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Asymmetric Impact of Government Expenditure on Economic Growth in Nigeria

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Abstract

The study investigates asymmetric impact of government expenditure on the economic growth of Nigeria using secondary data that spans through 1981 through 2018. In capturing the asymmetric impact, the study adopted the Non-Linear Auto-regressive Distributed Lag (NARDL) model. Government expenditure components (recurrent and capital expenditure) were decomposed to positive and negative changes due to government review. From the result, it was confirmed that in the short-run, both positive and negative changes in recurrent and capital expenditure had a significant positive impact on economic growth in Nigeria at different time lag. In the long-run, positive changes in recurrent expenditure have a negative impact on economic growth, while negative changes have a positive significant impact on economic growth in Nigeria. Positive changes in capital expenditure have a positive impact on economic growth, while negative changes has a negative 5% significant impact on economic growth. It was concluded from the findings that government expenditure plans has a significant impact on the economic growth of Nigeria in the short-run and long-run. Therefore, it is recommended that government should rebalance its plans between capital and recurrent expenditure to enhance its growth target.

Keywords: *government expenditure; economic growth; NARDL.*

JEL Classification: *H50; C01; O40; C1; H5; O4.*

Introduction

Established in literature is the significant role of government expenditure pattern in the growth process of an economy. The growth status of many economies, most especially the developing countries has necessitated the need for researchers to continue verifying the impact of government expenditure pattern is unstable due to several regimes with its own expenditure

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blueprint. Theoretical arguments such as Wagner (1893) and Peacock and Wiseman (1967) have submitted the reasons for the dynamic nature of government expenditure in that that government expenditure is propelled by changes in individuals real per capita income, while Peacock and Wiseman (1967) suggested that increase in social services demand by the public who are dissatisfied in the system of spending by the government increases public expenditure and reduces revenue through people's unwillingness to pay tax to enhance revenue for spending. Keynesian economists believed that a rising public spending that is targeted on public goods such as infrastructure, defense, power, healthcare, education, among others serve as a panacea for boosting economic output which therefore brings about economic growth and development. This idea was however challenged by other sect of economic philosophers including Barro (1990) who argued that an increase in government spending will restrain economic growth. Barro (1990) argued based on two factors: the high degree of wastefulness associated with government institutions and governance, which bring about misallocation of resources; and the high level of political motivation behind government spending (Okoye et al., 2019).

The controversies on the empirical fronts is also recognized and seen as one of the reasons the issue of government expenditure impact on the growth of an economy remains inconclusive. While Basuki et al. (2019); Dissou et al. (2016); Gupta (2018); among others observed a positive impact of government expenditure on economic growth, other studies such as; Landau (1983) and Landau (1985) found a negative connection between government expenditure and economic growth. Therefore, Sáez et al. (2017) confirmed the controversies by empirically stating from its study on 15 European Union countries that the impact of government expenditure on economic growth is inconclusive.

Similarly in Nigeria, there is divergence in the findings of several studies on the impact of government expenditure. Studies such as: Okoye et al. (2019), Ebong et al. (2016), and Okere et al. (2019) noticed a strong positive nexus between government expenditure and economic growth in Nigeria; Gukat and Ogboru (2017) noted a long-run but insignificant link between public expenditure and economic growth; and Olulu et al. (2014) realized a negative connection between government expenditure components (i.e. public spending on education and health sector) and economic growth.

However, observing the trend of government expenditure in Nigeria, it can be concluded that the pattern of spending in Nigeria remains unstable due to review of government yearly budgets to fit its yearly policy reviews. The data observed on government expenditure (inclusive of recurrent and capital expenditure) and Gross Domestic Product (GDP) from the CBN statistical bulletin (2018) shows that total expenditure (recurrent and capital expenditure) trended upwardly from 11.41 (N'billion) in 1981 to 8,302.10 (N'billion) in 2017, the total nominal gross domestic product (GDP) steadily increased from 144.83 (N'billion) in 1981 to 113,711.63 (N'billion) in 2017 (Figure 1).

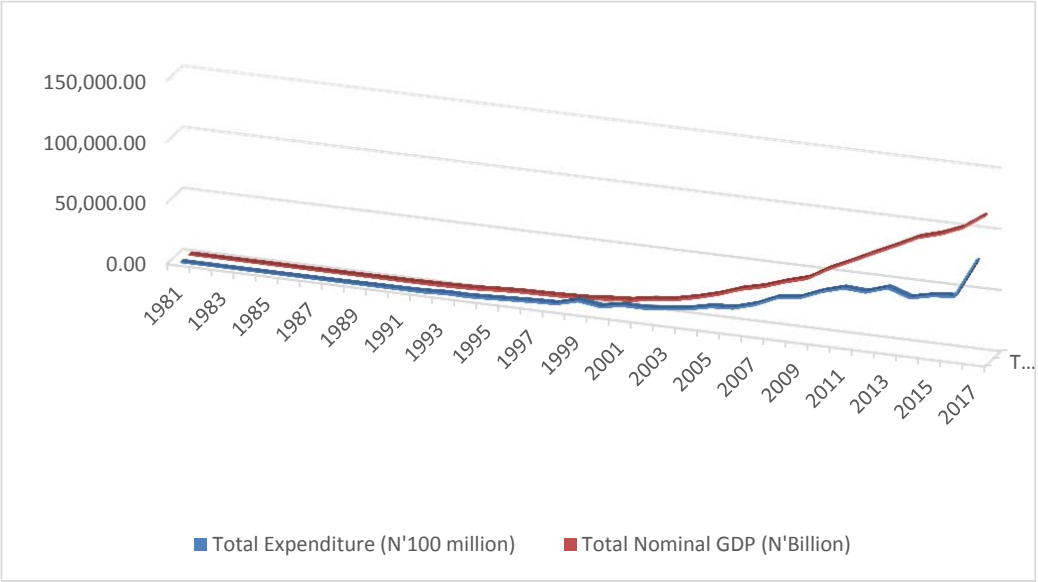

Fig. 1. Government Expenditure and Economic Growth trend in Nigeria

Source: Authors' Compilation (2021).

Considering the trend illustrated in figure 1, it should be noted that there were periods the expenditure slightly reduced and periods they increased. Noting this in the trend, this study deviates from other studies to investigate the impact of the periodic changes on the economic growth of Nigeria. Therefore, given the variations in the findings of existing studies on government expenditure impact on economic growth that may have caused by different objectives, scopes and methods used, this study adopts the non-linear Autoregressive Distributed Lag (NARDL) to analyse the asymmetric impact of government expenditure components (recurrent and capital expenditure) on the economic growth of Nigeria.

Literature Review

Theoretically, the study recognizes the theories of Wagner (1893) and Peacock and Wiseman (1967). Wagner (1893) was of the opinion that the growth of an economy is determined by its industrialization level accompanied with development. Therefore, in the industrialization process, as per capita real income increases, share of public expenditure in total expenditure also increases. Against the Wagner's submission, Peacock and Wiseman (1967) followed a political proposition and viewed Wagner's proposition as an organic state assumption of a nation. Peacock and Wiseman (1967) argued that it is agreed government likes spending money, but however, people may dislike increasing their tax compliance as a sign of showing displeasure in the system of government spending and still demand for more social services which affects government expenditure pattern.

Empirically, in the developed economies, notable scholars such as, Sáez et al. (2017) employed regression analysis to analyze the macroeconomic data gathered from 15 European Union countries. The study discovered that the nexus between public expenditure and economic growth is inconclusive among the studied countries, as a positive nexus was found for United Kingdom and Portugal; negative relationship was realized for Sweeden, Italy, Finland and; Austria while insignificant link was identified for Spain, Ireland, Greece, France, Luxembourg, Netherlands and Belgium. On a similar note, Dudzevičiūtė et al. (2018) conducted a study for European Union nations by employing Granger causality test to analyze the gathered time series data that covers the period of 1995 to 2015. Their result demonstrated the existence of

Keynesian and Wagnerian approaches among European Union nations. This implies that there is a causal link running from government spending to economic growth. In the case of United State, Atems (2019) used panel structural Vector Autoregressive (PSVAR) model and found that the effect of government spending shocks on the economy fluctuates with respect to economic environment and institutaional factors such as: government debt level, economy position either expanding or contracting, state debt restriction provisions, etc.

Landau (1983) used regression analysis to test the panel data sourced for 104 countries. The study submitted that there is a negative link between government spending and economic growth. In the same vein, Landau (1985) further developed an informal model which consists of a panel data sourced from 16 developed countries. The study analyzed the equation using ordinary least square (OLS) method and found the existence of negative connection between government spending and economic growth. On the other hand, Lin (2012) used both ordinary least square method, Parks' equation method, and 2SLS technique to validate the empirical claim on the interaction between public expenditure and economic growth in both 20 developed and 42 less developed countries. The study argued that government spending strongly and positively affect economic growth in the short-run.

D'agostino et al. (2016) obtained a panel data consisting of 106 countries and employed generalized method of moment to analyze the variables. The study submitted that public spending on investment enhance economic growth while, public spending on military negatively affect economic growth. The rationale for the negative nexus between public spending on military and economic growth is the existence of high levels of corruption. Similarly, Dissou et al. (2016) developed and applied an endogenous growth model for Benin economy incoorporating variables that captured both human and physical capital accumulation and various fiscal instruments to finance. The study found that all means of financing government expenditure on education sector positively affect the economic growth rate in the long-run. On the contrary, Basuki et al. (2019) employed panel data regression to explore the variables acquired from 18 provinces in Indonesia spanning between 2010 and 2015. The study argued that government expenditure component that includes marine and fisheries, and agriculture positively affect economic growth; while government expenditure on education have insignificant effect on economic growth. So also, In Nepal, Gupta (2018) gathered annual series data spanning from 2002/03 to 2015/06 and employed regression model to analyzed the variables. The findings shown that government spending on agriculture and non agriculture sector have a positive effect on economic growth in Nepal.

Hanif (2018) conducted a panel cointegration and causality test on the panel data obtained from 10 sub-saharan African countries. The study validated the existence of Wagner's Law and Keynessian hypothenses which indicates a long-run relationship between public spending and economic growth in Sub-Saharan African countries. In the same line, Gumus & Mammadov (2019) tested the panel data obtained from Southern Caucasus countries using various panel econometric techniques namely; Pedroni cointegration, panel DOLS, Wald test, and error correction model. The study demonstrated the existence of Wagner and Keynessian hypothensis and also realize a bidirectional causal link between real public spending and real economic growth in both short-run and long-run. In addition, so also, Abu-Bader & Abu-Qarn (2003) tested the panel data achieved from three MENA countries (namely; Egypt, Israel, and Syria) using Johansen cointegration test and standard granger causality (SGC) approach. The result demonstrated a long-run adverse bidirectional causality correlation between government expenditure and economic growth in Israel and Syria, and a short-run negative unidirectioal connection between government expenditure and economic growth in Egypt. While Devarajan et al. (1996) gathered a pooled data for 43 developing countries spanning between 1970 and 1990 and employed ordinary least square technique to estimate the model used. The study claimed that recurrent government spending has a positive effect on economic growth while capital government spending has a negative effect on economic growth.

Within the study framework i.e. Nigeria, various studies have emerged in the literature and lack of consensus was identified in their findings, For instance, Gukat & Ogboru (2017) obtained macroeconomic data spanning between 1981 and 2016 and tested the variables using error correction model. The study noticed a long-run but insignficant link between government expenditure and economic growth in Nigeria. Okoye et al. (2019) employed Autoregressive Distributed Lag (ARDL) to analyze that variables used in the study spanning from 1981 to 2017. The study discovered a strong short-run connection between government spending and economic growth in Nigeria. Okere et al. (2019) employed various econometric methods namely; granger causality test, error correction model and Johansen cointegration test to analyze the link between economic growth and government expenditure in Nigeria within the period of 1981 and 2016. The study realized a significant nexus between government expenditure and economic growth in Nigeria. Ebong et al. (2016) employed ordinary least square method and other pre estimation techniques such as unit root and cointegration test to analyze the annual time series spanning from 1970 to 2012. The study identified that public spending on education and infrastructure have a significant effect on economic growth in Nigeria. While, Olulu et al. (2014) applied Ordinary Least Square technique on the variables employed in the study spanning from 1980 to 2010. The study found that government expenditure on health sector and education sector have indirect effect on economic growth in Nigeria.

Earlier mentioned, it can be noted that the studies have dissimilarities in their objectives and methods used, which made the arguments on government expenditure impact on economic growth inconclusive.

Data Source and Methodology

For the purpose of this study, we re-specified Devarajan et al., (1996) model in a single model form by considering government expenditure as the only factor determinant of economic growth. The equation is expressed mathematically as:

$$GDP_t = \beta_0 + \beta_1 GE_t + u_t \tag{1}$$

In equation 1, economic growth is captured using gross domestic product at Local Currency Unit (LCU), GE implies Government Expenditure (GE) while β_0 is the intercept and β_0 is the coefficient explaining the parameter (GE), u is the error term and t is time.To achieve the objective of this study, the superiority of Autoregressive Distributed Lag (ARDL) propounded by Pesaran and Shin (1999) which permits estimation of parameters irrespective of their level of stationarity between I(0) and I(1), therefore the method was adopted. However, before specifying the model, it should be noted that Government Expenditure (GE) was decomposed into two components: Recurrent and Capital Expenditure (RE and CE). Then, the ARDL model is specified as:

$$\begin{aligned} GDP_t = \omega + \beta_1 GDP_{t-i} + \beta_2 RE_{t-i} + \beta_3 CE_{t-i} + \sum_{q=1}^{p} \rho_1 \Delta GDP_{t-i} + \sum_{q=1}^{j_1} \rho_2 \Delta RE_{t-j} \\ + \sum_{q=1}^{j_1} \rho_2 \Delta CE_{t-j} \\ + u_t \end{aligned} \tag{2}$$

Equation 2 represents the linear model of government expenditure components (RE and CE) and Economic growth (GDP) in Nigeria. In the equation,ω is the model intercept,GDP remains gross domestic product (LCU), ρ represents the intercept of the model, p and $j_1$is denotes the optimal lag number identified, $\beta_2 - \beta_5$ are long-run coefficients of the parameters, $\rho_1 - \rho_4$ are the short-run coefficients of the parameters. The coefficients explain the magnitude impact of

the parameters on the dependent variable.u_t is a denotation for error correction model at a time lag length. To further capture the impact of government expenditure pattern review on economic growth in Nigeria, recurrent and capital expenditure were decomposed into positive and negative review periods, therefore necessitating the re-specification of the Linear-ARDL model in the Non-Linear ARDL (NARDL) form. The equation is re-specified as:

$$GDP_t = GDP_t = \omega + \beta_1 GDP_{t-i} + \beta_2 RE_t^+ + \beta_3 RE_t^- + \beta_4 CE_t^+ + \beta_5 CE_t^- + \sum_{q=1}^{p} \rho_1 \Delta RE_t^+{}_{t-i} + \sum_{q=1}^{j_1} \rho_2 \Delta RE_t^+ + \sum_{q=1}^{p} \rho_3 \Delta CE_t^+{}_{t-i} + \sum_{q=1}^{j_1} \rho_4 \Delta CE_t^+ + u_t \quad (3)$$

where RE_t^+,$RE_t^- CE_t^+$ and $CE_t^-$are the partial sum process of positive and negative changes in RE and CE due to changes in government expenditure. ω is the intercept as explained in equation 2. The model is specified assuming economic performances depends on government expenditure spread on recurrent and capital expenditure as stated focused in its budget determines the performances of the economy.

The data used for this study is secondary in nature and spans through the period of 1981 to 2018. The scope is justified by the availability of data from the source. The data includes: GDP per capita (LCU) denoted as 'GDP', proxy for economic growth. The data is obtained from World-Bank Development Indicators (WDI) (2018). Government Recurrent Expenditure (at Billion naira) and Capital Expenditure (CE) (at billion naira) were sourced from the Central bank of Nigeria (CBN) (2018) statistical Bulletin.

Analytical Framework

It is important to understand the trend of the data used in empirical studies. This study recognizes this importance and subjects the data to pre-estimation tests which encompasses the descriptive statistics, correlation test and unit root test. The descriptive statistics reveals the behavioural trend of the variables data over the period studied, correlation test checks the linear association and the presence of multicollinearity problem among the variables data used, while unit root test confirms if the variables have unit-root problem or stationarity problems with need for differencing.

Descriptive Statistics

From the descriptive result, the mean value of the variables is found in between their maximum and minimum values. The implication of this is that the trend of the variables within the period focused on in this study is not outrageous. However, it can be interpreted that, averagely, the variables (GDP, recurrent expenditure [RE], capital expenditure [CE]) changes by 4.63%, 11.07% and 10.96% respectively. Taking a measure of volatility through the standard deviation result, it was revealed that GDP is the least volatile variable with the value 0.897 and RE is the most volatile variable with the value 1.154. The skewness result showed that all the variables have a long-tail to the left. This implies that they are negatively skewed, and the kurtosis result shows that the variables are leptokurtic in nature as they have values less than 3. The Jarque-Bera Statistics confirms that the variables are normally distributed given their probability values which is greater than 0.05.

From the correlation result, it was confirmed that the independent variables (Recurrent and Capital expenditure [RE and CE]) have a strong significant positive linear association with the dependent variable (GDP). This implies that these variables have a strong link in explaining the growth of the economy. The results are presented below in Table 1.

Table 1. Descriptive and Correlation Test Results

Descriptive Statistics			
Mean	4.627	11.072	10.965
Median	4.712	11.454	11.399
Maximum	5.794	12.401	11.991
Minimum	3.266	9.133	9.063
Std. Dev.	0.898	1.154	0.974
Skewness	-0.236	-0.385	-0.560
Kurtosis	1.586	1.706	1.703
Jarque-Bera	3.519	3.592	4.646
Probability	0.172	0.166	0.098
Observations	38	38	38
Correlation Test			
Variables	**GDP**	**RE**	**CE**
GDP	1		
RE	0.978	1	
	(0.000)**		
CE	0.867	0.896	1
	(0.000)**	(0.000)**	

Source: Authors' Computation (2021).

Unit Root Test

The unit root test was carried out using the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests. The variables were tested at level I(0) and first difference I(1). From the results, it was revealed that GDP and RE were stationary after first differencing for ADF and PP, while CE was not stationary at level and after first differencing at ADF, but stationary after first differencing for PP. The implications of the unit root results are that there is a unit root problem among the variables and are not mean reverting in the long-run. therefore as a result of this, there is need to carry out a co-integration test to verify if a long-run co-integrating relationship exist between the variables before estimating them. The results are presented in Table 2.

Table 2. ADF and PP Unit Root Results

		ADF	
Variables:	**LGDP**	**LRE**	**LCE**
Level	0.011	-1.291	-1.437
First Difference	-3.397***	-5.847*	-2.423
		PP	
Level	-0.876	-1.005	-1.591
First Difference	-3.313***	-9.309*	-7.162*
Critical Values	**Levels**		**First Difference**
1%	-4.227		-4.244
5%	-3.537		-3.544
10%	-3.200		-3.205

Source: Authors' Computation (2021).

Co-integration Test

From the co-integration analysis, it was revealed that linearly, there is no long-run co-integration among the variables. This implies that if reporting the linear estimation of government expenditure impact on economic growth, only the short-run result will be reported. However, testing the possibility of long-run co-integration considering the non-linear attributes, it was confirmed that there is a long-run co-integrating relationship among the variables at 10% significance level. This implies that the nonlinear model can be estimated with the short-run and long-run results reported. The result is presented in table 3.

Table 3. Linear and Non-Linear Co-integration Test

		Linear		
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.242	10%	4.19	5.06
k	2	5%	4.87	5.85
		Non-Linear		
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.308	10%	3.03	4.06
k	4	5%	3.47	4.57

Source: Authors' Computation (2021).

NARDL Estimation

The NARDL estimation of the parameters considers an automatic selection of lag numbers for the variables. The Akaike Information Criterion was used and it selects an optimal lag of (1, 4, 3, 3) for the variablesRE_t^+,RE_t^-, CE_t^+, CE_t^- respectively. In the short-run, both positive and negative changes in recurrent and capital expenditure due to expenditure pattern review have a positive significant impact on the economic growth of Nigeria. The implication of this is that, a percentage positive and negative change in recurrent expenditure pattern results in approximately 0.078% and 0.846% increase in the economic growth of Nigeria. Percentage of positive and negative change in capital expenditure results in 0.100% and 0.138% increase in Nigeria's economic growth. The error correction model result gives confidence in the independent variables capacity of correcting 0.155% deviation of Nigeria's economic growth in the short-run, back to equilibrium in the long-run.

In the long-run, positive changes in recurrent expenditure has an adverse impact on economic growth but insignificant, while negative changes in recurrent expenditure has a positive impact on economic growth and significant at 10% level. That is, one percentage positive and negative changes in recurrent expenditure causes a decrease and increase of 1.667% and 27.258% in Nigeria's economic growth. For capital expenditure, positive changes impacted on economic growth positively but insignificant, while negative changes impact on economic growth is negative and significant at 5%. It implies that one percentage positive and negative changes in capital expenditure brings about 6.491% and 9.236% increase and decrease in economic growth in Nigeria.

Comparing the results to existing studies in the context of Nigeria, the long-run results corroborates with the study of Gukat and Ogboru(2017) that a significant relatinship exist netween government expenditure and economic growth in Nigeria. Also, similar to the result of Okoye et al (2019), it was established that there is significant relationship between governmentexpenditure and economic growth in the short-run.

The results are presented in Table 4:

Table 4. NARDL Short-run and Long-run Estimation

Selected Model: ARDL(1, 4, 3, 3)				
Short-run				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.200	0.054	-3.719	0.003
ΔRE_t^+	0.078	0.034	2.268	0.043
ΔCE_{t-4}^-	0.846	0.203	4.167	0.001
ΔCE_{t-3}^+	0.100	0.053	1.867	0.087
ΔCE_{t-3}^+	0.138	0.059	2.350	0.037
ECM_{t-1}	0.155	0.029	5.359	0.000
Long-run				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
RE_t^+	-1.667	2.115	-0.788	0.446
RE_t^-	27.258	13.626	2.000	0.069
CE_t^+	6.491	4.625	1.404	0.186
CE_t^-	-9.236	3.762	-2.455	0.030

Source: Authors' Computation (2021).

Diagnostic Test

The diagnostic test consists of serial correlation and heteroscedasticity test. The test results show that the variables are free of serial correlation and heteroscedasticity problem as the probability values validating the F-statistics are greater than 5% significance level. The results are presented in Table 5.

Table 5. Diagnostic Results

Serial Correlation	F-statistic	0.057	Prob. F(2,10)	0.945
Heteroscedasticity Test	F-statistic	0.162	Prob. F(1,30)	0.690

Source: Authors' Computation (2021).

Conclusion and Recommendation(s)

The Nigerian economic condition has left many researchers on whether there is an appropriate policy to spur its economic growth. This is because of the impact of policy reviews not well felt in the economic system of the country. Among other determinants of economic growth in Nigeria, this study investigates asymmetric impact of government expenditure on economic growth in Nigeria by decomposing government expenditure components (recurrent and capital expenditure) into negative and positive policy review periods. The NARDL model was adopted to analyse the data covering the period 1981 to 2018. From the results, it was established that there is a long-run co-integration between government expenditure components and economic growth in Nigeria. However, from the estimation, it was revealed that positive and negative recurrent and capital expenditure had positive and significant impact on economic growth in the short-run. The periods also have the capacity of adjusting economic growth back to equilibrium by 0.155% in the long-run as a result of deviation in the short-run. In the long-run, positive changes in recurrent expenditure impacted negatively on economic growth in Nigeria, but insignificant, while negative changes in recurrent expenditure impacted positively on economic growth in Nigeria and also significant. For capital expenditure, positive changes impacted

positively and insignificantly on economic growth, while negative changes impacted negatively and significantly on economic growth. From the findings the study drew its conclusion that the economic growth of Nigeria has been faced with challenges of unstable expenditure policy which is very significant. However, for the growth of the economy to be transformed, there is need on the government side or policymakers to ensure the recurrent and capital expenditure needs are weighed to balance the effect they both have on the economic growth of the economy. Doing this will properly guide the government on when to exercise a positive or negative review on either of the components.

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