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## Public Investment in Social Services and Income Inequality in Nigeria

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### **Abstract:**

*This study contributes to the body of knowledge by investigating the dynamic effects of public social services investment on income inequality in Nigeria. The motivation for this study is the controversy surrounding the effectiveness of public spending on social services in promoting economic development in developing economies. Thus, this study followed an ex-post factor research design by obtaining annual time series data from the CBN Statistical Bulletin and the National Bureau of Statistics, which were analysed with the application of the autoregressive distributed lag (ARDL) model. Evidence of mixed integration was established from the unit root test results. The series was also found to be co-integrated at the significance level of 5 percent. It was established from the findings that public spending on social services significantly reduced income inequality in the long run. This finding explains the effectiveness of social services spending in income redistribution in the long term. The results also showed that public expenditure on economic services reduced income inequality in the short run. However, total public expenditure, as a percentage of the GDP, has a negative but insignificant effect on income inequality in the long run. This finding casts doubt on the effectiveness of total public expenditure in addressing the problem of income inequality in Nigeria. Given the findings, this paper recommends that policymakers should provide a sustainable path for increased public investments in social services to the required vehicle for equitable income distribution in Nigeria.*

**Keywords:** Public spending, income inequality, social services, economic services and total expenditure

### **1. Introduction**

Addressing the problem of income inequality has remained one of the most controversial issues in developing economies. This is because inequality has emerged as one of the biggest social challenges for the future, with negative implications for economic prosperity and social well-being. The increasing levels of income inequality have been associated with the growing public demand for income redistribution [International Monetary Fund (IMF), 2015]. This is based on the understanding that public investment is an essential tool employed by the government to influence the process of income distribution among the population. Martinez-Vazquez, Moreno-Dodson, and Vulovic (2012) have established that public spending, especially on social services, tends to offer higher benefits for income redistribution than taxes. This is consistent with Keynes' (1936) proposition on the benefits of fiscal stimulus in boosting aggregate demand and creating more opportunities for economic prosperity. Zolfaghari, Kabiri, and Saadatmanesh (2020) also highlighted the critical role of public investment in services in mitigating the income gap for a prosperous and more equal society. This could be partly attributed to the growing recognition that education and health as integral aspects of human capital development are fundamental for sustainable poverty reduction and equitable income distribution among the population. Essentially, public investment in social services in most developing economies has prioritised education and health while taking into consideration the provision of social protection. The endogenous growth hypothesis, which is related to Lucas (1988) and Romer (1990), emphasises the significance of education in developing an economy's capacity for innovation to promote growth and an equal distribution of income. It is also believed that increasing public spending on education will enhance social mobility by increasing productivity and preparing the lower-income group to compete for higher-paying jobs that require higher degrees. This is expected to offer opportunities for income redistribution among the population with positive implications for economic development. Similar to education spending, investment in social services integrates public healthcare spending for long and healthy living as outlined in the Sustainable Development Goals (SDGs). Grossman (1972) argues that an increase in health spending has the potential to enhance productivity through higher human capital accumulation. It is also established in the large body of literature that the promotion of broad-based economic growth and distributional efficiency is predicated on the quality of healthcare delivery. This has in accordance with Currie and Madrian's (1999) assertion that healthier people usually have more productivity.

In addition, it has been argued that social protection spending tends to reduce the net income gap among the population. Anderson *et al.* (2017) are of the view that social protection spending mitigates the income gap. This has remained an essential tool for a more equal distribution of resources among the population. Although the structure and

dimensions of public spending have continued to vary over time, policymakers in Nigeria have reignited interest in fiscal stimulus with an emphasis on economic and social services. However, there has been controversy over the expected and intended benefits the public spending for economic development. In this light, this study examined the contributions of public spending on social services, especially education and health, to the reduction in income inequality in Nigeria. Given the introduction, Section 2 embodies the literature review, whereas Sections 3 and 4 provide the methodology of the paper and results, respectively. The paper is concluded in section 5 with recommendations for policy.

## 2. Literature Review

### 2.1. Theoretical Literature Review

The underlying theories for the expansion of government spending have evolved over time. According to Wagner's (1890) theory, there are three factors that contribute to increased state activity:

- The rising demand for health and education services from the populace,
- The creation of an atmosphere that fosters business growth and
- The realities of market failure

Government action is required to help address these needs since there is a greater demand for services like health and education than there is per capita income. According to Magazzino, Giolli, and Mele (2015), Wagner's Law shows that as the economy grows, the proportion of government spending in the GDP tends to rise. This relates to the propensity for government spending to increase in relation to GDP. Consequently, it is thought that the rate of economic growth is what is responsible for the rise in public investments. Furthermore, Keynes's (1936) theory of public investment assumes that changes in public expenditure can promote short-term stability. Keynes advocated for increased government expenditure and lower taxes to stimulate aggregate demand and pull the economy out of the depression. Thus, public investment is believed to contribute positively to economic and social services, and in so doing, it provides a pathway for improved income distribution.

Peacock and Wiseman (1961) contributed to the theoretical discussion on the increase in government spending as they attempted to describe how government spending changes over time. According to the Wiseman-Peacock hypothesis, which is based on the political theory of public determination rather than Wagner's (1890) organic state theory, government spending develops as a catalyst for social upheaval like wars. The displacement, inspection, and concentration impacts of an increase in public spending were further broken down by the Wiseman-Peacock theory. While the inspection effect refers to attempts made to achieve fiscal balance, the displacement impact is concerned with variations in public spending between periods of peace and social displacement. The stabilisation of government revenue and spending at a new level is included in the concentration effect. Therefore, increased government expenditure tends to offer opportunities for pro-poor growth and income redistribution for the improved social well-being of people.

### 2.2. Empirical Literature Review

Ulu (2018) analysed the effect of government social spending on income inequality for 21 Organization for Economic Cooperation and Development (OECD) countries by using panel datasets. The results showed that government social spending affects income inequality positively. Income inequality decreases when the government's social spending increases. It has been proved that government social spending was more effective than education expenditures in regulating income inequality. It is also understood that unemployment and population growth affected income inequality negatively. The results further showed that there is a negative relationship between openness, education expenditures, elderly population, education participation and income inequality. The study concludes that government social spending is effective in addressing the problem of inequality in the selected OECD countries.

Using a panel dataset from 1980 to 2000, Ospina (2010) examined the factors that influence income disparity in Latin American countries, with particular emphasis on spending on social security, health care, and education. By addressing the endogeneity of the social spending variables in the income inequality equation, the study improved on earlier studies. To account for the correlation of some of the regressors with the disturbance term, the study utilised the two-stage least squares (2SLS) and generalised methods moments (GMM) approaches. It was observed that government expenditure affects inequality, while an increase in inequality tends to be related to social, economic, and political changes that can also affect government expenditures. Thus, the study revealed that social spending is potentially endogenous in the inequality regression. It was found that social spending variables are endogenous with the income inequality index.

Quionez (2022) examined the link between social spending and income equality in sixteen Latin American countries. Data on sixteen Latin American nations during the years 1990 to 2017 were obtained and analysed using the panel data analysis method. According to the findings, higher levels of overall social spending are, in fact, linked to lower levels of income inequality in this region, which is consistent with findings at the worldwide level. However, it was found that the four major social spending categories each had a unique impact on income inequality. The outcomes also demonstrated that the social safety and social services systems continue to struggle to effectively serve individuals at the very bottom of the income scale, despite changes and budget increases.

Sidek (2021) analyzed the effect of government spending on income disparity in a sample of 122 nations, 91 of which are classified as developing countries and 31 as developed. The influence of government spending on income inequality is examined, and the turning point of any negative or positive effects is estimated using the dynamic panel threshold regression. The major findings suggest that, in general, government expenditure does reduce income inequality. Results from developed countries support the inversed U-shaped Kuznet curve, where higher government expenditure

initially led to more inequality but would eventually bring about a positive effect after a certain threshold level. For developing countries, education and development expenditures were the driving forces towards lower income inequality. Alamanda (2020) evaluated the impact of different types of government spending on income inequality and poverty in Indonesia by using a panel data set of 33 provinces from 2005 to 2017. The fixed effect, random effect, and Seemingly Unrelated Regression (SURE) approaches are used in this study to determine the minimal impact social assistance, subsidies, and grant spending have on lowering income disparity and poverty in Indonesia. However, the empirical data indicates that, while applying the random effect model, infrastructure spending has a negative link with income disparity in both urban and rural areas. Also, there is a strong negative relationship between infrastructure spending and poverty in Indonesia, with the impact being greater in rural than urban areas.

Guzaa, Ishakb, Banic, and Madina (2020) use an empirical analysis of the Autoregressive Distributed Lag (ARDL) technique to ascertain the factors that contributed to income disparity in Nigeria between 1990 and 2016. The results demonstrate that income inequality and its causes in Nigeria are co-integrated. Again, the results showed that Nigeria's Gini coefficient is relatively high, demonstrating the country's extreme income disparity. The study also found that real GDP per capita, educational attainment, and economic growth are important factors influencing income disparity in Nigeria. Therefore, the study recommends the enactment of laws that will promote equity and equality.

Selem-Amachree and Ezekwe (2021) decomposed the effect of capital expenditures on income inequality in Nigeria between 1981 and 2019. To study the short- and long-term effects of capital investment on economic, social, and community services and administration on income inequality defined by the Gini index, the study specifically employed the autoregressive distributive lag (ARDL) model. The results showed that capital investments in social and community services have an adverse impact on income disparity over the long and short terms. However, the results showed that public expenditure on administration is not statistically significant in explaining changes in income inequality. Hence, the study recommends that governments at all levels should invest in critical social and economic infrastructures to optimize their redistribution effects in reducing income inequality.

In their study, Ewubare and Merenini (2018) explored the factors that contribute to poverty and income disparity in Nigeria. In particular, the study looked at how unemployment and population increase affected poverty and income inequality in Nigeria. Secondary data on poverty, income inequality, population growth, and unemployment were obtained from the National Bureau of Statistics and the CBN statistical bulletin. Descriptive statistics and the Generalized Method of Moments (GMM) test were used in the study as estimation methods for the data analysis. The GMM results demonstrate a positive relationship between poverty and population growth (POP), which is statistically significant at the 5 percent level. Unemployment is negatively related to poverty and is statistically significant at the 5 percent level. The recommendation provided by the study is that government should scale up its social investment programmes to foster equitable income distribution.

### 3. Methodology

#### 3.1. Research Design

This study followed an ex post facto based on the fact that the data required were obtained from secondary sources. It is also considered ideal for estimating the cause-and-effect relationship between the forecast and explanatory variables.

#### 3.2. Model Specification

The multivariate model for this study is patterned after the work of Ulu (2018) with some modifications following the segmentation of the public spending on social services into its integral sub-components. The functional specification of the model is provided as follows:

$$ING_t = f(PES, PEE, TPE) \quad (1)$$

Where:

ING = income inequality represented by Gini coefficient

PES = public expenditure on social services

PEE = public expenditure on economic services

TPE = Total public expenditure

The autoregressive distributed lag (ARDL) model is specified below:

$$ING_t = \alpha_0 + \sum_{i=1}^q \alpha_{1i} \Delta ING_{t-1} + \sum_{i=1}^q \alpha_{2i} \Delta PES_{t-1} + \sum_{i=1}^q \alpha_{3i} \Delta PEE_{t-1} + \sum_{i=1}^q \alpha_{4i} \Delta TPE_{t-1} + \beta_1 ING_{t-1} + \beta_2 PES_{t-1} + \beta_3 PEE_{t-1} + \beta_4 TPE_{t-1} + U_{1t} \quad (3.2)$$

Where:

$\alpha_0$  = Intercept,

$\alpha_4$  = short-run parameters,

$\beta_1 - \beta_4$  = long run multipliers,

$\Delta$  = First difference operator,

$U_{1t}$  = error term,

$\Delta$  = First difference operator and

q = optimal selection operator.

### 3.3. Data Analysis Techniques

The ARDL model was used to estimate the short- and long-run relationship between the dependent and independent variables. When compared to alternative estimating methods, the ARDL methodology has several desirable statistical advantages. In essence, the ARDL model, as opposed to a static model, which solely accounts for static effects, allows for both the static and dynamic impacts of the independent variables on the dependent variable. Additionally, the ARDL is perfect for models that incorporate mixed-integrated  $I(0)$  and  $I(1)$  series. In addition, the KPSS stationary test and bounds cointegration test were applied to ascertain if the series have unit root and long-run relationships, respectively.

## 4. Results and Discussions

### 4.1. Descriptive Statistics

The descriptive statistics of mean distribution, standard deviation, skewness and kurtosis, among others for the series, are presented in table 1.

Statistics	ING	PES	PEE	TPE
Mean	44.64024	11.73659	41.18146	3.042195
Median	45.00000	11.56000	43.64000	2.640000
Maximum	56.00000	23.06000	67.00000	9.080000
Minimum	36.70000	2.560000	5.880000	0.640000
Std. Dev.	4.990348	5.145522	15.11521	1.829543
Skewness	0.476506	0.392353	-0.600696	1.027988
Kurtosis	2.557043	2.566407	2.923572	4.129812
Jarque-Bera	1.886757	1.373099	2.475690	9.401835
Probability	0.389310	0.503310	0.290009	0.009087
Observations	41	41	41	41

Table 1: Summary of Descriptive Statistics for the Series  
Source: Author's Computation (2023) from E-Views Software

The results showed that the Gini coefficient, a proxy for income inequality, averaged 44.640 percent with minimum and maximum values of 36.700 and 56.00 percent, respectively. This suggests that the distribution of income among the population is unequal over the study period. As a percent of total capital expenditure, public spending on social and economic services averaged 11.736 and 41.181 percent, respectively. This suggests that spending on economic services more than doubled social services over the study period. In addition, total public investment as a percentage of the GDP averaged 3.0421 with minimum and maximum values of 0.6400 and 9.0800 percent, respectively. The standard deviations showed that the observations for all the variables converged around their respective mean values. This is based on the fact that the computed standard deviations are less than the corresponding mean values. The skewness showed that the Gini coefficient and public spending on social and economic services are right-tailed while total investment as a percentage of GDP is left-tailed. The kurtosis showed evidence of normal distribution for the series except for total investment, which is leptokurtic. The probability values of the Jarque-Bera statistics further authenticated the normal distribution of the series except for total investment as a percentage of GDP which is not normally distributed at a 5 percent significance level given that the probability value of the associated Jarque-Bera statistic is less than 0.05.

### 4.2. Unit Root Test

The KPSS unit root test results, which are based on the LM statistics, are presented in table 2.

Series	LM stat. at Levels	LM stat. at 1 <sup>st</sup> Difference	5% Critical Value	I(d)
ING	0.229	-	0.463	I(0)
PES	0.134	-	0.463	I(0)
PEE	0.271	-	0.463	I(0)
TPE	0.467	0.066	0.463	I(1)

Table 2: Summary of the KPSS Unit Root Test Results for the Series  
Source: Author's Computation (2023) from E-Views Software

The results revealed that the Gini coefficient and public spending on social and economic services are stationary at levels given that their LM statistics are less than the critical value at the significance level of 5 percent. This finding necessitated the acceptance of the null hypothesis of the stationary process in the series. Thus, the series are integrated of order zero,  $I(0)$ . However, the results revealed that total public investment as a percentage of the GDP is non-stationary at levels, given that its corresponding LM statistic is greater than the critical value at the 5 percent significance level. The first

difference test result showed evidence of stationarity in the series. Hence, total public investment as a percentage of the GDP is integrated into order one, I (1). Overall, the KPSS stationarity test results showed that series are mixed integrated.

#### 4.3. Cointegration Test

In accordance with the evidence of mixed integration in the series, the bounds approach to the cointegration test was adopted in this paper. The results are reported in table 3.

Null Hypothesis: No Levels of Relationship				
Test Statistic	Value	Significance Level	I(0)	I(1)
F-statistic	5.552	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Table 3: Summary of Bounds Cointegration Test Results  
Source: Author's Computation (2023) from E-Views Software

##### 4.3.1. K Denotes the Number of Explanatory Series in the Model

The results of the bounds test cointegration revealed that the computed F-statistic (5.552) is greater than the upper bound critical value at the significance level of 5 percent. This finding provided the basis for rejecting the null hypothesis of no levels relationship among the series. Consequently, the explanatory variables have a long-run relationship with income inequality during the study period.

#### 4.4. Model Estimation

The short and long-run ARDL results are presented in table 4.

ARDL Long-run Results				
Dependent Variable: ING				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PES	-1.210003	0.182491	-6.630497	0.0000
PEE	0.164212	0.036220	4.533725	0.0001
TPE	-0.571574	0.325841	-1.754151	0.0900
C	53.94280	3.280082	16.44557	0.0000
ARDL ECM Regression				
Dependent Variable: D(ING)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ING(-1))	0.590131	0.108652	5.431388	0.0000
D(PES)	-0.174956	0.045782	-3.821464	0.0006
D(PES(-1))	0.181920	0.052394	3.472129	0.0016
D(PEE)	0.004847	0.019467	0.248991	0.8051
D(PEE(-1))	-0.073272	0.018688	-3.920829	0.0005
CointEq(-1)*	-0.458166	0.081518	-5.620428	0.0000
R-squared	0.680675	Mean dependent var		0.253846
Adjusted R-squared	0.632293	S.D. dependent var		1.932326
S.E. of regression	1.171740	Akaike info criterion		3.295495
Sum squared resid	45.30817	Schwarz criterion		3.551428
Log-likelihood	-58.26215	Hannan-Quinn criter.		3.387321
Durbin-Watson stat	2.058777			

Table 4: Summary of ARDL Long and Short-Run Equations  
Source: Author's Computation (2023) from E-Views Software

The long-run results showed that public expenditure on social services significantly reduced income inequality. It was evident from the coefficient that a 1 percent increase in public expenditure on social services reduced income inequality by 1.2100 percent in the long run. The implication of this finding is that public expenditure on social services plays a substantial role in mitigating the income gap among the Nigerian population. This finding is consistent with the work of Selem-Amachree and Ezekwe (2021), Ulu (2018) and Quionez (2022), which revealed that higher levels of education and social spending are associated with lower levels of income inequality. Similarly, total public expenditure, as a percentage of the GDP, has a negative relationship with income inequality in the long run. Although this finding conforms to the a priori expectation, it is not significant at the 5 percent significance level. This finding casts doubt on the effectiveness of total public expenditure in addressing the problem of income inequality in Nigeria. The results further showed that public spending on economic services has a positive and significant effect on income inequality in the long run. This suggests that higher levels of public spending on economic services are linked with higher levels of income inequality. The estimated parameter showed that the gap in income distribution increases by 0.164 percent as public

expenditure on economic services increases by 1 percent. This finding is contrary to the theoretical expectations and findings of Alamanda (2020), which showed that infrastructure spending has a negative link with income disparity in both urban and rural areas.

However, the short-run results revealed that income inequality in the previous period is positively and significantly linked to its value in the previous period. This explains that the previous level of income gap can be relied upon in predicting the future level of income disparity. The results also showed that the current public spending on social services and the one-period lag of public spending on economic services negatively and significantly affected income inequality. This finding conforms to the a priori expectation of the effectiveness of spending on economic and social services in mitigating income disparity. Unlike the current value, the first lag of public spending on social services contributed positively to income inequality. The error correction coefficient (-0.4581) is negative and significant at the 5 percent significance level, suggesting that the model can adjust from short-run to long-run equilibrium position. The adjusted R-squared (0.632) also showed that 63.2 percent of the total variations in income inequality were explained by the changes in the explanatory variables.

Tests	Value	Prob.	Inference
Breusch-Godfrey LM	0.4279	0.8074	Serial independence
Breusch-Pagan-Godfrey	9.7041	0.3750	Homoscedastic
Jarque-Bera	4.867	0.0878	Residuals are normally distributed
Ramsey RESET	0.5095	0.6065	No misspecification

Table 5: Summary of the Diagnostics Tests Results

Source: Author's Computation (2023) from E-Views Software

The Breusch-Godfrey LM test results showed evidence of the Chi-square statistic (0.4279) and corresponding insignificant probability value (0.8074), which suggests that the residuals are serially independent at the 5 percent level of significance. Similarly, the Breusch-Pagan-Godfrey test results revealed that the residuals are homoscedastic with a significance level of 5 percent, given that the probability value (0.3750) of the test statistic (9.7041) is greater than 0.05. There is also evidence of normal distribution in the residuals and the absence of specification bias in the model. In sum, the diagnostics test results provided enough evidence for the reliability of the entire model.

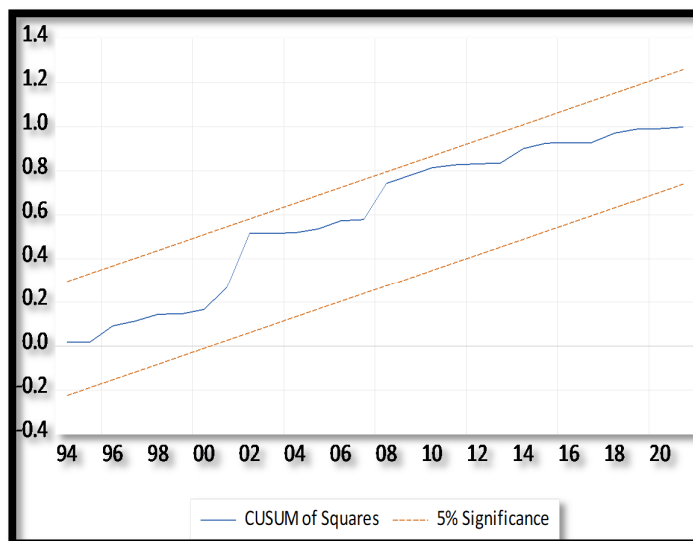


Figure 1: Cumulative Sum (CUSUM) of Squares Graph

Source: Author's Computation (2023) from E-Views Software

The CUSUM of squares graph lies within the two critical lines at the 5 percent significance level. This suggests that the estimated parameters are stable over the study period. Therefore, this finding authenticated the reliability of the estimated ARDL model.

## 5. Conclusion and Recommendations

The thrust of this paper is a re-examination of the income distribution implications of public investment in social services. This is based on the understanding that social services, especially education and health, are critical for a more equal and within-the-country distribution of income among the population. The findings provided evidence to support the claim that public investments in social services have the potential to reduce income inequality. This highlights that policymakers can leverage public social services investments to mitigate the gap in the distribution of income. It was also evident from the results that public investment in economic services is only effective in the long run in reducing income inequality, whereas the long run results showed that it worsened the menace of income inequality. In addition, the

percentage of total investment to the GDP exacerbated the inequality in income distribution. This showed that the intended and desired benefits of public investments in terms of improved income redistribution are yet to be achieved in the country. Given the findings, this study concludes that public investment in social services is imperative for mitigating the gap in income distribution in Nigeria. Therefore, this paper recommends that policymakers should provide a sustainable path for increased public investments in social services to the required vehicle for equitable income distribution. Investment in economic services should prioritise agriculture development to boost food security and create more opportunities for income redistribution.

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