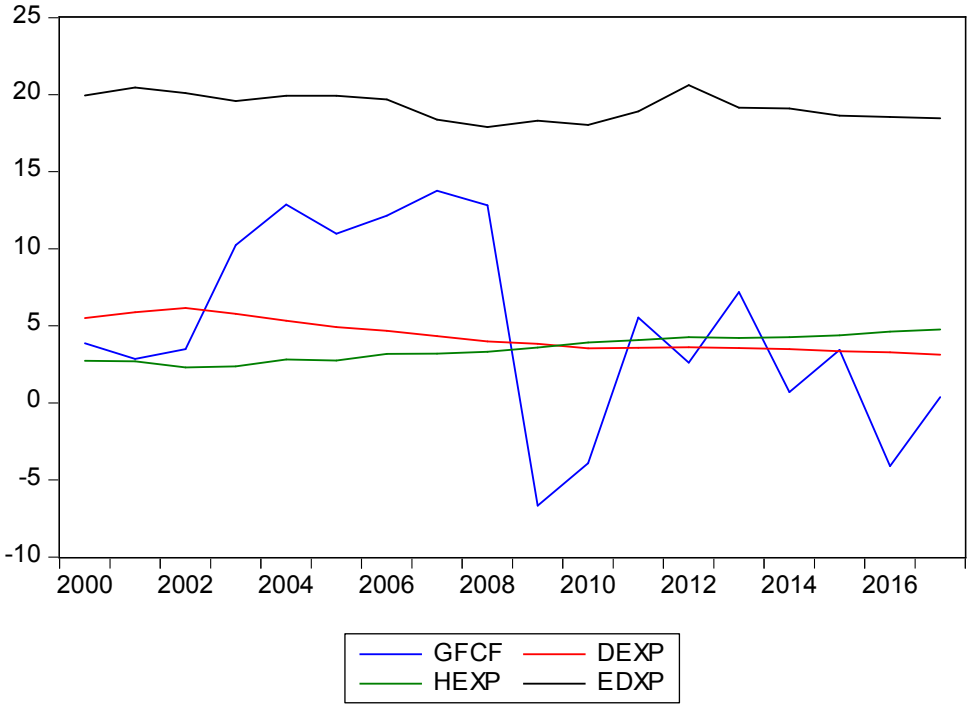

Fig. 2. South African trend analysis of disaggregated public expenditure

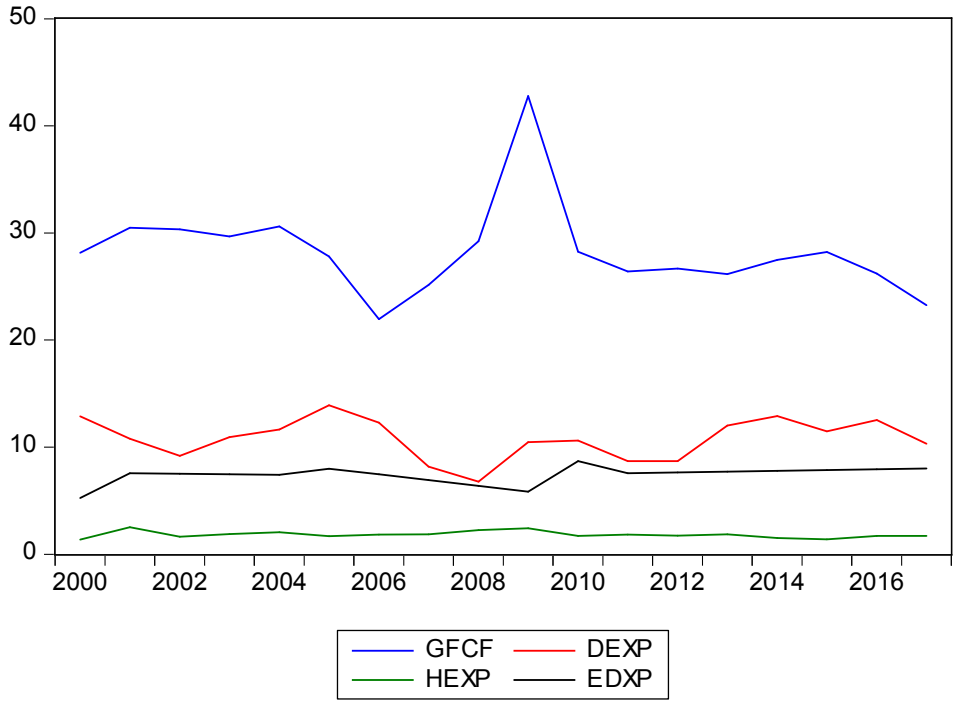

Fig. 3. Angola trend analysis of disaggregated public expenditure

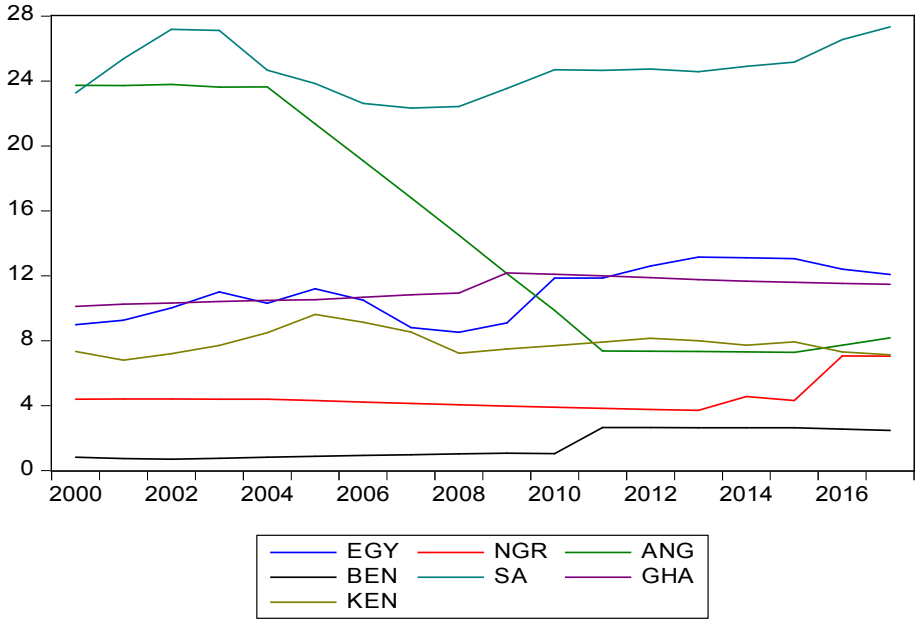

Fig. 4. Trend analysis of unemployment rate of Egypt, Benin Republic, Kenya, Nigeria, South Africa, Angola and Ghana

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The major objective of this research work is to examine the impact of gross public expenditure on unemployment rate in Angola, Benin, Botswana, Cameroun, Central African Republic, Chad, Egypt, Equatorial Guinea, Ethiopia, Ghana, Kenya, Mauritius, Morocco, Namibia, Nigeria, South Africa, Sudan, Tanzania, Togo

and Tunisia with panel data from 2000 to 2017. The study employed dynamic panel Approach of two-step system Generalized Method of Moments (GMM) techniques for empirical analysis. The findings from the two-step GMM result shows that gross fixed capital formation and education expenditure have an inverse relationship with the unemployment rate in selected African countries. The study also finds that expenditure on defense and health increase unemployment rate in the region. However, all the variables investigated are statistically significant. The inability of defense and health expenditure to meet up with *a priori* could be attributed to high rate of insecurity and crime as a result of joblessness, and mismanagement of funds meant for health sector due to corruption in the region. In conclusion, the study unravelled that unemployment rate in Angola, Benin, Botswana, Cameroun, Central African Republic, Chad, Egypt, Equatorial Guinea, Ethiopia, Ghana, Kenya, Mauritius, Morocco, Namibia, Nigeria, South Africa, Sudan, Tanzania, Togo and Tunisia had created the emergence of militants groups, constituting hiccups to security of lives and properties in the region.

Therefore, the study recommendsstiffer constraints for cases of mismanagement of government funds by economic managers in order to limit the occurrence of repeated cases. Also, adequate attention should be given to infrastructural development in order to build up productive capacity through government expenditure. There is need for drastic measures to improve the educational sector through adequate investment in education that will help in skills development and training. Finally, more effort should be given to the health sector at all levels with the government and private sector in order to improve the capacity for additional opportunities.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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