Original Research Article

Effect of Interest Rate Spread on Output Gap in Nigeria (A Var Granger Causality Analysis)

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Abstract: This study examines the effect of interest rate spread on the output gap of Nigeria by using monthly data on the output gap, interest rate spread, foreign direct investment, federal government expenditure, and inflation covering the period of M12010 to M12 2022. Employing the var granger causality model, the result shows that interest rate spread does not granger cause the output gap in Nigeria. Also, variables such as federal government expenditure, foreign direct investment, and inflation do not granger-cause Nigeria's output gap. Given these findings, policy implications were derived.
Keywords: Interest rate spread, output gap, var granger causality test.
JEL Classification: C51, D53, E40

1. INTRODUCTION

The output gap signals the dynamics of the performance of an economy. It reveals the difference between the potential and actual gross domestic product (GDP) of an economy. A scenario where actual output exceeds its potential is indicative that the demand for goods and services exceeds supply, thus, inflationary pressures might likely be triggered. Conversely, when potential GDP exceeds its actual, it suggests that the supply of goods and services exceeds demand. As a result, this might engender a slowdown in production and a reduction in the employment level of the economy. It is imperative to explore the determinants of output gap to channel the right policies towards addressing the challenges the economy is confronted with. Among many determinants of output gap in the literature are; interest rate, inflation, trade openness, and exchange rate. As one of the major transmission channels of monetary policy, interest rate comprises the lending rate and deposit rate, which often refer to the cost of borrowing, and the income on depositing with commercial banks, respectively.

The interest rate determines the level of savings and investment in an economy. The interest charged on loans serves as income to banks, and at the same time, it represents the cost borne by customers for borrowing money. On the other side, the rates of interest on deposit is the amount of funds the bank is presumed to pay to customers; it also represents reward received by customers in exchange for retaining deposits with banks. The difference between interest on loans and deposit interest rate from all banking schemes is called interest rate spread (IRS) (Jamil and Shubiri, 2017). The spread together with other key variables influence macroeconomic stability and the overall output of an economy. As a business entity, a commercial bank would charge a lending rate higher than the deposit interest rate in order to compensate for risk, and to earn a margin of profit, which is instrumental to business the continuity and the overall health of the bank as a business unit, and financial system stability generally. This is a pointer to the sensitivity of interest rate spread, being a major determining factor of income and employment.

Thus, the nexus between output gap and interest rate spread is that interest rate spread is a key determinant of banks' continuity, and banks play a major role in financial intermediation, thereby generating investment, employment and economic growth.

According to CBN (2020), total asset of Other Depository Corporations as at 2020 stood at ₦54,579.73. Accordingly, commercial and merchant banks accounted for total assets of ₦52, 966.04, while Non Interest banks account for ₦300.15, Micro Finance Banks amounted to ₦1,010.22 and Primary Mortgage Banks was ₦303.32, implying that over 60 percent of the total asset of Other Depository Corporations constitutes assets of commercial banks. This is suggestive that in the Nigerian financial sector, Deposit Money Banks play the most significant role in financial intermediation. Thus, the banking sector is instrumental in the drive towards growth and development of the Nigerian economy, notwithstanding, a major challenge in its operation is the quest for higher rate on lending and the payment of lower rate on deposit. According to Zuzana & Tigran (2008), high interest margins is an impediment to financial deepening, as lower deposit rates deflate savings, and excessive loan rates discourages investment. Thus, banks are expected to carry out intermediation roles at the cheapest cost possible for the promotion of economic growth.

Given the relevance of the banking sector in promoting economic growth and development, studying the relationship between interest rate spread and output gap comes in handy, especially at a time of sluggish growth as a result of the impact of the 2015/2016 recession, and the COVID 19 pandemic. According to Falwewo & Tennant (2008), the research of interest rate spread is dominant in many ways, due to the significant relationship between the intermediation efficiency and interest rate spread. The broader the interest rate spread, the greater the inefficiency in the banking system, and vice-versa. The implication of this especially for a developing economy like Nigeria is that savings and investment would decrease, with the attendant detrimental effect on growth and development.

As the main regulatory body responsible for the control of money supply, the policy actions of the central bank have great impact on the activities of commercial banks, through the interest rate channel. The attributes of warfare among banks in the market relies on the working policy rate of the Central Bank. According to Chirwa (2001), the lower the interest rate margin of commercial banks, the more efficient, the stimulating role of the Central Bank through the supply of money. Although studies abound on the relationship between interest rate and economic growth, the relationship between output gap and interest rate spread is a grey area within the Nigerian context. Most studies on this subject dwell on the catalysts of interest rate spread, output gap, and the affiliation between interest rate and GDP. Following this introduction, Section 2 dwells on the literature review, Section 3 presents some stylized facts, while Section 4 discusses the methodology and results. Conclusion and recommendations are captured in Section 5.

2. LITERATURE REVIEW
2.1 Theoretical Literature
A key theory that explains the nature of Bank's interest rate margin is the Model of Bank Dealership developed by HO and Saunders (1981). The theory advocates that the volume of bank interest margins is interpreted on the basis of uncertainties concurrent with deposit and loan markets, fibbing behavior, and habitual utility maximization (Daniel, Yonas and Milcah, 2012). This implies that the bank, being an institution that is instrumental in financial intermediation also considers possible risks associated with the issuance of loans to customers. Thus, the behavior of commercial banks in managing risk in order to maximize profit and ensure business continuity determines interest rate spread in the banking sector. Banks engage in these to bridge the gap between loans and deposits, which come at an inconsistent manner. This brings about uncertainties in the banking sector, especially on bank's inventories, hence the nature of interest rate spread goes a long way reducing the effect in banking sector productivity.

From a broader perspective, the Neo Classical Production Function theory also emphasizes the relationship between interest rate and output. The Production Function Approach, which is considered an approach used in measuring potential output advocates that firms consider public capital as an unpaid factor of production when maximizing profit. The output is termed to be a function of capital (k); that is both private and public, input of Labour (L), multifactor productivity MFP_t. Functionally, this could be estimated as:

$$Y = MFP_{(t)} F (K, L, G) \dots\dots\dots\dots\dots (1)$$

It is worthy of note that embedded in capital is interest rate, thus, the manipulation of interest rate affects economic growth in line with changing dynamics around investment. This estimate is a generated parameter from Cobb-Douglas (1928), who theorized that output is a combination of labour, capital and technical changes in an economy.

2.2 Empirical Literature

Most literature on the determinants of output gap identified interest rate as a key determinant. Thus, interest rate, being a contributing factor determines stability in the banking sector, and thus, crucial for banking sector continuity. Consequently, given the relevance of interest rate spread and output gap, investigating their relationship has recently gained attention among scholars and policy managers. Interest rate spread and output gap are key determinants of financial sector stability and economic growth. There are available studies on the determinants of interest rate spread, determinants of output gap, and the relationship between interest rate spread and selected macro-economic variables (Saadia *et al.,* (2009; Adisu, 2012; Njuguna *et al.,* 2005). These studies used various econometric techniques, with the aim of influencing policy decisions in the financial sector, and to foster output growth. Interest rate has been identified as a major determinant of output gap by most authors; this attribute has influenced our study of interest rate spread, as the significance of interest rate policies is determined by the nature of spread in the banking sector. The literature in this study are presented in three unique strands. The first strand encapsulates the determinants of output gap, the second strand presents the determinants of interest rate spread, and the third strand captures the relationship between interest rate spread and output gap.

For instance, Saadia, Faiza and Naheed (2009) estimated the output gap and factors responsible for such gap in Pakistan. The study utilized the production function (PF) approach and a regression model to investigate the relationship between output gap and selected macroeconomic variables using time series data from 1964 – 2005. Findings revealed that the major factors influencing output gap in the Pakistan, the major factors influencing output gap are import and money supply, while public sector investment and export reduce the gap. In the same vein, Adisu (2021) estimated the output gap of Ethiopia using the production function (PF) approach and the Hodrick Prescott (HP) filtering in order to determine the output trend. Time series data sourced from Ethiopian Bank and the World Bank database for the period 1990 to 2018 was employed. To investigate the determinants of output gap, the ARDL model was utilized on gross domestic product (GDP), labour, capital stock, trade openness, inflation, lending rate and foreign direct investment (FDI). The result indicated that output gap exhibited an inconsistent trend, especially between 1996 and 2003. This implies that during the study period, there was a mismatch between actual and potential output. In addition, findings from the ARDL model revealed that lending rate and trade openness have positive

and significant effect, whereas inflation and foreign direct investment (FDI) revealed a negative and significant effect on the output gap in Ethiopia. Thus, improvement in domestic production and the lowering of lending rate were recommended to reduce the gap. In an earlier study by Felipe, *et al.*, (2015), the scope of the study was narrowed by estimating the potential output growth for the G-5 countries and for 10 high- and middle-income Asian economies. Given that financial variables are determining factors of output gap, a multivariate model was utilized by considering changes in real credit, property prices, and real interest rate. Findings of the study showed a positive and significant effect of financial factors on the output gap of the G-5 and high-income Asian economies. However the effects were found to be minimal for the middle-income Asian economies. In a study on the Kenyan economy, Njuguna *et al.*, (2005) estimated potential and output gap using various statistical detrending method, and the estimation of structural relationships. These include the Hodrick-Prescott Filter, Unobserved Components Methods, Linear Method, Structural Vector Auto Regression (VAR) method and the Production Function Method. Findings of the study dwelled on the result from the HP approach, which revealed contraction in the Kenyan economy in the recent years, and a decline in output growth. In line with the aforementioned authors, Emmanuel *et al.*, (2019) studied the behavior of potential output and output Gap for the Namibian economy by utilizing annual data ranging from 1980 to 2016. The Hodrick – Prescott (HP) Filter method and Production Function Approach was utilized for the study and findings showed that average growth rate of potential output has been fluctuating during the period under review, while potential output estimate was smooth and stable throughout the study period.

Employing panel data covering the period 2000 to 2009, cutting across 44 banks in Kenya, Tarus *et al.*, (2012) using panel data covering the period 2000 to 2009, examined the determinants of net interest margins of commercial banks in Kenya using panel data. The research applied pooled and fixed effects regression and the results revealed that operating expenses and credit risk have a positive and significant effect on net interest margin of commercial banks in Kenya. In a similar study using a fixed effect model for the Namibian economy, Muine and Essau (2013) employed panel data from 2004 to 2011 for four commercial banks to determine the variables that influence interest rate spread in Namibia. The variables utilized for the study are interest rate spread, excess liquidity, non-performing loans, bank's core capital, tax paid by commercial banks, deposit market share and operating cost. The study applied the Ordinary Least Square (OLS)

technique and found out that deposit market share, liquidity levels and operating costs are the trough determinants of interest rate spread in Namibia. Furthermore, deposit market share and operating costs reduce net interest margin, while liquidity levels of commercial banks increase its net interest margin. However, non-performing loans, tax paid by banks and the capital ratio were found to be insignificant in the determinants of net interest margin.

Shubiri and Jamil (2017) investigated the contributing factors of interest rate spread for the economy of Oman over the period 2008 to 2014 using four market indicators, namely; financial, economic, and legal and market indicators. Thus, four models were developed, with each capturing the variables that fall under the four categories of indicators. The study utilized the Spearman Correlation Matrix (SCM) and found that interest rate spread has significant relationship with market indicators and all the economic indicators utilized for the study, except GDP. Further findings showed that no significant relationship exists between financial indicators and interest rate spread. However, two legal indicators (size of government and regulation) revealed a significant relationship. Thus, to provide a margin competitive interest rate, the study recommended that the monetary authorities of Oman should implement monetary policy that can improve easy access to credit for individuals, as well as firms. In another study by Gabriele *et al.*, (2019) on the determinants of net interest margin in the euro area during and after the global financial crises, using annual balance sheet data of individual banks for the period 2008–2014 and a Dynamic Panel Model, the result revealed that sustainable profitability of banks is vulnerable during the period, although it was curtailed by the European Central Bank's recent monetary policy.

Several authors also investigated the relationship between interest rate spread and some selected macroeconomic variables and indicators, dwelling specifically on the financial sector. These include Oke *et al.*, (2020) who investigated the nexus between corporate bond market development and interest rate spread in selected African economies using Co – integration analysis. The study utilized data for thirteen countries which include; Botswana, Egypt Mauritius Nigeria, Tunisia, Cameroon, Kenya, Morocco, South Africa, Cote d'Ivoire, Ghana, Namibia and Tanzania, from 2004 to 2014. Utilizing the Autoregressive Distributive Lag (ARDL) model, findings revealed that in the short and long run, interest rate gap negatively affected corporate bond issue during the study period. Thus, the authors suggested a contraction in interest rate and the spread in order to boost the expansion/growth of

corporate bond issues for a market-led financial development. Dwelling on Sub Saharan Africa, Mohamed and Yao (2017) examined the nexus between financial deepening, interest rate spread and economic growth. To estimate the parameters, the study employed a dynamic panel approach and the result showed that interest rate spread has negative impact on growth, while financial deepening is key determinant of economic growth. In view of this, the study recommended policies targeted at the reduction of interest rate spread in order to increase financial deepening. Further studies were also carried out by Quayyum *et al.*, (2020) to investigate the nexus between interest rate gap and output gap as indicators of inflation. By utilizing the ARDL model, the study tested the Keynesian and Wicksellian proposition for the economy of Pakistan using data covering 1974Q1 to 2017Q4. The results revealed that in the short run, there exist an insignificant relationship between inflation and interest rate gap, while a significant relationship was found between inflation and output gap. However, a long run co-integration was observed among the three variables. TSE (1998) also explored the link between interest rate spread and Gross Domestic Product (GDP) with an eye to predicting real economic for the Singaporean economy. Findings showed that the paper bill spread has a significant predictive power for future economic growth in Singapore.

Most literature within the context of Nigeria dwelt on the determinants of interest rate spread and output gap. These include; Akinlo and Owoyemi (2012) who utilized 12 commercial banks during the period 1986 – 2007 to investigate the determinants of interest rate spreads in Nigeria using panel. Results showed that, average loans to average total deposits, cash reserve requirements, remuneration to total assets and gross domestic product have positive effect on interest rate spreads. However ratio of non-interest income to average total assets, treasury certificate and development stocks have negative relationship with interest rate spreads. The study, thus, recommended that high interest rate spread could be moderated through the reduction of cash reserve ratio and high bank overhead costs. Similarly, banks' interest margin in Nigeria was modelled by Ini *et al.*, (2016). The study enforced panel analysis to actuate the factors influencing interest margins in Nigeria using quarterly data on bank-specific, inflation rate and gross domestic product (GDP) sector-specific policy rate (MPR), from 2010:Q1 to 2014:Q2, cutting across 18 banks in Nigeria. Balanced panel OLS was employed and the result revealed that growth in loans and advances, credit risk, GDP growth, staff operating cost, inflation rate and money supply growth are important determinants of interest margins in Nigeria. The result also revealed that operating cost is often transferred to customers

through lending rates or low deposit rates. Thus, the study recommended that staff remuneration, redundancy, employee turnover, automation processes and outsourcing of non – critical tasks should be given due consideration in order to make certain, competitive margin that can increase growth.

Furthermore, Enendu (2003), using data from selected banks in Nigeria for the period 1989 - 2000 also investigated the determinants of interest rate spread in Nigeria. It was observed that cash reserve requirement (CRR), treasury bill rate, gross domestic product (GDP), risk premium, financial deepening, inflation rate, liquidity risk, loan asset quality, and non-interest expense were the key drive of commercial banks' interest rate spread during the period of the study.

However, Osazee and Michael (2019) took a different dimension by investigating the relationship between financial vulnerability index, interest rate spread, and financial system stability in Nigeria. To achieve the objective data were collected from

Central Bank of Nigeria Annual Reports and Statistical Bulletin, Statistics Database, Financial Stability reports of the CBN, and the National Bureau of Statistics (NBS), secondary data covering the period of 1989 to 2017. To determine the relationship between the variables. Findings disclosed that interest rate spread was negative and did not have any statistically significant impact on financial stability. The study also found that the financial vulnerability index on financial system stability its negative statistically significant.

A major point of departure in this study is the investigation of the relationship between interest rate spread and output gap in Nigeria. Given that most studies in Nigeria dwelt on the determinants of interest rate spread and output gap, it becomes imperative to investigate the relationship between interest rate spread and output gap in view of its impact on financial sector, which in turn, determines economic growth.
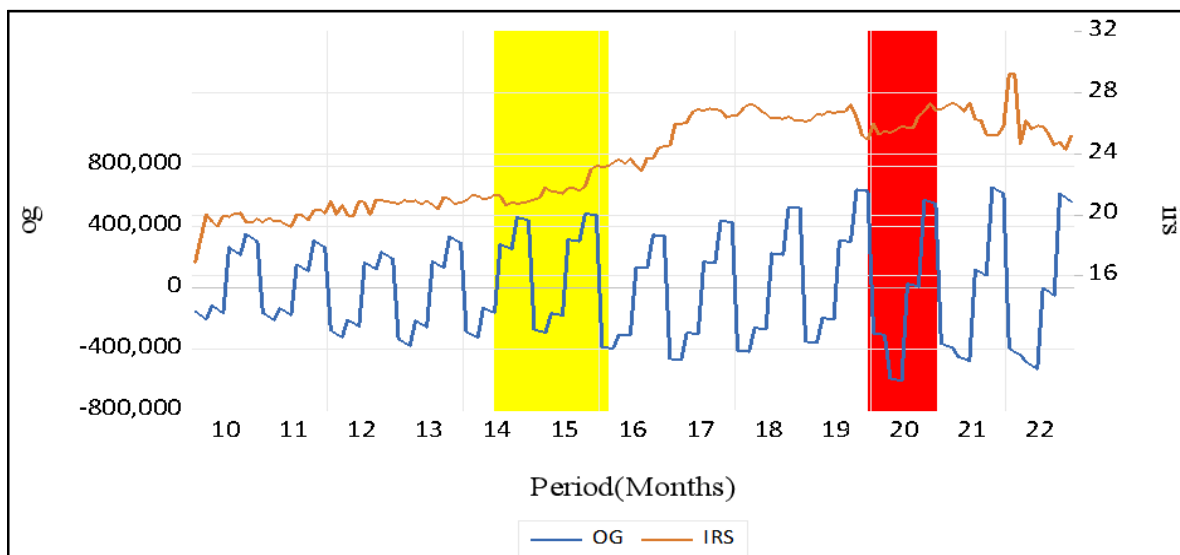
2.3 Stylized fact

Figure 1: Output gap and interest rate spread

The movement of output gap and interest rate spread from 2010 to 2022 is shown in figure 1 above. IRS reveals an increasing trend between 2010 and 2019, while output gap is non trending due to its sporadic and inconsistent movement in Nigeria. The upward trend in interest rate spread could be as a result of the impact of the global financial crisis and the 2015/2016 recession caused by the collapse of oil price during that period. Crude oil being the main stay of the Nigerian economy and the earner of foreign exchange, US dollar traded at 360 Naira and high inflation was also witnessed. During the same period, output gap also trended upwards and a large difference between output gap and interest rate spread (IRS) was observed. The increasing trend was

sustained till 2019 when it dropped as the economy responded positively to the policies embarked upon by the fiscal and monetary authorities to cushion the effect of the recession.

However, a turnaround was witnessed when the spread widened in 2020 due to the impact of the Covid 19 pandemic, which resulted in a lockdown, putting most business activities to a halt. Thus, between 2020 and 2021, interest rate spread increased and subsequently decreased in 2022 as a result of the ease of lockdown, and various interventions by the monetary authorities to cushion the effect of the lockdown.

3. DATA AND METHODOLOGY
3.1 Data

Table 1: Data and sources

Variable	Meaning	Sources
Og	output gap	cbn statistical bulletine
Irs	interest rate spread	cbn monetary survey
Fge	Federal government expenditure	cbn statistical bulletine
Fdi	Foreign Direct Investment	cbn statistical bulletine
Hinf	Headline inflation	cbn statistical bulletine

The study employed monthly time series data ranging from 2010 to 2020. Data for the study were realized from the Central Bank of Nigeria Statistical Bulletin and cbn monetary survey. In Consideration of determinants of og, Some of the variables utilized for the study include; irs, fge,fdi, and hinf.

3.2 Theoretical Framework

This work would adopt the neoclassical model as it was evidenced in Abebaw and Tajani (2021), who modified their model from the Approach of the Production Function, where output gap is computed as the discrepancy between actual output and potential output. Mackinnon and Shaw (1973) Hypothesis also argues financial repression also distorts financial prices including interest rates, which subsequently reduces real rate of growth (Obamuyi, 2001).

3.3 Model Specification

Output gap was derived from real GDP by calculating the difference between actual and potential output as adopted from Abebaw and Tajani (2021), which was modified from the Production Function Approach. Thus, the output gap is derived as stated below:

$$y_t = A_t L t^{\propto} K t^{\beta} \text{......................} (2)$$
$$= \frac{1}{\delta + \vartheta}$$

$$OG_t = \frac{yt - Y*t}{Y*t} \text{.........................} (3)$$
$$K. LnYt = lnAt + \propto lnlt + \beta lnkt \text{....................} (4)$$
$$lnAt = lnyt - \alpha lnlt \dots \beta lnkt \text{........................} (5)$$
$$Kt = It + (1 - \delta)Kt - 1 \text{........................} (6)$$
$$Y*t = A*tL*\alpha_t K*\beta_t \text{........................} (7)$$
$$LnY*t = LnA*t + \alpha lnl*t + \beta lnk*t \text{..........} (8)$$
$$OG = (irs, fge, fdi, hinf) \text{..........................} (9)$$

In our model, we selected some variables that output gap could respond to their individual changes in line with apriori expectations. Thus, in our proposition, the variables are combined to form a functional equation as stated below:
$$OG = f(irs, fge, fdi, hinf) \text{..............} (10)$$

Output gap was derived from the gross domestic product by employing the HP-filter. Interest rate spread is the difference between interest on maximum lending rate and Weighted Average Saving & Time/Term Deposits rate.

The estimable var equation is derived from equation (10) and expressed as:
$$og_t = b_{10} + b_{12} irs_t + b_{13} fge_t + b_{14} fdi_t + b_{15} dhinf_t + U_t \text{........................} (11)$$
$$irs_t = b_{10} + b_{12} og_t + b_{13} fge_t + b_{14} fdi_t + b_{15} dhinf_t + U_t \text{....................} (12)$$
$$fge_t = b_{10} + b_{12} irs_t + b_{13} 0g_t + b_{14} fdi_t + b_{15} dhinf_t + U_t \text{.....................} (13)$$
$$fdi_t = b_{10} + b_{12} irs_t + b_{13} fge_t + b_{14} og_t + + b_{15} dhinf_t + U_t \text{..................} (14)$$
$$dhinf_t = b_{10} + b_{12} irs_t + b_{13} fge_t + b_{14} fdi_t + + b_{15} og_t + U_t \text{................} (15)$$

4. ANALYSIS AND RESULT

This section involves evaluating the data, identifying patterns or trends, and drawing conclusions based on the findings. The results, on the other hand are the outcomes or findings obtained from the analysis.

Descriptive statistics

Descriptive statistics are used to summarize and describe the main features of a dataset. They include measures like mean, median and standard deviation.

Table 1: Descriptive statistics

Variable	og	irs	fge	fdi	hinf
Mean	-1.53e-07	23.43	475138.3	9.77e+07	12.86
Median	-81117.25	23.53	400588.5	6.65e+07	12.28
Standard deviation	346546	2.89	249669.1	9.06e+07	3.51

From the above descriptive statistics, it showed that og has a value of -1.53e-07, which is the lowest mean value among the variables. Fge was shown to have the highest mean value among the variables, with value of 475138.3. The least median value among the variables is also og and the highest is still fge. Since the mean values among the variables are higher than their standard deviation, except og.

This means that the various have centred series except og which is scattered.

Unit root test

These tests help to determine if a time seiries is stationary or not. Non-stationary data can have trends or patterns that change over time, making it challenging to analyze.

Table 2: Unit root test table

Variable	Level			First difference		
	Without drift	**trend**	**with drift**	**Without drift**	**trend**	**with drift**
Og	-5.39***	-5.37***	-5.39***			
Irs	-2.28	-3.129	-2.28**			
Fge	-4.80***	-10.42***	-4.80***			
Fdi	-10.26***	-10.72***	-10.26***			
Hinf	-0.04	-1.28	-0.04	-11.64***	-12.00***	-11.64***

*note: ***, indicates one percent level of significance, **, indicates five percent level of significance and * indicates ten percent level of significance.*

From the above table, it shows that all variables in the model are stationary at level, except hinf which is stable at first difference.

Johanseen Cointegration Test

The johanseen cointegration test is a statistical test used to determine the presence of a long-term relationship, or cointegration between multiple time series variables. It helps analyze the number of cointegrating vectors, which represent the long-term equilibrium relationship among the variables.

Table 3: Johanseen cointegration test

Maximum rank	Trace statistics	Critical Value
0	132.76	68.52
1	72.77	47.21
2	38.09	29.68
3	14.09 *	15.41
4	2.01	3.76

From the above table, it shows that there are three cointegrating equations in the model. This is from the value of the trace statistics and critical value. Since the trace statistics is greater than critical value it means there is no cointegrating equations.

Lag-length criteria

This criterion helps to determine the optimal lag length by considering the trade-off between model fit and complexity.

Table 4: Lag-length criteria

Lag	LL	LR	DF	P	FPE	AIC	HQIC	SBIC
0	-7674.33				1.0e+38	101.71	101.75	101.81
1	-7377.1	594.45	25	0.00	2.8e+36	98.10	98.35*	98.71*
2	-7340.93	72.35	25	0.00	2.4e+36*	97.96*	98.41*	99.05
3	-7317.73	46.391*	25	0.00	2.5e+36	97.98	98.63	99.58
4	-7300.88	33.71	25	0.11	2.8e+36	98.09	98.94	100.19

From the above table, it can be deduced that the appropriate lag-length is two, this is because fpe, aic and hqic showed that two is the approximate lag-length.

Stability of the model

This is used to verify if the estimated lag is significant for the analysis. Therefore, the significance of the two lags is estimated and tested.

Table 5: Stability of the model

Lag	chi2	df	prob> chi2
1	242.49	25	0.00
2	83.65	25	0.00

From the above table it is seen that specified lag is statistically significant since the probability of the chi square is less than 0.05. This means that lag2 is suitable for the var estimation.

Granger causality test

Granger causality test is a statistical test used to determine if one time series can be used to predict another time series. It helps in understanding the causal relationship between variables. It's a useful tool used for understanding the direction and strength of the causal relationship between different economic factors.

Table 6: Granger causality table

Equation	Excluded	chi2	df	prob
og	irs.	0.53	2	0.77
og	Fge	1.03	2	0.60
og	fdi	0.17	2	0.91
og	dhinf	0.18	2	0.92
og	All	1.85	8	0.99

From the above table, the various granger causality of the variables on og was displayed. The table shows that all the variables such as irs, fge, fdi, and dhinf does not granger cause og. That is the variable together do not have any impact on og. The table further showed that irs, do not granger cause og because the probability of the variable is 0.77 which is higher than 0.05. Fge do not also granger cause og, because the probability showed to be at 0.60, fdi and dhinf also showed not to granger cause og because their probability were 0.91 and 0.92 respectively. All the variables collectively also do not granger cause og.

Post Estimation Test

Post estimation test are conducted after performing a statistical analysis to further examine and validate the result. They help to assess the robustness and reliability of the estimated model.

Roots of the companion matrix:

The roots of the companion matrix are the eigenvalues of the matrix. They provide information about the stability and dynamics of the system represented by the matrix.
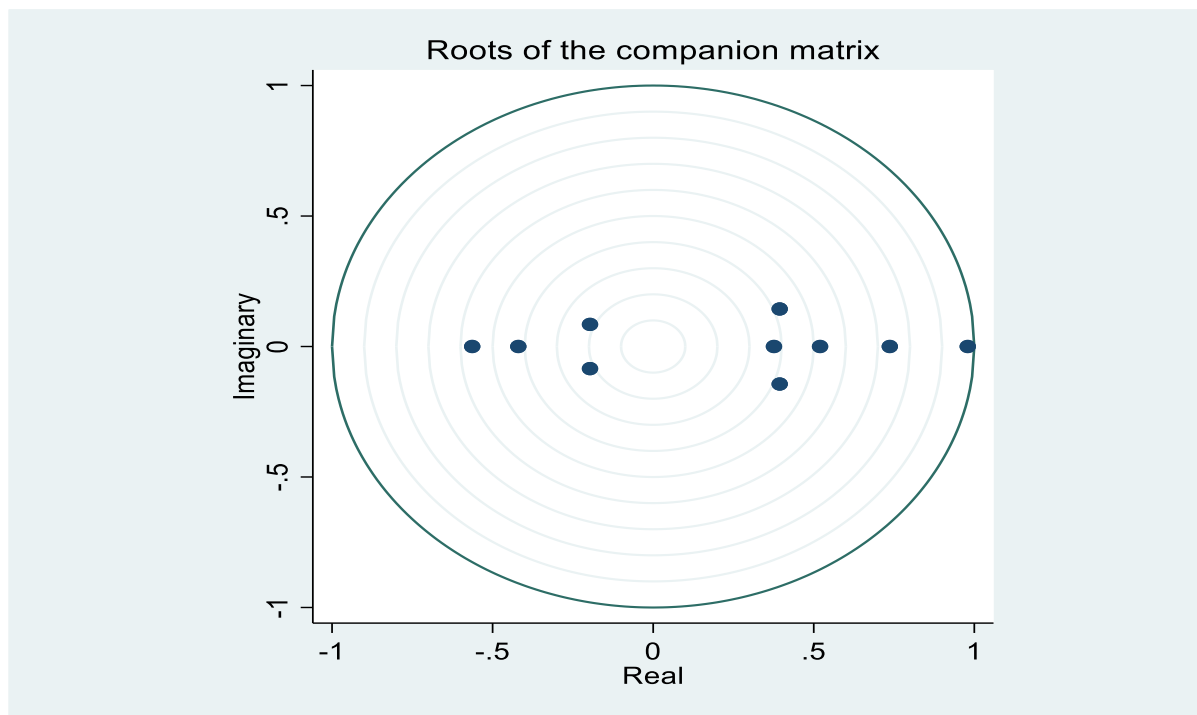

Figure 2: Roots of companion matrix

The above figure shows that the model is fit, because the values of the eigen value lies within the circle of the matrix. This means that the model is fit for analysis, and the result gotten from the analysis can be used for policy making.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The study set out to investigate the relationship between interest rate spread and output gap in Nigeria. To carry out the study, monthly data on output and interest rate, ranging from 2010 to 2022 were utilized to generate interest rate spread and output gap, using the HP Filter. Incorporating other control variables, such as inflation rate (dhinf),

foreign direct investment (fdi) and federal government expenditure (fge) were included, as these variables are all determinants of output gap (og). The study conducted a unit root test to determine the stationarity status of the variables and the result revealed that all the variables were stationary at level except hinf which was stationary at first difference.

The johanseen cointegration test showed that there is a long run relationship in the model, this is because of the two cointegrating equation in the model. The lag-length criteria displayed that the appropriate lag-length was two. We also went further to test for the stability of the model, which showed that lag 1 and lag2 were statistically significant.

The granger causality showed that all the variables in the model, that is irs, fdi, and hinf did not granger cause og. The post estimation test showed that the eigen value is seen to be within the matrix.

The implication of these findings for the Nigerian economy is that interest rate spread is not a major determinant of output gap in Nigeria. This could be as a result of the large informal sector in the country. Most loans for business purposes are sourced outside the financial sector, particularly from personal and family earnings and the indigenous apprenticeship system, thus, rendering the interest rate spread ineffective in influencing the output gap of the economy.

In view of these findings, this study recommends that policies geared towards reducing the size of the informal sector should be put in place. This could be achieved through greater access to credit and the pursuit of financial sector education policies, with a view to enlightening the informal sector on various financial instruments and transaction platforms. The health status of the financial system should also be studied to avoid the formulation of policies that are detrimental to the effective functioning of the sector. The zero impact of interest rate spread on output gap could be because commercial bank loans do not really meet individuals who are actively involved in productive activities in the country. Thus, the central bank should carry out a background check before disbursing loans. This would significantly make interest rate spread to have an impact in the Nigerian economy.

Disclaimer: Views expressed in this paper are solely the authors not the CBN.

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