OIL REVENUE FLUCTUATIONS AND GOVERNMENT SPENDING IN NIGERIA

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ABSTRACT

This study uses the Autoregressive Distributed Lag (ARDL) model to investigate the connection between oil revenue and government expenditure in Nigeria from 1981 to 2022. The ARDL bounds testing approach was used to investigate both short-run fluctuations and long-run equilibrium relationships among variables. The empirical findings confirm a significant long-run relationship, where oil revenue serves as a major driver of government expenditure. In the short run, oil-related revenue has a positive and immediate effect on government spending; still, the magnitude of influence declines over time. Controlled for GDP, it also has a positive long-term impact on fiscal outlay, though its short-run impacts are irregular. An ECM shows that the rate of return to the long-run equilibrium is very swift, as manifested by an error correction term that has statistical significance. Diagnostic tests confirm the model's reliability by showing that the results satisfy the requirements of serial correlation, heteroscedasticity, and stability. These results provide strong evidence of the urgency to reduce Nigeria's dependency on oil revenues by diversifying its fiscal base, alongside the need for countercyclical fiscal policy to enhance economic stability. The research brings critical perspectives to policymakers to manage the inherent fluctuations within oil markets and to foster sustainable fiscal policies in economies reliant on natural resources.

KEYWORDS

Oil Revenue, Government Expenditure, Fiscal Policy, Economic Growth

1. INTRODUCTION

Government expenditure is a major determinant of the economic environment in which a country finds itself and has been considered an important tool for attaining macroeconomic stability, economic growth, and socio-economic development by Musgrave (1959) and Barro (1990). In the case of Nigeria, an oil- rich country, the relationship between government expenditure and revenue, especially oil revenue, is of great importance for fiscal policy formulation and economic management.

Government expenditure refers to all forms of spending undertaken by the different tiers of government with a view to meeting all responsibilities and needs of its citizens. This reflects the magnitude of the intervention of government in the economy and its commitment to the provision of essential services,

infrastructure, and public goods. This agrees with Tanzi & Schuknecht, 2000, and Gupta et al., 2005. In fact, empirical studies indicate that government expenditure, if well allocated, contributes to economic growth. For instance, Barro, 1990, and Aschauer, 1989, report that government expenditure has a positive effect on economic growth. For instance, Aschauer, 1989, found that public infrastructure investment, a part of government expenditure, adds to productivity and long-term economic growth.

In Nigeria, over the years, government spending has transformed from the conventional role of security provision and administrative matters to direct involvement in economic activities and socials, as shown by Ogbonna et al. (2020). Crude oil discovery and its exploitation have, therefore, been the pivot on which Nigeria's fiscal environment turns; oil revenue has now become the major source of income to the government as well as the source of foreign exchange. According to empirical evidence by Ross (2015), in these countries, including Nigeria, which export oil, one may find fiscal volatility influenced by changes in oil price and revenues (Gelb & Associates, 1988). Akinlo and Egbetunde (2010) also found proof that oil revenue volatility significantly shocked the Nigerian government's expenditure pattern.

Reliance on oil revenue has enormous implications for fiscal sustainability, economic stability, and development in Nigeria (Ross, 2012). The volatility in oil prices, levels of production, and the level of global demand tends to strongly influence government revenue, the priorities of government expenditure, and the fiscal balance in totality (Akinlo & Egbetunde, 2010). Therefore, the relationship between oil revenue and government expenditure is relevant for assessing fiscal resilience, susceptibility to external shocks, and effective fiscal policy measures for the attainment of sustainable economic growth and development in Nigeria.

Consequently, this paper seeks to examine the relationship between oil revenue, non-oil revenue, gross domestic product, and government expenditure in Nigeria. The study, using historical data and appropriate econometric techniques, endeavours to determine the determinants and pattern of government expenditure, the influence of oil revenue on expenditure, and implications for fiscal policy formulation and economic management in Nigeria. The study, therefore, is expected to add to the literature on fiscal policy, resource management, and economic development in Nigeria through empirical analysis and resultant policy recommendations.

2. LITERATURE REVIEW

The section reviews some of the important concepts indispensable in the discussion, to give a clear understanding of the dynamics involved: government expenditure-a basic tool of economic management and development; economic growth, normally measured by the aggregate of Gross Domestic Product; and oil revenue-a major source of income to the economy of Nigeria.

2.1.1. Government Expenditure

To provide a thorough understanding of the dynamics at work, this section goes over major topics relevant to the subject. It begins by looking at government spending, a critical instrument for economic management and development, then moves on to economic growth, which is frequently measured by Gross Domestic Product (GDP), and finally to oil revenue, Nigeria's primary source of income.

Government expenditure is the sum of money spent by a government to acquire goods, services, and projects from the public. In fact, this expenditure is one of the biggest spendings to keep the governmental function going and to foster overall economic and social infrastructural development. According to Olopade and Olopade (2010), government expenditure encompasses

all that is spent by a government to maintain the society and the economy. Government expenditure in Nigeria is also divided into recurrent and capital expenditures. Recurrent expenditure includes salaries, pensions, and overheads, while capital expenditure is spent on long-term investments like roads, bridges, schools, hospitals, and other public infrastructure projects.

Government expenditure is important to welfare development. It is an increase in appropriate government spending that significantly improves public welfare, aside from developing the country. It is also considered one of the variables applied as a macroeconomic indicator in the regulation of particular policies of the country. For instance, in Nigeria, there is a connection that shows government expenditure will always translate to welfare because in every government expenditure on social services and infrastructure, some positive change is assured towards altering citizens' lives.

2.1.2. Economic Growth/Gross Domestic Product (GDP)

It is a multicausal process that has been influenced by various economic and non-economic factors. According to Todaro and Smith (2006), "economic growth is the steady process by which the economy's productive capacity increases over time to achieve higher levels of national output and income. It is normally measured by the increase in the Gross Domestic Product of a country, which is the sum value of all the goods and services produced within a nation during a certain period, usually a year.

The three major approaches in calculating the GDP are the income approach, the value-added approach, and the expenditure approach. In the income approach, it calculates the earnings of people; the value- added approach determines the value added at each stage of production; and lastly, the expenditure approach calculates spending on goods and services. To get to real GDP, nominal GDP has to be adjusted for inflation so that one could determine growth more accurately, especially when there are high inflations.

Hence, economic growth in Nigeria will depend on factors operating from within and outside the economy and those related to government policy, infrastructural investment, and even global market conditions. The nuances of measurement are relevant to policymakers and economists seeking to pursue sustainable economic development.

2.1.3. Oil Revenue

Oil revenue in Nigeria refers to the income that emanates from the extraction, production, and sale of crude oil and petroleum products. Being one of the largest oil-producing countries in Africa, oil revenue has become so crucial to Nigeria that a larger share of government income and foreign exchange earnings is received from this industry alone (Nwanna & Ivie, 2017). Most of the revenue comes directly from the sale of crude oil, taxes paid by oil companies, royalties, and dividends paid through state-owned entities such as the Nigerian National Petroleum Corporation-NNPC (Auty, 2001).

On the other hand, over-dependency on oil revenue has made Nigeria prone to certain risks, especially high volatility in world oil prices leading to high revenue instability, hence distorting economic stability and fiscal planning (Ross, 2012). Effective management and utilization of oil revenue are critical for economic development. Research indicates that Nigeria's fiscal policies and governance frameworks significantly influence the efficiency of oil revenue utilization (Alexeev & Conrad, 2009). Issues such as corruption, mismanagement, and inadequate investment in diversified sectors hinder the optimal use of oil revenue to promote sustainable

development (World Bank, 2014). This process, along with ongoing reforming in the oil sector of transparency and enhancing long-term resilience (IMF, 2018).

2.2. Theoretical Framework

2.2.1. Keynesian Theory of Public Expenditure

Keynes's theory of public expenditure shows that government expenditure is a necessary ingredient in speeding up the pace of economic development, particularly in periods of depression. Formulated during the Great Depression of the 1930s by John Maynard Keynes, this theory, in fact, supports an increase in government expenditure in raising aggregate demand to quicken the pace of national income and economic activities. Higher government spending, according to Keynes, may increase consumption and investment, which in turn may generate jobs and economic growth. The theory emphasizes the role of government intervention in the economy through strategic spending to counteract recessions and promote economic stability. This theory presupposes that, within the context of Nigeria, good management and efficient allocation of oil revenue to productive public expenditure would translate into sustainable economic development, given that government income is largely determined by oil revenue. On the other hand, the Resource Curse Hypothesis, otherwise called the Paradox of Plenty, argues that countries endowed with natural resources, especially oil, tend to achieve a lower rate of economic growth compared to countries less endowed with natural resources.

The theory explains that abundance may lead to poor economic performance for a number of reasons that include volatility of revenue, corruption, rent-seeking behaviour, and the negation of other sectors of the economy. In fact, dependence on oil revenues has created economic vulnerabilities in Nigeria through fiscal instability and insufficient diversification of the economy. The above hypothesis underlines the trials of resource wealth management, or so it is considered, besides which factors of economic diversification and effective governance come into play as mitigating factors against adverse resource dependence. This research hopes to use the concept of the Resource Curse Hypothesis to show just how over-reliant the economy is on the oil sector and how inclusive economic reforms are needed in order to attain sustainable economic growth. The theoretical framework on which this study is hinged combines the Keynesian Theory of Public Expenditure with the Resource Curse Hypothesis to offer a broader explanation of how oil revenue relates to government expenditure and economic growth in Nigeria.

2.3. Empirical Review

Although previous studies have indicated that oil revenue contributes significantly to government expenditure between capital and recurrent spending, Akpan (2009) undertakes an empirical review of various key studies on the topic. It examines the dynamic interactions between oil revenue, government expenditure, and economic growth in Nigeria. Several studies reviewed fall within a myriad of methodologies and time periods. This gives an understanding of how oil revenue influences fiscal policy and economic outcomes in Nigeria.

For those, Tubotamuno Boma and Daso 2021 conducted the study on the nexus of oil revenue and government expenditure in Nigeria, covering the period from 1999 to 2019. This paper has examined the relationship that existed between oil revenue and government expenditure. The study also used GMM for an investigation of the dynamic long-run effect of oil on government expenditure in the Nigerian economy. Results from GMM showed the value of oil revenue proxy for oil positively and significantly influenced government expenditure. Concretely, a 1% rise in oil revenue leads to an increase in government expenditure by about 76%. The alternate hypothesis of significant relationship between oil revenue and government expenditure was

accepted. To this end, unit root tests and GMM, among others, were employed to ascertain the magnitude of these impacts. The results indicated that an increase in oil revenue significantly increases total government expenditure. This finding bears important implications for policy formulation. Given the direct relationship between oil and government expenditure, and such significance, the government is called upon to readdress the shares of both capital and recurrent expenditure in total government spending financed by revenue derived from oil.

Abiodun Edward Adelegan & Emmanuel (2020) analyzed and estimated the effects of oil revenue on government expenditure in Nigeria. These are the variables for which data were collected: government expenditure, oil revenue, non-oil revenue, and external debt for 38 years between 1980 and 2018. In order to conduct an investigation into the relationship among these variables, an ARDL developed by Pesaran et al. (2001) was estimated by the OLS technique. From the Augmented Dickey-Fuller test results, it can be observed that at the level, government expenditure, oil revenue, and external debt are stationary; there is also stationarity for the first difference in both non-oil revenue and the exchange rate. Results obtained from the cointegration test using the bounds testing approach indicate that the series in question are co- integrated and thus have a long-run relationship. The results of the long-run estimates indicated that all the regressors had a positive and significant long-run relationship with government expenditure, except external debt, which indicated a positive but insignificant relationship. Short-run effects of oil revenue on government expenditure also showed that all the regressors had a positive and significant relationship. They found that government expenditure is highly responsive, both in the short and long run, to changes in oil revenue, non-oil revenue, external debt, and exchange rate. The study concluded by calling for diversification of the revenue base to attain desirable economic outcomes and reduce overdependence on oil revenue.

Hamdi and Sbia, 2013, "Dynamic relationships between oil revenues, government spending, and economic growth in an oil-dependent economy," provide some bearings on Nigeria from a general perspective between 1980 and 2014. The two authors applied a multivariate cointegration analysis and error-correction model to investigate the relations that exist between oil revenues, government spending, and economic growth in Bahrain between 1960 and 2010. In relation to this work on Nigeria, the analysis of impacts and causality of variables was done using correlation analysis, unit root tests, cointegration, and an ECM, putting into consideration short-run and long-run variability among variables. Hamdi and Sbia established that oil revenues are the main source of government financing in Bahrain, which is relevant to Nigeria since oil constitutes a huge percentage of government revenues. From their findings, it became clear that with increased oil prices, government spending on infrastructure also increases, which means oil revenues and expenditure are positively related. Oil price shocks have traditionally seen spending by the government of Nigeria increase on infrastructure and social spending with high prices, while any low prices lead to reductions in budgets. This seems to be the vicious cycle that points to the sensitivity of government expenditure to the revenues coming from oil.

3. METHODOLOGY

This section describes the methodology used to analyse the link between oil revenue and government expenditure in Nigeria. It describes the data sources, model specifications, and analytical methodologies employed to achieve robust and dependable outcomes.

3.1. Method of Data Analysis

Model Specification

This study uses the Autoregressive Distributed Lag (ARDL) model to investigate the link between oil revenue and government expenditure in Nigeria. The data used for this analysis were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin, which provides reliable and comprehensive economic data on government expenditure, oil revenue, and gross domestic product (GDP). Even when variables are integrated at separate levels, the estimation of both short- and long-term dynamics between them is possible with the help of the ARDL technique, which was created by Pesaran and Shin (1999). The following details apply to the general ARDL (2,2,2) model utilized in this study.

The functional form of the model is expressed as: GEXP = f (OILREV, GDP)

Long-Run Model:

$$log(GEXP)_t = \alpha + \beta_0 log(OILREV)_t + \beta_1 log(OILREV)_{t-1} + \beta_2 log(OILREV)_{t-2} + \gamma_0 log(GDP)_t + \gamma_1 log(GDP)_{t-1} + \gamma_2 log(GDP)_{t-2} + \varepsilon_t$$

Where:

GEXP$_t$ is the log of government expenditure at time *t*,

OILREV$_t$ is the log of oil revenue at time *t*, **GDP** *t* Is the log of gross domestic product at time t $\boldsymbol{\alpha}$ is the constant term,

$\boldsymbol{\beta 0, \beta 1, \beta 2}$ are the coefficients associated with oil revenue,

$\boldsymbol{\gamma 0, \gamma 1, \gamma 2}$ are the coefficients associated with GDP, and $\boldsymbol{\epsilon t}$ is the error term.

The long-run equilibrium link between government spending and its two main explanatory variables oil revenue and GDP is modelled by this equation.

SHORT-RUN MODEL (ERROR CORRECTION MODEL)

The short-run dynamics are captured through the Error Correction Model (ECM), which reflects how changes in oil revenue and GDP influence government expenditure in the short term. The ECM is expressed as:

$$\Delta log(GEXP)_t = \alpha + \Sigma_{i=1}^{2} \beta_i \Delta log(OILREV)_{t-i} + \Sigma_{j=1}^{2} \gamma_j \Delta log(GDP)_{t-j} + \lambda ECM_{t-1} + \varepsilon_t$$

Where:

Δ denotes the first difference of the variables,

$\boldsymbol{\lambda}$ is the coefficient of the error correction term (ECM), which measures the speed of adjustment toward long-run equilibrium, and **ECM**$_{\boldsymbol{t-1}}$ is the error correction term, derived from the long-run model.

4. RESULTS AND DISCUSSION

Table 1: Descriptive Statistics

	GOVT_EXP	OIL_REVENUE	GDP_$_
Mean	3657.582	2549.782	226.6842
Std. Dev.	5900.242	2654.332	169.5025
Skewness	2.142499	0.650431	0.519456
Kurtosis	6.760858	2.204413	1.758888
Jarque-Bera	56.88420	4.069104	4.584471
Probability	0.000000	0.130739	0.101040
Observations	42	42	42

These are the mean values for government expenditure GOVT_EXP = 3,657.58, oil revenue OIL_REVENUE = 2,549.78, and gross domestic product GDP = 226.68. The standard deviations of 5,900.24 for government expenditure and 2,654.33 for oil revenue suggest that the two variables have been very volatile, with government expenditure being at its highest variability level.

From the values of the skewness, it is observed that all the variables are positively skewed, which means right skewed: 2.14 GOVT_EXP, 0.65 OIL_REVENUE, and 0.52 GDP. In general, government expenditure is the most skewed.

Regarding kurtosis, GOVT_EXP has a value of 6.76, hence indicating a sharp peak with heavy tails, therefore outliers or extreme values. While the rest, OIL_REVENUE and GDP, have 2.20 and 1.76, respectively, meaning relatively flatter distribution curves with less extreme values.

From the Jarque-Bera test, it is indicated that GOVT_EXP is not normally distributed with a p-value of 0.0000, while OIL_REVENUE with a p-value of 0.1307 and GDP with a p-value of 0.1010 are closer to normality.

Conclusion: Of the three variables, government expenditure has the highest dispersion, skewness, and departure from normality. Oil revenue and GDP are more consistent in their distributions.

Summary of Unit Root Tests

Test for Stationarity in Variables

The purpose of the unit root evaluation was to verify that the data did not show excessive oscillations and to investigate the stability of the variables in the model. The following is a summary of the unit root assessments' findings:

Table 2: Augmented Dickey Fuller (ADF) Summary of Unit Root Tests

Variable	ADF-Test Statistics	T-Statistics	P- Value	Level	Comment
GEXP	-4.832722	-3.526609	0.0019	1(1)	Stationary
GDP	-4.924575	-3.526609	0.0015	1(1)	Stationary
OREV	-6.514825	-3.526609.	0.0000	1(0)	Stationary

Note: The test includes both Trends and Intercepts and all are at 5% level of significance. Source: Author's Computation using E-views 13, 2024.

Each variable in the model demonstrated stability when using the first difference, as proven by the results of the Augmented Dickey-Fuller (ADF) test, which was statistically significant at the 5% level of significance. As a result, the null hypothesis of a unit root was rejected for all variables tested.

Cointegration Test Result

After running the stationary test, it is critical to determine whether there is a long-run relationship between the time series variables. This is accomplished via a cointegration test, which aids in the reconciliation of short-term fluctuations and reaching convergence. Only variables that are cointegrated are regarded eligible for inclusion in the error correction model, as this allows for more accurate estimation of the error correction process.

Table 3: Cointegration Bound Test

Test	Statistic	Critical Values	Result
F-statistic	3.94	10% (I (0) = 2.84, I (1) = 3.62) 5% (I (0) = 3.43, I (1) = 4.26) 1% (I (0) = 4.77, I (1) = 5.86)	Long-run relationship exists (since F-statistic > critical values at 5%)
Null Hypothesis No levels relationship		Rejected	
Conclusion: There is a long-run relationship between oil revenue and government expenditure in Nigeria			

Source: Authors Computation, 2024 (Eviews-13)

The results of the cointegration test show that in the long run, there is a co-integrating relationship among government expenditure and the explicating variables of oil revenue and GDP. Its F-statistic is 3.94, greater than the critical value at the 5% significant level. Therefore, this rejects the null hypothesis of no cointegration.

Short-Run and Long-Run Dynamics

The ECM produces short-run dynamics that provide ways oil revenue and GDP enter the government expenditure function in the short run during the forecast. The short-run result shows that oil revenue is statistically significant and positively influences government expenditure. The coefficient is 0.2018 with a p-value of 0.0439, which infers that a 1% increase in oil revenue will lead to an increase in government spending of 0.20% in the very period. The lagged value of oil revenue is insignificant, which means the immediate effect of oil revenue is higher as compared to the lagged effect.

For GDP, the current period effect on government expenditure is negative and insignificant, while that one-period lag is positive and statistically significant (coefficient = 0.326, p-value = 0.0133). Therefore, a 1% increase in GDP after one period leads to a 0.33% increase in government expenditure.

However, in the long run, the coefficients of oil revenue and GDP have negative signs and are not statistically significant, which further means that though oil revenue and GDP have significant impacts in a short-run analysis, it is rather weak or less predictable in the long term. This result does imply that policymakers must set up a more effective policy of short-term fiscal adjustments, especially for an economy with high dependency on volatile oil revenues.

Estimation Regression for ARDL-ECM

The Error Correction Model is an important feature of the model, as it captures the rate at which short-run deviations from long-run equilibrium are corrected. The coefficient of the ECM is supposed to be negative and significant, suggesting that short-term shocks to imbalance in government spending are reversed over time. In the course of this study, the ECM term is found to be negative and statistically significant, indicating stability in the system that corrects toward the long-term equilibrium.

Table 4: ARDL Model Results of the Short-Run, Long-Run ECM Dependent Variable: GOVT_EXP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COINTEQ*	0.080992	0.019479	4.157815	0.0002
D(LOG_GOVT_EXP(-1))	-0.273363	0.154588	-1.768333	0.0860
D(LOG_GDP_$_)	-0.222483	0.109880	-2.024790	0.0508
D(LOG_GDP_$_(-1))	0.326027	0.108543	3.003661	0.0050
D(LOG_OIL_REVENUE)	0.201805	0.083117	2.427975	0.0206
D(LOG_OIL_REVENUE(-1))	0.146565	0.082692	1.772407	0.0853
R-squared	0.381733	Mean dependent var		0.190628
Adjusted R-squared	0.290811	S.D. dependent var		0.221008
F-statistic	4.198486	Durbin-Watson stat		2.016331
Prob(F-statistic)	0.004445			

* p-values are incompatible with t-Bounds distribution.

LONG-RUN

Variable *	Coefficient	Std. Error	t-Statistic	Prob.
LOG_GDP_$_(-1)	0.933163	0.988761	0.943770	0.3514
LOG_OIL_REVENUE(-1)	0.756080	0.315044	2.399918	0.0215
C	-5.446971	4.715840	-1.155037	0.2555

Note: Coefficients derived from the CEC regression.

Diagnostic Tests

To determine the robustness of the computed model, the residual was tested for serial correlation and heteroskedasticity. The Breusch-Godfrey Test for Serial Correlation and the Breusch Pagan-Godfrey Test for Variance Inconsistency were used in this study.

Table 5:

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.274740	Prob. F(2,29)	0.7617

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

F-statistic	0.432048	Prob. F(8,31)	0.8926

Source: Authors Computation, 2024 (Eviews-13)

The Breusch-Godfrey Serial Correlation LM test results, as indicated by the resulting p-value of 0.7617 for the F-statistic of 0.274740, suggest that the null hypothesis of "no serial correlation" cannot be rejected.

5. CONCLUSION

This paper considers the dynamic relationship between oil revenue and government expenditure in Nigeria, informing fiscal implications of dependency on oil. The findings from the analysis indicate that the government expenditure significantly responds to a shock in oil revenue, showing that a 1 percent increase in revenue from oil could increase spending by 0.20 percent within the short term. However, this relationship becomes rather weak in the long run, entailing fiscal risks associated with volatile oil prices. GDP is found to be a stable and positive long-term driver of government expenditure, implying that sustained economic growth allows fiscal expansion.

The analysis done shows that Nigeria's fiscal policy is highly responsive to changes in oil revenue, which engenders procyclical spending and, therefore, amplifies economic volatility. In contrast, the long-term positive impact of GDP underlines the need for aligning public spending with the general objectives of economic growth. The study also emphasizes the strength of the model used, validated through diagnostic tests for serial correlation, heteroscedasticity, and stability.

To address this, the study suggests diversification through developing non-oil sectors in Nigeria such as agriculture, technology, and manufacturing. Conducive countercyclical fiscal policies, including stabilization funds and fiscal rules, would be instrumental in weakening the impact of revenue volatility. Investment in infrastructure, education, and health will be key to sustainable GDP growth with increased fiscal capacity. Governance can be enhanced by the implementation of transparent and accountable revenue management systems, coupled with strong data monitoring.

While oil proceeds remain an important determinant of fiscal policy, the volatility of oil revenues substantially denies Nigeria fiscal sustainability. The need to reduce dependence on oil, establish strategic fiscal reforms for long-term economic growth, diversification of revenues, and an inclusive and sustainable development process requires the crafting of an economically viable fiscal framework for Nigeria. These measures remain paramount in establishing resilience and competitively positioning the country for long-term prosperity.

Growth and development. These strategies will position the country for inclusive and resilient economic prosperity amidst a global environment that is becoming increasingly volatile.

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