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INVESTIGATING THE ARMEY CURVE HYPOTHESIS IN NIGERIA: AN EMPIRICAL ANALYSIS

ABSTRACT

Despite decades of substantial government spending and policy reforms, persistent macroeconomic instability and fiscal imbalances have continued to challenge Nigeria's economic growth. The country's fiscal policy has been characterised by inefficient resource allocation resulting in volatile growth outcomes and heightened vulnerability to external shocks. Focusing on the size of government, this research investigated the existence of Armey curve evidence in Nigeria. Grounded in neoclassical growth theory and the Armey curve framework, the research addresses nonlinear growth dynamics. Utilising nonlinear autoregressive distributed lag (NARDL) models, wavelet coherence analysis, and threshold regression, the study analyses disaggregated fiscal data from the Central Bank of Nigeria. Key findings reveal a long-term negative correlation between total government expenditure (% of GDP) and economic growth, driven by crowding-out effects. The Armey curve hypothesis is validated by identifying an optimal government size of 22–24% of GDP, beyond which growth diminishes. Threshold regression highlights diminishing returns to capital expenditure beyond 7.3% of GDP. The research concludes that Nigeria's fiscal architecture is misaligned with sustainable growth. It is recommended that government should gradually reduce government size to 22% (optimal threshold) of GDP by privatising non-strategic public enterprises and deregulating.

Keywords: *Armey curve, economic growth, Fiscal policy, Nigeria, NARDL model.*

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INTRODUCTION

The Armey Curve, a concept in economics, proposes an inverted U-shaped relationship between government spending and economic growth. This curve suggests that as government expenditure increases, economic growth initially rises, reaches an optimal point, and then declines due to inefficiencies and crowding out of private investment. The Armey Curve hypothesis has been tested in various countries,

yielding mixed results although the state of debate and research results in this area are seemingly contradictory.

A variety of conflicting theoretical explanations has been advanced that can only be resolved through empirical investigations (Inuwa, 2012).

The claim that an increase in government size promotes economic growth is not supported by all scholars. A good number of prominent authors especially of the Neoclassical School argue that increased government expenditure may slow down the aggregate performance of the economy because, in an attempt to finance rising expenditure, government may have to increase taxes and/or borrowing. Sudha (2007) pointed out that countries with large public sector have grown slowly. Sachs (2006), however, countered this by contending that, among the developed countries, those with high rates of taxation and high social welfare spending perform better on most measures of economic performance compared with countries with low rates of taxation and low social services spending. Thus, there is no general consensus among scholars on the effects of the size of government on economic growth. In fact, study by Foister and Henrekson (2001) suggested that large government expenditure has negative impact on economic growth. Despite the significant role of government spending in Nigeria's economic development, there is limited empirical evidence on the existence and applicability of the Armey Curve hypothesis in the country.

Currently, studies about the Armey curve do not adequately explore nations that have transitioned from centrally planned economies and political instability to market-oriented economies and democracy like Nigeria. The literature regarding government size and economic growth includes studies that assume a linear as well as a nonlinear relationship between government expenditure and economic growth. Most of the studies are based on linear models like Feder (1982) and Dalamagas (2000). Although Armey and Armey (1995), Vedder and Gallaway (1998), among others, subscribe to forms of nonlinear relationships. However, all these studies were not on Nigeria, hence, this study intends to investigate the existence or otherwise of U-shaped Army curve evidence in Nigeria.

Based on the above research problems, the research questions, which would guide this study, are as follows:

i. What is the effect of government size on economic growth?
ii. Is there existence or otherwise of Armey curve evidence in Nigeria?

The broad objective of this study is to empirically determine the effects of the size and structure of government finance on economic growth in Nigeria. Following from this, the specific objectives are to:

i. examines the effect of government size on economic growth in Nigeria;

ii. determine the existence or otherwise of Armey curve evidence in Nigeria.

LITERATURE REVIEW

Neoclassical Growth Theory

Neoclassical growth theory is an economic theory that outlines how a steady economic growth rate results from a combination of three driving forces: labour, capital, and technology. While an economy has limited resources in terms of capital and labour, the contribution from technology to growth is boundless. In neoclassical models pioneered by Solow (1956) and Swan (1956), there are diminishing returns to capital and the long-term growth rate is exogenous. Since neoclassical growth models omit the factors that explain long-term growth, they are sometimes viewed as at best less useful and at worst inadequate. Nevertheless, even static policy effects can be sizeable, affecting the level of savings or the level of employment. With simplified assumptions, the neoclassical models are a good tool to help organize thought regarding growth and what growth might depend on. Neoclassical theory is still adjudged to be the best in explaining and analyzing public sector economy as in this case and hence it will be relied upon in this study and will serve as the principal theory to be used.

The Armey Curve Proposition

According to Armey (1995), in a state of anarchy, output per capita is expected to be low. However, where there is a mix of private and government decisions on the allocation of resources, output is often larger. At some point, further expansion of government no longer leads to output expansion, as growth-reducing aspects of government grow larger, and the growth-enhancing features of government diminish. Further expansion of government contributes to economic stagnation and decline. As governments grow, the law of diminishing returns sets in. New government spending no longer enhances economic growth. The Armey curve does not suggest that "all government is bad". To the contrary, some governments serve the public good. But like most good things, too much of it is harmful. So, government in moderation is good for the economy while in excess it is bad. Armey (1995) maintains that low government expenditure increases economic growth until it reaches a certain level; nevertheless, excessive government expenditure reduces economic growth. Any expansion of government spending in the economy initially is associated with an expansion in output. The Armey curve thus implies the following assumptions: no economy can obtain a high level of economic growth without a government; excessively large government reduced

economic growth; and output should be high when there is a mix of private and government decisions regarding the allocation of resources. In this context, government involvement in the economy is a necessary but not a sufficient condition for growth.

Figure 1:

(THE ARMEY CURVE)

G/Y optimum

Federal spending as a percent of GDP
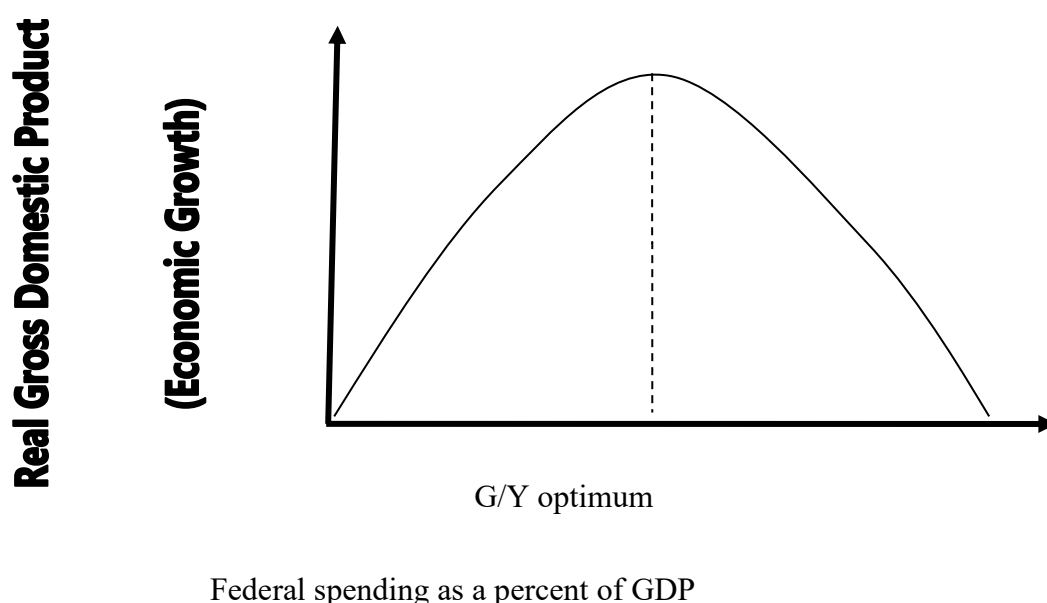
Source: Vedder, et al, (1998)

Empirical Literature

Chen and Lee (2005) indicated that a nonlinear relationship of the Armey curve exists in Taiwan. Using the threshold regression methodology, it demonstrated that all the three classifications of government size have threshold effects. The analysis produced a threshold regime of 22.84% for 'total government expenditure divided by GDP', a threshold regime of 7.30% for 'government investment expenditure divided by GDP' and a threshold regime of 14.97% for 'government consumption expenditure divided by GDP'. The study of Pieroni (2006) explored the relationship between government expenditure on the military and economic growth by including the impact of the share of military and civilian components of government expenditure in an economic growth model with endogenous technology. The study empirically considered the hypothesis of a nonlinear effect of military expenditure on economic growth and the parametric partial correlations are in line with empirical findings. The negative relationship

between military expenditure and growth in countries with high levels of military burden as predicted by theory becomes significant only after including a proxy for re-allocative effects in the growth equation.

Moreover, De Witte and Moesen (2010) investigated the Armey curve using nonparametric Data Envelopment Analysis (DEA). The results showed that among the 23 OECD countries, the long-run optimal government size oscillates between 29% and 54%. The optimal average government involvement amounts to 41% of GDP. This analysis also suggests that a large decrease in government involvement should occur in Italy compared to an increase in government involvement in New Zealand.

The study by Facchini and Melki (2011) examined the optimal government size and economic growth in France for the period of 1871-2008. They combined both theories of market failures and state failures to account for an inverted U-shaped relation between government size and economic growth. The empirical investigation according to them is to provide evidence through a long time-series analysis of the existence of such a relation on the period under review; indeed, the study offers one of the longest stable democratic periods to analyze.

METHODOLOGY

Economic theory suggests several mechanisms by which government activities can affect growth. However, these mechanisms do not suggest an unambiguous link between government size and growth. In fact, there are many reasons to expect a relationship that is inversely U-shaped, a hypothesis sometimes referred to as the Armey-curve (Armey 1995). This study adopts the Neoclassical growth model using Cobb-Douglas production function. In economics, the Cobb-Douglas functional form of production functions is widely used to represent the relationship of an output to inputs. It was proposed by Knut Wicksell (1851-1926), and tested against statistical evidence by Charles Cobb and Paul Douglas in 1928. The function they used to model production was of the form:

$$Y(K, L) = A f (K, L) \qquad\qquad (1)$$

Where Y = real GDP (the monetary value of all goods produced in a year), K = capital input (CAP), L = labour input (LAB), A = total factor productivity and are the output elasticities of labour and capital, respectively. These values are constants determined by available technology. The derivation of economic growth function from the above production function in equation (1) proceeds according to the stages described below. Rewriting equation (1), we have:

$$RGDP = f(K, L, A) \hspace{5cm} (2)$$

Where A = total factor productivity captured in this study by government expenditure (GEX), trade openness (TOP), political regime (POL), and inflation (INF) because according to the literature they all have influence and play important roles on economic growth. Hence, equation (2) becomes:

$$RGDP = F(CAP, LAB, GEX, TOP, POL, INF) \hspace{3cm} (3)$$

Equation (3) represents the conventional neoclassical growth theory-based growth accounting framework adopted.

Model Specification

Empirical Model for Testing Non-Linear Relationship between Government Size and Economic Growth: The Armey Curve Relationship.

To test for this Armey curve relationship, the square of government expenditure (GEX^2) can be imagined to be included, in addition to government expenditure (GEX) in the productivity equation (3), implying that the positive (or negative) effect of GEX on (A) is offset by the opposite effect of GEX^2. Following the stages described in equation (1) to equation (3) for testing non- linear relationship between government size and economic growth, we substitute government expenditure (GEX) with government expenditure minus the square of government expenditure $(GEX\ less\ GEX^2)$ in Equation (3), to arrive at Equation (4) thus:

$$GEX = GEX - GEX^2 \hspace{4cm} (4)$$

Substituting equation (4) into equation (3), we have equation (5) thus:

$$RGDP = F(CAP, LAB, GEX - GEX^2, TOP, POL, INF) \hspace{2cm} (5)$$

The empirical baseline growth model is specified by transforming equation (5) econometrically, yielding:

$$RGDP = \text{Ʊ}_1 CAP + \text{Ʊ}_2 LAB + \text{Ʊ}_3 GEX - \text{Ʊ}_4 GEX^2 + \text{Ʊ}_5 TOP + \text{Ʊ}_6 POL + \text{Ʊ}_7 INF \hspace{1cm} (6)$$

Due to the fact that there are no statistics on capital stock (CAP), we are constrained to proxy it with the share of gross capital formation (or gross investment) in GDP, which is denoted by INV. Incorporating the error term $(\mathcal{E})$, intercept term (Ʊ_0) and time subscript (t) to Equation (6), it becomes the following baseline econometric Equation (7) in line with the existing empirical specification:

$$RGDP_t = \text{Ʊ}_0 + \text{Ʊ}_1 INV^2_t + \text{Ʊ}_2 LAB^2_t + \text{Ʊ}_3 GEX_t - \text{Ʊ}_4 GEX_t^2 + \text{Ʊ}_5 TOP_t + \text{Ʊ}_6 POL_t + \text{Ʊ}_7 INF_t + \varepsilon_t \hspace{0.5cm} (7)^`$$

where $RGDP$ = Real Gross Domestic Product as the indicator for economic growth, INV = Share of gross investment in the GDP as a proxy for capital stock, LAB = Labour force, GEX = Government expenditure as a ratio of GDP, GEX^2 = Square of government expenditure in relation to the GDP, TOP = Trade Openness as a ratio of GDP, POL = Political regime dummy variable that takes a value of 1 for a civilian administration and 0 for a military regime, INF = Inflation, $℧_1....℧_7$ = coefficients on the explanatory variables, $℧_0$ = the intercept term, ε = The stochastic term which from a statistical point of view is regarded as a random noise, t = Time period. In mathematical terms, the a priori expectations are as follows: $℧_1 > 0, ℧_2 > 0, ℧_3 > 0, ℧_4 < 0, ℧_5 > 0, ℧_6 >< 0, ℧_7 < 0$. Equation (7) therefore represents the empirical growth model to be estimated to determine the existence or nonexistence of Armey curve evidence in Nigeria. The positive coefficient of the linear GEX term is related to the constructive effects of government spending on output, and the expected negative coefficient of the squared GEX term is related to the negative or destructive effect of increased government size. This regression equation includes both the linear term and the squared term of GEX in the estimation equation, and therefore is a quadratic form sharing a second-degree polynomial function. Since the second-degree polynomial function is linear in the parameters, it does not present any special estimation problems. A second concern is whether there is a collinearity problem: are these two GEXs highly correlated since they are both powers of GEX? The terms such as GEX^2 and GEX^3 are all nonlinear functions of GEX and, therefore, they do not violate the assumption of 'no multicollinearity'. Consistent with the literature detailed earlier, only the linear and quadratic terms of GEX were employed, assuming that the relation between government spending and growth is uncomplicated and the curve depicting this relationship has no more than one maximum/minimum.

Methods of Data Analysis

The study used both descriptive and inferential techniques to achieve the objectives of the study as indicated earlier. The study employs yearly data on public expenditure and gross domestic product, which spans 1981 to 2023 yielding 43 observations. The chosen data is gleaned from the Central Bank of Nigeria Statistical bulletin. The selected data span is based on data availability. The sample period is long enough to welcome economic events and other socio-political crises that influenced the Nigerian economy such as the 1981 oil gloom, rebasing the economic statistics of the country in 2000, the 2003 banking sector clean-up, vision 2020, the 2008 Global Financial crisis, the COVID-19 pandemic, and the global crude oil price crash. Hence, gross domestic product is specifically utilised in this study to deal with business

cycle issues. All estimations are performed using the natural logarithm of public expenditure (EXP) and gross domestic product (GDP) to enhance effective comparison.

RESULT AND DISCUSSION

Unit Root Test.

Unit root test was conducted using the Augmented Dickey-Fuller method to examine the stationarity properties of the study variables. The results of the unit root test are as presented in Table 1.

Table 1: Unit Root Result Using Augmented Dickey-Fuller (ADF) Stationarity Test

Variables	ADF Test Statistics at Levels	5% Critical Value	Order of Integration	ADF Test Statistics at First(1st) Difference	Order of Integration
D_GEX	-1.348	-2.939	NS	-10.066	I (1)
INF	-3.082	-2.933	I (0)	-	-
INV	-1.407	-2.933	NS	-7.186	I (1)
D_LAB	-1.631	-2.935	NS	-4.058	I (1)
POL	-1.505	-2.933	NS	-6.245	I (1)
TOP	-1.612	-2.935	NS	-7.888	I (1)
RGDP	-1.715	-2.935	NS	-7.766	I (1)

Source: Author's Computation using Eviews-12, 2025
NS = Not Stationary

As indicated in table 1 above, the ADF unit root test results indicate that inflation rate (INF) exhibited zero-order integration (I(0)), this shows that inflation rate fluctuates around a constant mean over time and it suggests monetary policy effectiveness, stable economic environment and predictable inflation pattern which allows for more accurate modelling, forecasting, and policy analysis. In comparison, the remaining six (6) variables displayed first-order integration (I(1)). The implication of this result is that using Ordinary Least Squares (OLS) method to estimate the parameters will lead to a spurious regression result if there is no long run cointegration. This necessitates the test of cointegration to check if at all there is a long-run relationship among the non-stationary variables used in the model. Given the order of integration of these variables as pointed out in the above paragraph and, following the previous explanation, an appropriate technique to be used to conduct the cointegration test is the ARDL bound test

approach to cointegration. This is because the variables appearing in several equations are a mix of I(0) and I(1) series. Sherstha and Bhatta (2018) recommend employing the ARDL analysis method when a time series model comprises variables demonstrating stationarity at distinct levels. The outcome of this test is as presented and discussed below.

Model for Testing Non-Linear Relationship between Government Size and Economic Growth: The Armey Curve Relationship (Non-Linearity)

This section presents and discusses the results of cointegration test for the variables in order to verify if there exists a long-run relationship among each dependent variable and its explanatory variables of non-linearity between government size and economic growth. The decision rule is to accept the null hypothesis of no cointegration if the reported F-statistic value is below the I(0) critical value (lower bound) and to reject it in favour of accepting the alternative hypothesis that there is cointegration if the reported F-statistic value is above the I(1) critical value (upper bound). But if the reported F-statistic value is within the bounds of I(0) and I(1), the evidence would be inconclusive as to whether to accept or reject the null hypothesis (Pesaran, Shin & Smith, 2001). Some variables are omitted in selected equations in order to reduce the incidence of multicollinearity due to observed high correlations among the affected variables following the preliminary tests (through an examination of the correlation matrix) and the results of the VIF tests carried out.

Table 2: Lag Order Selection Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2612.4	NA	8.34e+50	134.277	134.533	134.3689
1	-2448.82	268.4417*	1.23e+48*	127.7344*	129.5259*	128.3772*
2	-2423.16	32.21402	2.39e+48	128.2646	131.5918	129.4584
3	-2394.77	29.11443	5.19e+48	128.6551	133.5178	130.3998

Source: Author's Computation using Eviews 12, 2025

Table 2 was utilized to precisely determine the optimal lag length for the ARDL model, which is crucial for capturing the non-linear relationship between government size and economic growth in Nigeria. The selection criteria include the log-likelihood (LogL)**,** Likelihood Ratio (LR) test**,** Final Prediction Error (FPE)**,** Akaike Information Criterion (AIC)**,** Schwarz Criterion (SC), and Hannan-Quinn Criterion (HQ). The model with the smallest FPE, AIC, SC, and HQ values is generally preferred, as it indicates a better fit with lower prediction error. From the table, the optimal lag length is lag 1, as it has the lowest values

for FPE (1.23e+48), AIC (127.7344), SC (129.5259), and HQ (128.3772). The significant LR statistic (268.4417) at lag 1 also confirms that including one lag significantly improves the model's explanatory power compared to the baseline model (lag 0).

At lag 2 and lag 3, the values for FPE, AIC, SC, and HQ increase, showing a diminishing return in model fit when additional lags are utilized. Although the LR statistics for lags 2 and 3 remain positive, the increase in the information criteria values suggests that the model becomes less efficient with additional lags. Therefore, selecting lag 1 is justified because it strikes a balance between model complexity and predictive accuracy, ensuring that the dynamic adjustments of government size components to economic growth are captured without overfitting. Meanwhile, the short-run and long-run effects of government size on economic growth in Nigeria are best represented when lag 1 is considered in the model.

Table 3: ARDL Bound Test Result for Non-Linearity Relationship

Null Hypothesis: No long-run relationship exists

Test Statistic	Value	K
F-statistic	7.219050	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	3.18
1%	3.41	4.68

Source: Author's Computation using Eviews-12, 2025

Table 3 investigates the existence of a long-run association between government size and economic growth in Nigeria. The calculated F-statistic of 7.219050 is higher than the upper bound critical values at all conventional significance levels (1%, 2.5%, 5%, and 10%). Specifically, at the 1% significance level, the upper bound (I1 Bound) is 4.68, which is significantly lower than the computed F-statistic. Since the F-statistic surpasses the upper bound, the null hypothesis of no long-run relationship is rejected. This affirms the presence of a statistically significant long-term correlation between government size and economic growth during the study period (1981–2023).

Failure to accept the null hypothesis means that key government size components such as government expenditure, fiscal deficit, transfer payments, and tax revenue are interconnected with Nigeria's long-term economic growth. The significance of this relationship reveals that changes in the size of government have

a long-term impact on economic prosperity. Therefore, effective fiscal policies, incorporating balanced government spending, efficient allocation of transfer payments, and sound fiscal responsibility measures, are critical for sustaining long-term economic growth in Nigeria.

Table 4: ARDL Error Correction Regression Result for Non-Linearity Relationship Between Government size and Economic Growth in Nigeria.

Dependent Variable (RGDP)				
ECM Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	7.29E+25	2.04E+25	0.000000	0.0000
D(D_LAB^2)	-4.3E+23	4.59E+23	0.000000	0.0000
D(TOP^2)	1.48E+23	4.18E+24	0.000000	0.0000
CointEq(-1)*	-0.030527	0.004314	7.076875	0.0000
R-Square				0.580640
Adjusted R-Square				0.546638
F-Statistics				17.07658
Prob.(F-Statistics)				0.000000

Source: Author's Computation using Eviews-12, 2025

Table 4 utilizes the Non-linear ARDL (NARDL) error correction regression model which reveals key findings into the asymmetric effects of government size on economic growth in Nigeria from 1981 to 2023. The constant term (C) has a unique large positive value (7.29E+25) and is statistically significant at 1% level (p-value = 0.0000), indicating a substantial underlying base-level influence of government size variables on economic growth. This could reflect that the underlying structural characteristics of Nigeria's economy have large-scale, systemic influences on growth. The coefficient of the change in the squared labour force variable (D(D_LAB^2) = -4.3E+23) is negative and statistically significant at the 1% level (p-value = 0.0000), implying that increases in the labour force beyond a certain point may generate diminishing returns or even become harmful to growth. This aligns with theoretical expectations (Armey, 1995) that excessive growth in the labour force without corresponding improvements in human capital, employment opportunities, and productivity-enhancing infrastructure may increase unemployment, underemployment, and social strain, ultimately reducing the positive impact on economic growth. The coefficient for the change in the squared trade openness variable (D(TOP^2) = 1.48E+23) is positive and

statistically significant at the 1% level (p-value = 0.0000), showing that greater levels of trade openness have a non-linear and increasing positive effect on economic growth. This reveals that Nigeria's increasing integration into global markets and the expansion of trade activities are beneficial for long-term economic growth. However, the large magnitude of the coefficient also raises concerns about the potential volatility or sensitivity of Nigeria's economy to external shocks and trade imbalances. The error correction term (CointEq(-1) = -0.030527) is negative and significant at the 1% level (p-value = 0.0000), indicating that about 3.05% of the disequilibrium from the previous period is corrected in the current period. This moderate speed of adjustment shows that while the Nigerian economy responds to deviations from long-run equilibrium, the process of returning to equilibrium is relatively slow, which may reflect structural rigidities, policy inconsistencies, or institutional weaknesses. The R-squared value of 0.580640 implies that approximately 58% of the variation in economic growth is explained by the model's independent variables, which discloses a reasonably good fit for a macroeconomic model. The F-statistic value of 17.07658 and its significant p-value (0.0000) confirm the overall robustness and statistical validity of the model, meaning that the size of government particularly through labour market dynamics and trade openness play a meaningful and asymmetric role in driving Nigeria's economic growth.

Table 5: ARDL Long Run Result for Armey Curve Evidence

Dependent Variable (RGDP)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.29E+25	7.95E+25	0.000000	0.0000
RGDP^2(-1)*	0.030527	0.019088	1.599263	0.1196
INV^2**	-2.2E+17	1.41E+17	-1.53077	0.1351
D_LAB^2(-1)	-3.5E+24	1.27E+24	0.00000	0.0000
D_GEX^2**	-6.53842	2.356882	-2.77418	0.0110
TOP^2(-1)	8.27E+24	9.26E+24	0.892937	0.3773
INF^2**	6.02E+25	2.15E+22	0.00000	0.0000
D(D_LAB^2)	-4.3E+23	5.77E+23	0.00000	0.0000
D(TOP^2)	1.48E+23	6.65E+24	0.00000	0.0000

Source: Author's Computation using Eviews-12, 2025.

Table 5 utilizes the non-linear ARDL (NARDL) long-run regression results which reveals important findings into the asymmetric long-term effects of government size on economic growth from 1981 to 2023 to proof the existence or non-existence of Armey curve evidence in Nigeria. The constant term (C) has an

extraordinarily large positive value (7.29E+25) and is statistically significant at the 1% level (p-value = 0.0000). This reveals that there are underlying structural factors impacting Nigeria's economic growth. The coefficient for the lagged dependent variable ($RGDP^2$(-1) = 0.030527) is positive but not statistically significant (p-value = 0.1196), showing that previous economic growth has a limited and statistically weak influence on current economic performance. This implies that the Nigerian economy may be more influenced by short-term shocks and policy changes rather than relying on its inherent growth momentum. The coefficient for gross investment (INV^2 = -2.2E+17) is negative and not statistically significant (p-value = 0.1351), showing that increased investment does not significantly drive long-term growth, potentially due to inefficiencies in capital allocation, poor infrastructure development, or weak institutional support. The coefficient for the lagged labour force variable (D_LAB^2(-1) = -3.5E+24) is negative and highly significant at the 1% level (p-value = 0.0000), showing that in the long run, an excessive increase in the labour force may exert downward pressure on economic growth. This reflects that the Nigerian economy may struggle to absorb a growing labour force due to weak industrialization, limited job creation, and low productivity. Government expenditure squared (D_GEX^2 = -6.53842) is negative and statistically significant at the 5% level (p-value = 0.011), revealing that increased government spending will negatively affect long-term growth, possibly due to misallocation of resources, corruption, or crowding out of private sector activity, this major finding is in tandem with theory of Armey curve postulation (Armey 1995). The trade openness variable (TOP^2(-1) = 8.27E+24) is positive but not statistically significant (p-value = 0.3773), proposing that while trade openness may have a positive influence, it is not a decisive factor in driving long-term growth. Inflation (INF^2 = 6.02E+25) is positive and highly significant at the 1% level (p-value = 0.0000), which is counterintuitive since inflation typically constrains growth. This may reflect structural inflationary pressures in Nigeria, such as cost-push inflation driven by exchange rate volatility, supply chain disruptions, and high production costs. The short-term coefficients for labour force ($D(D\_LAB^2)$ = -4.3E+23) and trade openness ($D(TOP^2)$ = 1.48E+23) are highly significant at the 1% level but their large extent reveals that short-term changes in labour dynamics and trade exposure have strong but possibly unstable influences on growth. This emphasizes the need for structural reforms to harness the benefits of trade and labour market dynamics more effectively.

Table 6: Diagnostic Tests Result for Non-Linearity Relationship

Diagnostic Result			
Test	**Techniques**	**Jacque-Bera/F-Statistics Value**	**P-Value**
Residual Normality	Jacque-Bera	24.53501	0.000005
Serial Correlation	Breusch-Godfred	1.234635	0.3114
Heteroskedasticity	Breusch-Pagan-Godfred	1.495869	0.1448
Ramsy	Reset Test	1.623167	0.1195
Stability Test	CUSUM & CUSUM of Squares	Stable	Stable

Source: Author's Computation using Eviews 12, 2025

Table 6 displays important findings into the validity and reliability of the regression model used to examine the size of government and its effect on economic growth in Nigeria from 1981 to 2023. The Jacque-Bera test for residual normality has a test value of 24.53501 with a highly significant p-value of 0.000005, indicating that the residuals are not normally distributed at the 1% significance level. This suggests that the model may suffer from issues such as omitted variables, outliers, or non-linearity in the relationship between the dependent and independent variables. However, the Breusch-Godfrey test for serial correlation reports a test value of 1.234635 with a p-value of 0.3114, indicating that the model does not suffer from serial correlation. This implies that the error terms are not systematically correlated, which supports the validity of the model's inference and improves the reliability of the estimated coefficient. The Breusch-Pagan-Godfrey test for heteroskedasticity returns a test value of 1.495869 with a p-value of 0.1448, revealing that the null hypothesis of homoskedasticity cannot be rejected. This shows that the variance of the error terms is constant, which strengthens the credibility of the model's estimated parameters and suggests that the model is correctly specified in terms of variance. The Ramsey RESET test for model specification yields a test value of 1.623167 with a p-value of 0.1195, indicating that the model is correctly specified and does not suffer from functional form misspecification. Finally, the CUSUM and CUSUM of Squares tests confirm that the model is stable over the sample period, as both tests fall within the critical bounds. This means that the model's parameters are consistent over time, reinforcing the reliability of the long-term relationship identified in the regression analysis.
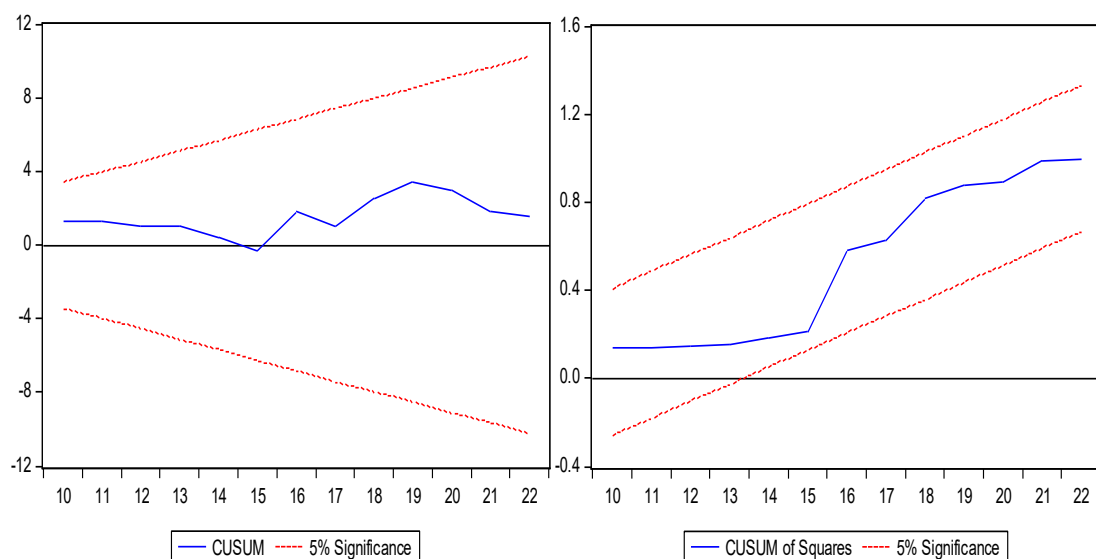
CONCLUSION AND RECOMMENDATIONS

This research investigated the existence or nonexistence of Armey curve evidence in Nigeria from 1981 to 2023. Grounded in neoclassical growth theory and the Armey curve proposition, the research employed non-linear autoregressive distributed lag (NARDL) models and threshold regression to analyse disaggregated government expenditure in Nigeria. The study aimed to address the effect of government size on economic growth, and the existence of a nonlinear relationship (Armey curve) between government size and growth. Government size was operationalised through aggregated measures of expenditure. The methodology integrated time-series econometrics, including unit root tests, cointegration, error correction mechanisms, and nonlinear modelling, to address gaps in prior studies, such as insufficient disaggregation of expenditures and inadequate exploration of nonlinear dynamics. Notably, the analysis offered empirical evidence of a non-linear, inverted U-shaped relationship between government size and economic growth in Nigeria, thereby confirming the validity of the Armey curve hypothesis within the Nigerian context. The following are the key findings from the research regarding nonlinear dynamics: The Armey curve hypothesis is validated by identifying an optimal government size of 22–24% of GDP, beyond which growth diminishes. Threshold regression confirmed diminishing returns to government expenditure, with capital spending losing efficacy beyond 7.3% of GDP. The validated Armey curve suggests Nigeria operates beyond its optimal government size, with excessive public sector involvement distorting market efficiency. The empirical findings of this study highlight a nuanced and context-specific relationship between the size and economic growth in Nigeria. The evidence supports the claim that while public expenditure can serve as a catalyst for economic growth, particularly when allocated efficiently and judiciously, excessive and misdirected government spending may be

detrimental. The existence of an optimal threshold validates the theoretical insights of Armey (1995) and reaffirms the significance of fiscal discipline in public finance. Based on the research findings; government should gradually reduce government size to 22% of GDP by privatising non-strategic public enterprises and cap recurrent expenditure at 50% of the total budget, then reallocate savings to critical infrastructure (power, transport) and social services (health, education). Moreover, policymakers should establish an Independent Project Monitoring Office to enhance accountability

References

Armey, D. (1995). The freedom revolution. Washington, D. C.: Regnery Publishing.

Armey, D., & Armey, R. (1995). The Freedom Revolution: The New Republican House Majority Leader tells why big government failed, why freedom works, and how we will rebuild America. Washington, D.C.; Regnery Publishing Inc.

Chen, S. & Lee, C. (2005). Government size and economic growth in Taiwan: A threshold regression approach. *Journal of Policy Modeling, 27(9),* 1051- 1066.

Cobb, C. W., & Douglas, P. H. (1928). A Theory of Production. *American Economic Review. 8(2),* 139- 1965.

Dalamagas, B. (2000). Public sector and economic growth: the Greek experience, *Applied Economics, Taylor & Francis Journals, 32(3),* 277- 288.

De witte, K. & Moesen, W. (2010). Sizing the government: Empirical evidence for the impact of government size on economic growth. *Journal of Economic Studies, 37(4), 404- 419.*

Facchini, F., & Melki, M. (2011). Growth and Political Ideology in a democracy: The French experience 1871– 2009. EPCS, Rennes, France, 28th-1st mai *omic Studies, 37(4), 404- 419.*

Feder, G. (1982). On Export and Economic Growth. *Journal of Development Economics, 12,* 59- 73.

Folster, S., & Herekson, M. (2001). Growth effects of government expenditure and taxation in rich countries. *European Economic Review, 4*5(5), 1501- 1520.

Inuwa, N. (2012). Government Expenditure and Economic Growth in Nigeria: Cointegration Analysis and Causality Testing. *Academic Research International, 2(3),* 718- 730.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16(3),* 289– 326.

Pieroni, L. (2006). Military Expenditure and Economic Growth, Department of Economics, Finance and Statistics, University of Perugia. (Mimeo)

Sachs, J. D. (2006). The Social Welfare State, Beyond Ideology *Scientific American.* http://www.sciam.com/ article.cfm?id=the-socialwelfare-state.

Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics, 70(1), 65- 94.*