BUDGET DEFICIT AND INFLATION IN NIGERIA: A CAUSAL RELATIONSHIP

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ABSTRACT

This study examines the direction of causality among the two variables. This is with a view to providing empirical insight into the relationship between budget deficit and inflation rate in Nigeria. Secondary data were used in this study. Data on inflation rate, budget deficit exchange rate, Gross Domestic Product (GDP) trade balance were collected from World Development Indicator (WDI) and Central Bank of Nigeria (CBN) Statistical Bulletin. Granger Causality pair wise test was conducted in determining the causal relationship among the variables. The result showed that there was causal relationship from inflation to budget deficit (F = 6.3, P < 0.005), while there was no causal relationship from budget deficit to inflation was significant (F = 1.2, P > 0.05). This implies that a uni-directional causality from inflation to budget deficit exist in Nigeria. Furthermore, the result showed that inflation affects budget deficit directly and indirectly through fluctuations in exchange rate and balance of trade in the Nigerian economy.

Keywords: budget deficit, consumer price index, exchange rate, gross domestic product, trade balance, time series models.

1. INTRODUCTION

Over the past thirty years, extensive research has been conducted on the relationship between budget deficits and inflation, attracting significant attention in both developed and developing economies. Numerous theoretical and empirical studies have emerged in this field (Pekarski, 2011; Nayab, 2015; Olubiyi & Bolarinwa 2018; Ahmad &Aworinde, 2019; Bayir & Güvenoğlu, 2020; Oyeleke, 2021). Despite the abundance of studies examining the relationship between budget deficits and inflation a clear and widely accepted conclusion remains elusive while some studies such as Oladipo&Akinbobola (2011), Danlami (2019), Ahmad &Aworinde (2019),Kaur (2019), Chukwuani&Egiyi (2020) support the notion that budget deficits contribute to inflationary tendencies, others such as Viera (2000), Bhusal (2013), Abu &Karim (2015), and Austine et al. (2022) raise doubts about the capacity of budget deficits to stimulate inflation

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In the light of the significant challenges posed by increasing inflation, policymakers have focused on minimizing inflationary pressures. Consequently, research efforts have been directed towards understanding the factors that contribute to inflation (Loungani&Swagel, 2001; Doan, 2019; Okeke et al., 2022). One prominent factor identified in the literature is the budget deficit. Many developing countries, including Nigeria, often experience a shortfall in government revenue compared to expenditures due to limited funds. This leads to fiscal deficit financing, where governments resort to borrowing to cover the revenue gap. The resulting increase in money supply, induced by government borrowing, is considered a significant driver of inflationary pressure in these countries. Various studies, such as those conducted by Arjomand et al (2016), and Oluwole et al (2020), support this viewpoint.

In Nigeria, like many other developing nations, inflation poses a significant challenge to the economy (World Bank, 2021; International Monetary Fund (IMF), 2023a). Structural bottlenecks, such as heavy reliance on crude oil, low levels of industrialization, a limited tax base, and tax evasion, constrain the fiscal capacity of the Nigerian government (IMF, 2023b). Since the structural adjustment programme (SAP) implemented in 1986, Nigeria has consistently experienced budget deficits, often accompanied by double-digit inflation rates during most periods (Nwaeke&Korgbeelo, 2016; Ifeanyi&Umeh, 2019; CBN Statistical Bulletin, 2020). An analysis of Nigeria's budget history since 1981 reveals persistent budget deficits and inflation, except for the years 1994 and 1995 (CBN Statistical Bulletin, 2020).

While there is a general upward trend observed in both budget deficits and inflation in Nigeria, it is crucial to accurately determine the nature of the relationship between these variables, given the challenges faced by a developing economy like Nigeria, characterized by limited public resources, persistent price instability, and low growth (World Bank, 2022; IMF, 2022). An accurate evaluation of the nexus between budget deficits and inflation will provide a clear framework for formulating and assessing policy outcomes. However, the existing literature on the relationship between budget deficits and inflation in Nigeria presents divergent findings. While Oladipo&Akinbobola (2011) and Olaniyi (2020) support the notion that budget deficits contribute to inflation, Aliyu&Englama (2009) refute this claim. Furthermore, the recent interest in the budget deficits depends on the mode of fiscal deficit financing adopted (Ishaq&Mohsin, 2015). Therefore, this study aims to contribute to the existing literature by examining the trends and causal relationship between budget deficits and inflation.

2. Literature Review

Oladipo and Akinbobola (2011) examined the relationship between budget deficit and other macroeconomic variables in Nigeria. They utilized annual time series data from 1971 to 2005 obtained from the Central Bank of Nigeria statistical Bulletin and the International Financial Statistics database. The study employed the pair-wise Granger causality test to assess causality. The findings indicated a unidirectional causality running from budget deficit to inflation in the long run. Additionally, they found an indirect effect of budget deficit on inflation, whereby budget deficit led to exchange rate fluctuations, which in turn contributed to an increase in the inflation rate in Nigeria.

Lin and Chu (2013) employed the dynamic panel quantile regression (DPQR) model of the autoregressive distributional lag (ARDL) specification to analyze the direction of causality between budget deficits and inflation in 91 countries from 1960 to 2006. Their results revealed that the fiscal deficit had a significant impact on inflation, particularly during periods of high inflation, while a weak impact was observed during periods of low inflation. While Viera (2000) investigated the inflationary effect of central government deficits in six European Union members (Belgium, France, Germany, Italy, Netherlands, and the UK) using annual time series data from 1975 to 2000. The study employed the ARDL Bounds test approach to examine the long-run relationship and Granger causality analysis to confirm the direction of causality. The results did not support the hypothesis that deficits are inflationary, aligning with the findings of Burdekin and Wohar (1990) who analyzed the relationship between budget deficits and money growth in eight developed countries.

Jayaraman and Chen (2013) examined the relationship between budget deficits and inflation in four Pacific Island countries using the Wester-Lund error correction based panel cointegration test procedure. Their findings confirmed a strong, direct relationship between budget deficits and inflation in all the studied countries. In the vein, Muhammad et al. (2016) used the ARDL Bounds Test approach to explore the link between budget deficit and inflation in Pakistan using annual time series data from 1973 to 2014. The findings indicated a positive association between budget deficit and inflation.

Khumalo (2013) examined the nexus between inflation and budget deficit in South Africa from 1980 to 2012 using the Vector Auto Regression (VAR) model and Granger causality. The results showed a significant positive relationship between the two variables, with causality running in both directions. While Lawanga and Mawejje (2014) aimed to understand the multidimensional impacts of budget deficit on key macroeconomic indicators in Uganda, they analyzed annual time series data from 1999 to 2011 and employed VECM, pair-wise Granger causality analysis, and variance decomposition tools. The results revealed a unidirectional causality from inflation to budget deficit and from budget deficit to lending interest rates. They also suggested an indirect effect of budget deficit on money supply through lending interest rates.

Ehinomen and Ugwu (2017) investigated the relationship between budget deficit, inflation, and money supply growth in Nigeria from 1970 to 2014. They used the Vector Auto Regression (VAR) specification and Johansen cointegration test procedure. The study found that except in the long term, funding capital projects with budget deficits did not lead to inflation or excessive money supply in the short run if poorly managed. In the same vein, Akinmulegun (2014) employed the econometric technique of Vector Auto Regression (VAR) Model to study deficit financing, inflation and its effect on economic growth in Nigeria. Previous investigations reviewed found an inverse effect of budget deficits on inflation and fiscal deficit in Nigeria from 1970 to 2010. The empirical results showed that although fiscal deficit causes inflation, there was no feedback between inflation and fiscal deficit deflated by the GDP. The structural model of inflation revealed that it takes about two years for the fiscal deficit to impact on inflation in Nigeria.

Dockery et al. (2012), using a modeling approach that incorporates the theory of co-integration and its implied vector error correction model, determined the long-term relationship between fiscal deficit and inflation for Nigeria. The empirical results indicated a positive but insignificant relationship between fiscal deficit and inflation. While Akinmulegun (2014) studied deficit financing, inflation, and their effect on economic growth in Nigeria, using the Vector Auto Regression (VAR) model. Previous investigations reviewed in the study indicated an inverse effect of budget deficits on inflation and economic growth.

Ahmad and Aworinde (2019) looked into the connection between budget deficits and inflation in a sample of 12 African nations between 1980 quarter 1 and 2018 quarter 4. The countries include Botswana, Cameroon, Egypt, Ethiopia, Ghana, Kenya, Morocco, Nigeria, South Africa, Tanzania, Tunisia, and Uganda. The budget deficits and inflation were compared using Enders and Siklos (2001) Threshold Autoregressive (TAR) and Momentum-Threshold Autoregressive (M-TAR) tests due to its suitability to some factors embedded in African economies. The findings show that there is a long run relationship between fiscal deficits and inflation in all the countries economy, highlighting the significance of fiscal consolidation. Nabatov (2022) examined the relationship between money supply, budget deficits, and the inflation rate in Azerbaijan between 2009 and 2019. The study employed the Granger method of causality to empirically define the relationships between the supply of money, budget deficits, and inflation. The results suggest that there is one-way causality from the supply of money and the budget deficit to inflation. There is also a one-way causal link between the supply of money and the budget deficit.

Kaur (2018) using annual data for India from 1970–1971 to 2014–2015, investigates the equilibrium relationship between the fiscal deficit, money supply, exchange rate, and inflation. The Johansen cointegration technique, which verifies the presence and quantity of cointegrating vectors, served as the analysis' econometric framework. Granger causality tests have been used to examine short-term causality. The findings indicate a long-term connection between the fiscal deficit, money supply, exchange rate instability, and inflation whereas; Granger causality tests do not confirm the causality running from fiscal deficit to inflation. Lawanga and Mawejje (2014) examine using annual time series data stemming across 1999 and 2011. Empirical interests in this paper were the direct association between budget deficit and inflation and the indirect impact of budget deficit on money supply via the lending interest rate mechanism. The authors incorporated VECM, pair-wise Granger causality analysis and variance decomposition tools to examine these relationships. The results confirmed a unidirectional causality running from inflation to budget deficit.

3. Data, Specification and Methodology

3.1 Theoretical Framework

The theoretical framework of this study is based on the monetarist quantity theory of money (MQTM), which has been widely used for explaining the relationship between inflation and the increase in nominal money supply. The MQTM posits that the general price level is determined by the nominal money supply. In line with previous studies such as Ishaq&Moshin (2015) and Sunge&Makamba (2020), this study adopts the MQTM to investigate the causal relationship between inflation and budget deficit in Nigeria. The

MQTM argues that there is a functional relationship between the growth in money supply (Ms) and changes in the general price level (ΔP).

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$$\Delta P = f(M_s)$$
 (1)
The monetarist school, led by Milton Friedman, contends that budget deficits can contribute
to an increase in the general price level by expanding the money supply. The monetarists
argue that regardless of the method used by the monetary authority to finance the budget
deficit, it will affect the nominal money supply and, consequently, the general price level.
Friedman famously stated that inflation is always and everywhere a monetary phenomenon.
Thus, $\Delta M_s = f(BD)$ (2)

Therefore, the study proposes that an increase in the budget deficit (BD) leads to an increase in the money supply (Δ Ms), which in turn leads to inflation (INF). This occurs when there is an increase in money supply without a corresponding increase in output growth, causing a reduction in the marginal value of money. As a result, the purchasing power of the currency decreases, leading to rising prices of goods and services and ultimately resulting in inflation. Δ M_s= INF = f(BD) (3)

3.2 Model Specification

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In specifying the model for this study, this research will adopt the work of Solomon and Wet (2004). The model takes the following functional form;

INF = f(BD, EXR, GDP, TB) (4)

Where the dependent variable INF represents the measure of inflation while the principal independent variable, budget deficit is denoted by BD. Macroeconomic variable including exchange rate (EXR), economic growth proxy by gross domestic product (GDP) and trade balance (TB) will be included as control variables to account for other determinants of inflation. This is important to mitigate the problem of misspecification error in the model. The choice control variables are based on recommendation from existing literature (Adetunji et al., 2012; Alexander et al., 2015; Inim et al., 2020). This study source annual secondary data from World Bank's World Development Indicators (WDI) 2021 and the Statistical Bulletin of Central Bank of Nigeria (CBN). The data span through forty (40) years from 1981 to 2020.

3.3 Methodology

To determine the direction of causality among the variables, an initial analysis is conducted using the Granger-causality test. The Granger causality test examines whether a stationary variable x can be considered a cause for another stationary variable y. It assesses whether y can be predicted more accurately by considering the past changes of both x and y, rather than solely relying on the past changes of y (Omanukwue, 2010). In this study, a bivariate autoregressive standard Granger causality model is presented to examine the causal relationship between the variables.

The Granger Causality Test was carried out specified by the Granger Representation Theorem (GRT) (Khalid and Guan, 1999; Arinze and Malindretos, 2008, Oladipo and Akinbobola 2011). The question of which one causes the other, using the test is embedded in the time series data of the variables. The test involved estimating of the following pair of regressions: For simplicity, taken (INF, BD, EXR, GDP, TB) to be c, b, x, y and z respectively

$$C_{t} = \sum_{i=1}^{n} \alpha_{i} Q_{t-1} + \sum_{i=1}^{n} \beta_{i} C_{t-1} + \mu_{1t}$$
(5)
$$Q_{t} = \sum_{i=1}^{n} \varphi_{i} Q_{t-1} + \sum_{i=1}^{n} \rho_{i} C_{t-1} + \mu_{2t}$$
(6)

Where it assumed that the disturbance μ_{1t} and μ_{2t} are uncorrelated and Q (b, x, y, z).

4. Result and Discussion

4.1 Appraising the trends of budget deficits and inflation in Nigeria over the study period

4.1 Trends of Inflation Rate and Budget Deficit in Nigeria



Figure 4.1 Trends of Inflation Rate and Budget Deficit

The factors that have demonstrated constant barriers and unbeatable hindrance to the sustainability of higher growth and well-being in the case of Nigeria, the rapid increase in prices and budget deficit are constantly showing at the top for years now. Inflation as measured by this study (consumer price index) indicating the annual percentage change in the cost of consumer's average of acquiring a measure of goods and services that may be steady or adjust at particular period, such as yearly while the budget deficit is measure by the value when government expenditures exceeds their revenue through income from tax and other sources. This is based on the available data from World Development Indicators (WDI) and (CBN) Statistical Bulletin (2021), for Inflation rate (consumer price index) and Budget deficit respectively.

The graph in figure 4.1, 4.2 and 4.3 shows both the individual trend analysis and the combination of both variables in Nigeria from 1981 to 2020. In 1981 the World Bank report provided the systematic position for accomplishing the Structural Adjustment Policies known as SAP's in Africa. This was also the period of the 4th five years rolling national development plan before the persuasion of international economic expert to relinquish the rolling plan, in favour of SAP (Olomola 2011), during this time the inflation rate was at 20.81% while budget deficit stands at over 3.9 billion naira, the rate of inflation drop drastically in 1982 but Budget deficit increase from 3.9 billion to over 6.1 billion in the same period. However, Inflation rate drop drastically yet again by 10% in 1985, this period was associated with stagnation and

degenerated economic condition that was due to unsuitable policy involvement by the government.



Figure 4.2: Trends of Inflation Rate in Nigeria

The World Bank report gave birth to the launching and implementation of SAP in July 1986 as representation of macroeconomic policies targeted at overhauling the weak economy. The country reforms her trade policies, foreign exchange systems, and business and agricultural regulations. (Jamali&Anka, 2011) However, both the inflation rate and budget deficit surge high between the 8 years of adoption of structural adjustment plan, inflation moving from 5.71% in 1986 to 54.51% and 50.46 in 1988 and 1989 respectively while budget deficit from over 8 billion in 1986 to over 39 billion in 1992 which shows that the structural adjustment plan was not delivering to its juicy promises.



Figure 4.3: Trends of Budget Deficit in Nigeria

Despite the obvious numerous failure of the Structural Adjustment Plan, some of which were unendurable to the people, some gain were unquestionably recorded. However, the plan

brought about indigenous inflation, shortage of foreign exchange, reduction in employment opportunity and under capacity utilisation of budget deficit etc (Olomola 2010, Bakare&Fawehinmi 2011). The dual exchange regime was launched in 1995 to redirect the persistent domestic currency depreciation so as to stabilise and achieve realistic value for the domestic currency (Olomola 2011). In this period, inflation present a substantial problem increase from 57.03% in 1994 to outrageous 72.83% in 1995, but fell in to 29% in 1996 which was still quite high. However, it reduces drastically to 8.52% in 1997 and increase slightly to 9.99% in 1998 while fiscal authority of the country record 70 billion of deficit budget in 1994. However, between the next two years of dual exchange, budget deficit was zero with 1 billion and 32 billion of surplus budgets in 1995 and 1996 respectively. This indicates the only years Nigeria fiscal authority record surplus within the study period.

The period of 1999 to 2010 indicate the return of domestic administration and public sector reform which is also a time of continuous domestic administration in Nigeria. The administration which began in 1999 was faced with failure which occurs as a result of economic mismanagement and inconsistency of the previous government. This administration witness some developmental reforms ranging from National Economic Empowerment and Development Strategy (NEEDS) launched in 2003 that was layout to re-evaluate government role, design an facilitating environment for sustainable growth of the private sector, ameliorate social service delivery, encourage competition among local industries, and establishing a new value structure (Olomola 2011, Stephen &Obah, 2017). In this period the inflation rate was below 15% except for 2005 when it was recorded to be 17.86% while the country witnesses a staggering increase in budget deficit at this period from just 5 billion in to 1997 to over 800 billion in 2009.

Furthermore, the period of 2011 to 2020 indicate the period of continuous democratic government, even as there was a major political change in 2015 at the federal tier of government. Within these years the inflation remains below 17% while budget deficit hit over 4 trillion and 6 trillion naira in 2019 and 2020 respectively as shown in figure 4.1, 4.2 and 4.3 which was far beyond the previous period reviewed in this study.

4.2 **Empirical Results**

Time Series Properties of the Data

Table 4.1 below presents the estimates of the Augmented Dickey Fuller (ADF) test. Evidence from the results shown in the table, confirmed that inflation (INF), log of budget deficit (LNBD) and trade balance (TD) were stationary at levels at 5% level of significance with intercept while effective exchange rate (EXR) and log of gross domestic product (LNGDP) are stationary after first difference since the series were integrated of order one i.e. I (1) at five percent level of significance

Level		First Difference			
Variables	Intercept	Trend &Intercept	Intercept	Trend & Intercept	
INF	0.048**		_		
LNBD	0.013**	-	-	-	
EXR	0.250	0.570	0.002***	-	
LNGDP	0.187	0.606	0.002***	-	
ТВ	0.010***	-	-	-	

Table 4.1: Unit Root Test using Augmented Dickey-Fuller Test

Note(s): ***, **, * denote levels of significance at 1%, 5% and 10% respectively **Source: Author's computation, 2023**

Pesaran, Shin and Smith Co-Integration Test

Since the variables in the in the model for objective two were of I(0) and I(1) order of integration, it is important to test for the existence of long-run relationship between the variables in the model. However, to be able to ascertain whether there is contegration among variable of interest, it is important to first determine the optimal lag length of variables to be used.

From table 4.2 below, the Akaike Criteria (AC) and Schwarz Bayesian Criteria (SBC) have indicated that the optimal lag structure for the VAR model, upon which the co-integration analysis is conducted, is one. This means that including one lagged values of the variables in the VAR model provides a good trade-off between model fit and complexity

Information	Akaike Criteria	Schwarz Bayesian Criteria	
Criteria (IC)	(AC)	(SBC)	
1	81.22	82.52	
2	81.29	83.68	
3	80.75	84.24	
Р	3	1	

Table 4.2: Determination of Optimal Lag Length

Note: <code>opticates</code> the lag length to use for Cointegration test **Source:** Author's computation, 2023

To check for this, Pesaran, Shin and Smith (2001) co-integration test was employed. Based on the modified F critical value i.e. lower bound and upper bound at 2.5% and 5% significant level would be compared with calculated F-statistics. The decision criteria used state "the null

hypothesis of no presence of co-integration". This would be rejected if and only if the computed F-statistics is more than the upper bound. The study fails to reject the null hypothesis of no presence of cointegration, if and only if the computed F-statistics is lesser than the lower bound. Moreover, if the computed F-statistics falls between the lower bound and upper bound, then the test shall be declared inconclusive. The result of the bounds test showed that the F-statistic value of 4.595933, which is higher than the upper bound (I(1)) critical values of 4.49 and 4.01 respectively at 2.5% and 5% significance level. Hence, the study reject the null hypothesis i.e. there exit long-run relationship between the variables.

Estimated Model	F-Statistics	Co-integration
F(INF, BD, EXR, RGDP, TB)	4.595933	Co-integration
Critical Values	Lower Bound	Upper Bound
2.5%	3.25	4.49
5%	2.86	4.01

Table 4.3: Co-integration Test

Source: Author's computation (2023)

The results of the co-integration analysis presented in Table 4.3 indicate that there is at most one co-integration relationship among the macroeconomic variables considered in the model. Specifically, the test suggests that inflation maintains an equilibrium condition with budget deficit, exchange rate, real GDP, trade balance. This suggests that these variables are interrelated and move together in the long run. In summary, the co-integration results in Table 4.3 confirm the presence of a single co-integration relationship among the macroeconomic variables studied, specifically between inflation, budget deficit, exchange rate, real GDP, trade balance. This finding helps establish a long-term proportional relationship between these variables, indicating that changes in one variable will have an impact on the others. However, a indicated by Oladipo and Akinbobola (2011), caution should be exercised when inferring causal relationships solely based on co-integration analysis.

Granger-Causality Test

In table 4.4, the study fail to reject the null hypothesis which state that, "reject the null hypothesis when the probability value is less than 0.05" which implies that Budget deficit, exchange rate, gross domestic product and trade balance do not have a causal effect on inflation rate in Nigeria while inflation have causal effect on budget deficit but it does not have relationship between other variables in the model. From the result below, it was reported that there exist a strong unidirectional causality running from inflation to budget deficit at 1% significant level as F-statistics (P- value) 6.3374 (0.0047). This finding does not conforms to a-priori expectations and corroborates the view of Oladipo and Akinbobola (2011); Awe and Olalere (2012), But the study accept the view of Viera (2000), Bhusal (2013), Abu &Karim (2015), and Austine et al. (2022) that raises doubts about the capacity of budget deficits to stimulate inflation.

Null Hypothesis:	Obs	F-Statistic	Prob.
BD does not Granger Cause INF	38	1.24389	0.3014
INF does not Granger Cause BD		6.33743	0.0047
EXR does not Granger Cause INF	38	1.56947	0.2233
INF does not Granger Cause EXR		0.45497	0.6384
LNGDP does not Granger Cause INF	38	2.5247	0.0954
INF does not Granger Cause LNGDP		0.62336	0.5423
TB does not Granger Cause INF	38	0.46477	0.6323
INF does not Granger Cause TB		0.03828	0.9625

Table 4.4: Results of the Pairwise Granger Causality Tests

Source: Author's computation, 2023

5. Conclusion and Policy Implications

5.1 Conclusion

The study investigates the relative causal relationship between budget deficits and inflation as well as appraises the trend of both variables in Nigeria from 1981 to 2020. The appraiser shows that, policy measures and economic conditions in Nigeria significantly impact both inflation and fiscal deficit. Secondly, it was revealed that there exists a long run relationship between the variables. In addition, there exists a unidirectional flow of causal relationship running from inflation to budget deficit, that is, for every change in inflation, budget deficit change in Nigeria.

5.2 Recommendations

Based on the findings of this study, the following recommendations are suggested:

- 1. Policymakers should prioritize the monitoring and control of fiscal deficits. This can be achieved through the promotion of fiscal discipline and measures to reduce the size of the government. By implementing responsible fiscal policies, policymakers can effectively manage deficits and mitigate their impact on inflation.
- 2. The government should make concerted efforts to mobilize funds by expanding the tax base and improving tax administration. This can involve implementing measures to increase tax compliance, reducing tax evasion, and enhancing overall tax collection efficiency.
- 3. Diversifying the economy and reducing dependence on oil revenue should be a key focus for the government. By diversifying the sources of government revenue, Nigeria can become less vulnerable to fluctuations in oil prices and market conditions. This can be achieved by promoting other sectors such as agriculture, manufacturing, services, and attracting foreign direct investment (FDI). A diversified economy will contribute to sustainable revenue generation and reduce the reliance on budget deficits.

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