Yield Curve and Monetary Policy in Nigeria: Investigating the Predictive Power of the Yield Curve

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Authors' contributions

*This work was carried out in collaboration among all authors. All authors read and approved the final
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ABSTRACT

This research paper examines the effectiveness of the yield spread in forecasting future economic activity and inflation in Nigeria. Quarterly data on GDP, Open Buy Back (OBB) Nigerian Treasury Bill (NTB), FGN Bond yields and inflation rates from 2010Q1 – 2020Q1 were employed in conducting this study. The Regression Model was used to establish the relationship among the variables of interest; the yield spread (10-year less 3-month bond) was used to predict output and inflation using the Dynamic and Static Forecasting Model. The projected variables, however, depicted co-movement between the actual and the forecasts in most of the periods. Nevertheless, the behavioral movement of the model was dissimilar at some points (2015-2017). Generally, the results indicated a significant predictive power of the yield spread in forecasting economic activities in the future as stipulated in the literature. The paper recommends the validity and use of the predictive information content embedded in the yield spread as a guide or signal for monetary policy actions and decisions.

*Keywords: Yield curve; yield spread; forecast; economic growth; inflation; recession; FGN Bonds;
Nigeria.*

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1. INTRODUCTION

A simple tool which is fundamentally and reliably used for predicting future level of economic activities in recent times is the yield curve. It measures the difference between short and long-term instruments' interest rates and has been a relevant discourse in literature. The theoretical justification of this claim is that, since short term interest rates are instruments of monetary policy, and long-term interest rates signal market expectations on future economic conditions, the difference between short and long-term interest rates may contain useful information to policy makers, [1,2]. Furthermore, when the yield curve is upward slopping during recession, it shows that there are expectations for future economic upturn. More so, there are signs that flattening of the yield curve typically precede economic recession. Facts about a country's future economic activity is important to consumers, investors, and policymakers. Kessel [3] provides the first evidence on how the term structure of interest rates varies with the business cycle. However, many studies thereafter, have examined whether the term structure is fundamental to predicting various measures of economic activity as shown in the literature review. The time (term) spread (the difference between the yields on long-term and short-term treasury securities) has been found useful for forecasting variables such as output growth, inflation, industrial production, consumption, recessions, and the ability of the spread to predict economic activity.

Market investors base their decisions on the forecast of real activity and inflation, and the information of key financial market indicators, one of which is the spread between yields on short-term and long-term government instruments (Yield Spread).

The interest rate tenure (term) structure is the relationship between the interest rate and the time to maturity of the debt for a given borrower in a given currency. Recently, for example, the current Naira value paid as interest rate on the Nigerian Treasury Securities for various maturities are closely watched and monitored by financial investors. Hence, the yield curve can be used to explain many economic variables.

The shape of the term structure or yield curve may vary from period to period depending on term rates. The slopes might be upward (i.e., long-term rates higher than short-term rates) or downward (i.e., long-term rates lower than short-term rates), or flat (long-term rates equal to short-term rates), often, the term structure is usually 'upward sloping' Duarte et al. [4] Hvozdenska.

Term structure analysis is concerned with the steepness of the slope at any particular time, where a greater slope signifies a larger disparity between interest rates over time. When such a difference exists, it is known as a term premium. Treasury securities are generally used to map the term structure of interest rates (i.e., the yield curve) because they are virtually free of default risk. However, term structures may be computed and analyzed for any number of interest-bearing instruments.

The slope of the yield curve is often used in financial policy as an indicator of future real activities and inflation. Empirical research confirms the predictive power of the yield spread both for real activities and for inflation, Mishkin [5].

Recently, financial analysts and economists adopt term structure analysis which frequently encompasses using mathematical models for a variety of analysis. Some of the most commonly used include: forecasting future interest rates, estimating the cost of capital for discounting future cash flows, building predictive models of general economic growth (for instance; to project gross domestic product), formulating monetary policy, estimating future inflation, understanding dynamics in financial markets, and constructing a portfolio). This study shall be focusing on estimating the yield spread as a potential source of information about economic conditions.

A lot of research on the subject matter has been carried out on some advanced countries in Europe and America, however, this paper attempts to evaluate the predictive power of the yield spread for output and inflation in Nigeria. The Nigerian financial market is still largely underdeveloped and unsubstantial; however, there may be limitations to establishing the predictive power of the yield spread on output and inflation expectations.

This paper is structured as follows: Section 1 gives background to the topic with reviews of concept, theoretical and empirical literatures on the yield curve and monetary policy. This section of the paper also provides research questions and some stylized facts on the subject matter.

Section 2 presents a description of data, models and methods of analysis employed. Section 3 discusses the results while Section 4 concludes the paper and finally, Section 5 provides the recommendation(s) based on the findings.

1.1 The Research Problem

Globally, the responsibility of all monetary authorities is to achieve price stability and to concern themselves with national outputs. They also attempt to predict inflation and output in the course of delivering specific mandates. One of the key instruments which Central Banks can use to carry out these forecasts is the "information contents" embedded in the yield curve. Most times, many Central Banks have challenges in forecasting future inflation and output using other forms of techniques, while ignoring the *predictive powers of the yield spread.* The failure to consider this by researchers may make the results of their estimation unreliable. Hence, this paper attempts to validate the usefulness of the yield curve as a tool to predict future output and inflation for Nigeria as well as recommending its usefulness to all stakeholders.

1.2 Research Questions

From the foregoing, this study attempts to address two specific research questions. These are:

(i)   Does the yield curve contain useful information about inflation and output in the future; and

(ii)   Can the yield curve predict or forecast future inflation and output in Nigeria?

In addressing these questions, we hope to provide some indication about the future path of output and inflation in Nigeria.

1.3 Research Scope and Limitations

The study employed secondary time series data ranging from 2010Q1 to 2020Q1. The level of precision of our results and estimations was therefore restricted by the extent of the accuracy of data obtained. Another issue is the discrepancy in the data presented by various organizations such as World Bank, National Bureau of Statistics to mention a few. Also, the non-availability of data for some variables that could have been included in the model was also a limitation to this study.

1.4 Stylized Facts on Yield Curve and Monetary Policy in Nigeria

The yield curve depicts the difference between short and long-term instrument interest rates. The outline of the yield curve contains information that signal the direction of the economy. This is built on the premise that short term interest rates are instruments of monetary policy, while long term interest rates reflect markets' expectations on future economic conditions. Therefore, the gap between the instruments' interest rate structure indicate some useful content which are usually used by policy makers to guide their decisions. Also, the shape of the yield curve i.e. upward or downwards trend contains a lot of information about future economic developments. This sub-section presents trend analysis of some macro-economic variables such as Monetary Policy Rate (MPR), Money Market Rates, Inflation, Output, Short and Long-term Interest Coupon etc.

1.4.1 Monetary Policy Rate (MPR) Anchor Rate

The MPR which is the benchmark rate to which all other Money Market Rates are anchored stood at 20.50 per cent in January 2002. By August 2003, it dropped to 15.00 per cent through to December 2004. It further declined sharply to 6.00per cent; which represents the lowest rate in the review period. However, it rose to14.00 per cent by December 2016 and remained flat at 14.00 percent throughout 2018. In March 2019, the MPR fell slightly to 13.50 percent following adjustments from the CBN MPC meeting of March 2019. However, the Interbank moderated slightly at 31.39 and 30.89 per cent in January 2018 and April 2019 respectively before closing at 30.72 percent at end 2019.

1.4.2 The Interbank rate

The Interbank which represents the rates at which Deposit Money Banks (DMBs) borrow funds among themselves and is expected to be above the MPR. The interbank rate stood at 23.91 percent in January 2002 but dropped sharply to 13.29 per cent as at January 2003. It declined sharply to 8.15 percent. The interbank call segment witnessed sluggish non-trading days in some periods within the review period (November 2019). The non-trading day at the uncollateralized segment of the market may be attributed to the persistent preference for the

OBB (Overnight Buy Back) instruments which does not have high risk perception for money market participants. Interbank call rates decreased from 12.14 per cent in January 2019 to an average of 7.17 per cent in November 2019. The rate also dropped from 13.98 percent in April 2019 to as low as 3.82 percent in end December 2019.

\ The Rate in the OBB segment of the market which is collateralized is expected to be lower, compared to the interbank call segment. The rate which stood at 13.82 percent in the month of January 2003, declined to 8.69 percent recorded in January 2017. It further lowered to 19.99 per cent in February 2019 and declined further to about 6.76 per cent in November 2019. The rate lowered further in the last quarter of 2019 to 3.24 percent.

1.4.3 Inflation and Treasury Bills Rates

The trend of inflation in Nigeria is shown in figure below. Inflation and Treasury Bills Rate (TBR) (91-days) in Nigeria stood at 18.55 and 21.13 percent, respectively in January 2002. By the month of January 2014, the rates witnessed decline to levels of 7.98 and 10.48 percent, respectively. The TB Rates is however, expected to be higher than the inflation rate to attain (Real Interest Rate i.e. rate that an investor, saver or lender is expected to receive after allowing for inflation).

The highest level of inflation rate (28.60) per cent in the review period was recorded in October 2005 and the lowest was July 2006 (3.00) percent. This trend, invariably, shows that the Nigeria macroeconomic environment could be aptly described as highly inflationary. The higher TB Rate in the review period stood at 21.13 percent in January 2002. The TB Rate represent the short-term interest rate, while, the Bonds rates depict for long term interest rate.

1.4.4 Output

GDP is standard measure of aggregate economic activity on a quarterly basis. It measures the performance of the economy on quarter over quarter. The output represents the performance of the economy; Nigeria's Gross Domestic Product (GDP) has continued to experience increase since the re-basing in 2010. In 2010Q4, the GDP stood at N14,789,816.45 million and by 2014Q4, the output experienced an upward trend to N24,205,863.34 million. As at the end of 2019Q4, it recorded N34,858,475.20

million from N35,230,607.63 million recorded in 2018Q4.

1.5 Review of Relevant Literature

1.5.1 Theoretical background of term structure

Literature on the theoretical background of the relationship between the term spread, future inflation rates and real growth (output) is exclusively based on the combination of the 'Fisher equation and the Rational Expectation Hypothesis of the Term Structure (REHTS)"as described by Tzavalis and Wickens [6]. The REHTS states that the yield to maturity of a bond with 'n' periods to maturity can be decomposed into expected one-period yield and a risk premium, so that;

$$R(n,t) - \frac{1}{n} \sum_{(i=0)}^{(n-1)} [\![E_t R(1,t+i) + \Phi(n,t)]\!] \tag{1}$$

where E_t (-) is the conditional expectation operator using the information available up to period t. R(n,t) is the yield to maturity of a bond with n periods to maturity and $\Phi(n, t)$ is the average risk premium on an n-period bond until maturity?

Using the Fisher decomposition, equation (1) can be rewritten as

$$R(n,t) = E_t r(n,t) + E_t \pi(n,t) + \Phi(n,t) \tag{2}$$

where $E_t r(n,t)$ is the average real ex-ante interest rate over the periods t to t + n - 1 and $E_t \pi(n,t)$ is the average expected inflation rate over the periods t + 1 to t + n.

The Term Structure as a Predictor of (eqn. 2), consider the second equation for a long-term interest rate of maturity n and a short- term interest rate of maturity m. Subtracting the latter from the former, we obtain

$$R(n,t) - R(m,t) = E_t [r(n,t) - r(m,t)] + E_t [\pi(n,t) - \pi(m,t)] + \Phi(n,t) - \Phi(m,t) \tag{3}$$

If real activity is related to changing real interest rates and if the term premium is constant, then (eqn. 2) and (eqn. 3) imply that the term spread should contain information about future economic activity and inflation.

While the literature on the theoretical relationship between the term spread and future inflation

rates focuses on the Fisher decomposition and the REHTS as mentioned above [6] the correlation between the term spread and production growth has been suggested with different theoretical context. From a theoretical point of view, the term spread can be positively or negatively linked to future real output depending on the medium at work. Various explanations have been put forward in the literature to this effect, for example; Estrella and Mishkin [7] Berg and van Bergeijk [8] and Estrella [9]

One of these channels is derived from the effect of the current monetary policy on both the term spread and real activity "common factor". For example, as a credible Central Bank, it tightens monetary policy, raises short-term interest rates, while long-term rates rise by less or are not at all affected resulting in a flattening of a previously positively sloped yield curve. After a few quarters of a lag, the restrictive policy is also dampening real activity. The latter leads to a slowdown in economic activity, due to the faster reaction of the term spread.
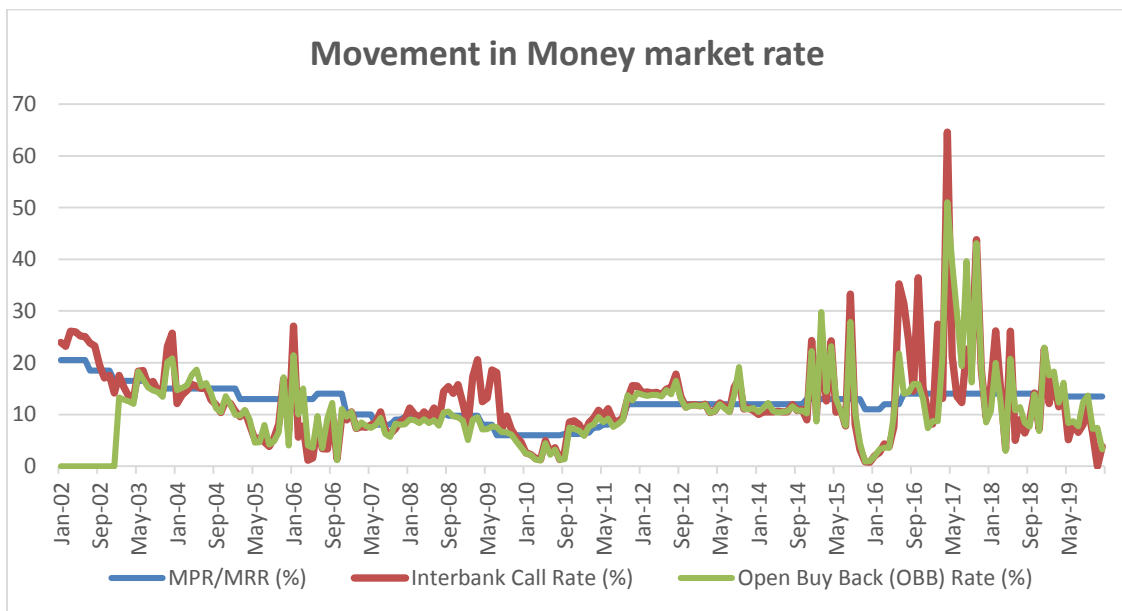

Chart 1. Showing Movement in Money Market Rate
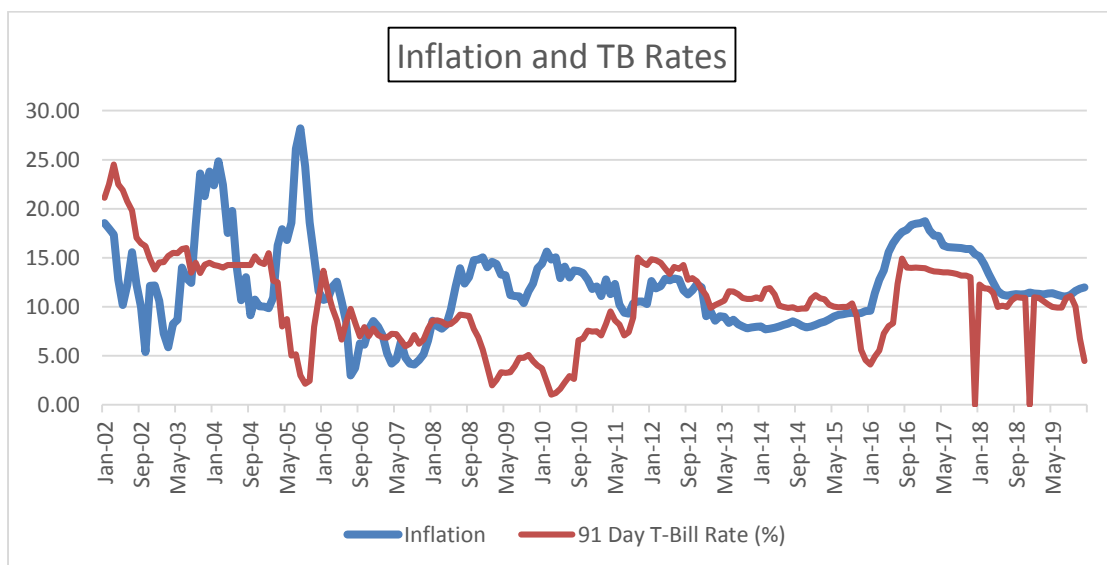*Source: CBN Statistical database*

Chart 2. Showing Inflation and Treasury Bill Rates
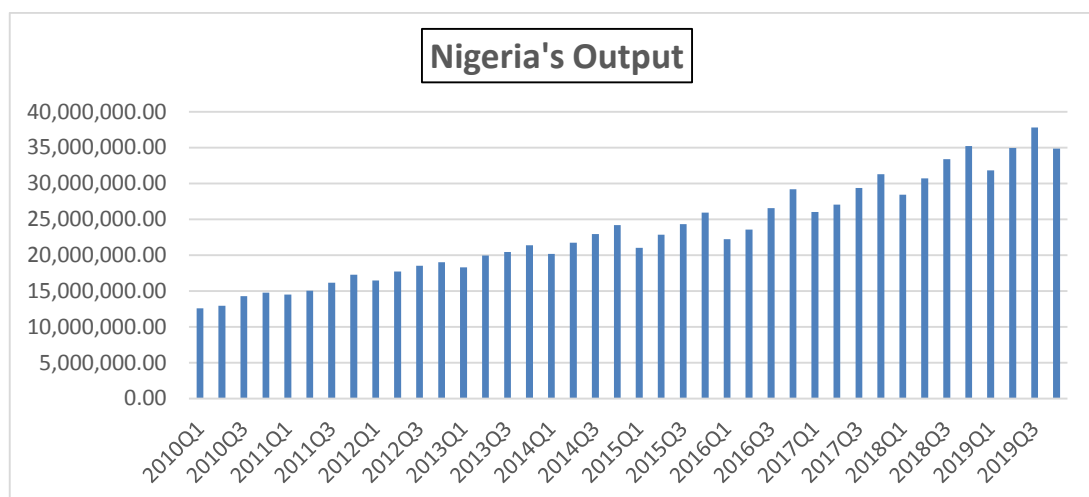*Source: CBN Statistical database*

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Chart 3. Showing Nigeria's Output
Source: CBN Statistical database

1.5.2 Empirical Literature

Empirical evidence that an inversion of the slope of the yield curve signals a recession dated back to the early 1990s in the US [10,11,12] In economic sense, the slope of the yield curve can be used as a monetary policy indicator since, it contains information about the future output of an economy. Short-term interest rate tends to be high when there are Monetary policy tightening. On the other hand, high short-term interest rates contribute to slowdown of the economy. Bernanke and Blinder [13].

The term or yield spread which shows the premium between long-term and short-term interest rate reflects the steepness of the yield curve, the graph of interest rates across all available maturities. A positive term spread represents an upward sloping yield curve. Estrella [14] examined the factors influencing the predictive power of the term spread for inflation and other real variables in the model comprising a (backward/forward- looking) Phillips curve. He established that, basically, yield curve is an important tool that can be used to predict output and inflation in most conditions. The backward-looking form of the model predicts a positive nexus between future term spread and output.

Research has shown in recent times beyond academic research circles, that yield spread are indicators of real activities in the economy. For instance, the Conference Board uses the yield spread in constructing its Index of Learning Indicators. Bonser-Neal and Morley found that the spread helps predict real activity over the subsequent year. They found however, that the percentage of growth forecast variations can be explained by the spread.

Given the Fisher equation, the nominal interest rate mirrors market expectations of both future inflation and the real rate for a given maturity period. Therefore, the expected changes in inflation should be reflected by the slope of the yield curve and, in line with this, Mishkin investigates the predictive content of yield curve and inflation for the US economy. Jorion and Mishkin [15] and Mishkin (1991) reach similar conclusions with a sample of 10 industrial economies. Most of their works find predictive content, but do not control for lagged inflation.

Other studies such as Hamilton [14] Fama and Gibbons [16] and Burmeister et al. [17] use low-order ARIMA models and identified expected inflation and real rates using a Kalman filter, and concluded that, efficiency increased significantly for the unobserved components. Jorion and Mishkin [15] reached similar conclusions with a sample of 10 industrial economies. Most of these early works, which claim to establish predictive content, did not control for lagged inflation.

Beyond the US, evidence on the ability of the yield curve to help predict future growth for other countries has remained scarce and limited. Plosser and Rouwenhorst [18] Bonser-Neal and Morley [19] used the shape of the yield curve to determine signs of economic slowdowns in the US.

In the Nigerian context, Oboh and Abdulsalam [20] conducted a study on the efficacy of the

yield curve in predicting economic growth performance in Nigeria and established that yield spread has the ability to predict growth.

This paper aims to add to the existing literature by providing additional value to the body of knowledge; coming from the fact that, not so much research has been done in this area in emerging economies, especially, Nigeria. On the methodology, the study employed two different forecasting methods to investigate the predictive power of the yield curve on future economic activities in Nigeria.

2. METHODOLOGY

2.1 Data and Methodology

This study examines the relationship between yield spread and real economic activity. We adopt the ordinary least squares (OLS) econometric technique to show the relationship between yield spread and measures of real economic activities (output/Inflation) using time series data. The standard explanation why yield spread predicts economic growth is based on the expectation hypothesis. One way of using the yield curve to predict the future real activity is through the method of inversion i.e. when short term rates are higher than long term rates, this condition can be a pointer for an economic recession. A yield curve can either be flat, down-sloping, humped or up-sloping. The standard solution uses a spread (difference between two rates), usually between 10-year and 3-month bonds.

Bond spread can be calculated by deducting 3-month Nigeria Treasury Bills Rates from a 10-year Government Bond Rates as depicted by [21]. Quarterly data were used for the spreads because the data of the economic activity are taken on quarterly basis as well.

The quarterly data used in the study are obtained from the World Bank, Central Bank of Nigeria (CBN) and the National Bureau of Statistics (NBS), covering the period 2010Q1 to 2020Q1. The timeframe for the study covers the periods prior to financial crisis, actual financial crisis period and post financial crisis. The significant of the model is to predict futuristic levels of inflation and real GDP growth based on the current yield spread [22]. The study also attempts to predict what inflation will be the future.

This will be achieved through series of regressions using real GDP growth, inflation and the spread between the 10year and 3-month NTB yields lagged period.

2.2 Predictive Power of the Yield Curve for Output

The standard explanation why the yield spread may be used to predict growth is based on expectation hypothesis. Under this, the term structure of interest rate is determined by agents' expectation of future short-term interest rates and therefore any current long-term interest rate is an average of expected short term rates. If there is monetary contraction, it makes the current short-term rate higher than the expected future short term interest rate, then today's investment and consumption will decline, hence low future economic growth. On the other hand, if there is monetary expansion which leads to low current short-term interest rate, which is expected to be favorable to growth in future. In theory, yield curve contains information about future economic growth. Just as Ang, Piazzesi and Wei [23] suggest that the expectation hypothesis component of the term structure of interest rate is the driving force for output prediction [24].

Table 1. Descriptive statistics of macroeconomic variables

DESCRIPTIVE	YIELDSPREAD	INFRATE	GDPGRWTH
Mean	3.362979	11.62879	3.900579
Median	3.160000	11.35000	4.281963
Maximum	9.570952	18.55000	8.598817
Minimum	0.070000	4.116460	-6.100000
Std. Dev.	1.909658	3.058002	3.134546
Skewness	0.867216	0.143935	-0.799668
Kurtosis	4.077514	2.775480	3.522579
Jarque-Bera	9.033459	0.288770	6.133754
Probability	0.010925	0.865554	0.046566
Sum	174.8749	604.6972	202.8301
Sum Sq. Dev.	185.9865	476.9202	501.0943
Observations	52	52	52

Most studies on the predictive power of yield curve for real economic activities adopted the ordinary least Squares (OLS) regression of real GDP growth on the yield spread, i.e the difference between the 10 years bond yields and 3MTH-NTB rates.

Real GDP$_{t+n}$= α + β*yield spread$_t$ (10years – 3Mht NTB) + £$_t$ (4)

To capture yield relationship with output growth

From the chart below, there is a perceived positive relationship between changes in the 10-year bond and the 3mth-NTB yield (yield spread) and the GDP growth, representing an indicator of real economic variable. Though, the graph seems to intercept between timelines, an increase in the yield spread of bonds means that investors demand higher interest return for holding the increased risk of the shorter-term bonds. This could be caused by economic fluctuations, if the real GDP fluctuates; the yield spread curve also respond thereby subjecting the bonds' value to high risk. At this point, bonds' investors would demand for higher returns on their portfolio investments to bring to bear the risks.

The yield spread may increase if the real GDP of a country experiences a decreased per capital level. If the nations' GDP lowers as a result of recession.

2.3 Predictive Power of the Yield Curve for Inflation

Chart 5 depicts the connection between the yield spread and inflation. Here we notice some co-movement between the two variables; the figure, however, depict an opposite movement between the variables, especially from January 2016.

2.4 Model Specification

The OLS model below shows the effect the independent variable (yield spread) has on dependent variables (RGDP, inflation and OBB) using three quarterly time lags. The two regressions were run to analyze spread in relation to each measure of economic activity while incorporating the generic formula for the regression as follows. We define the regression models below as,

Real GDP$_{t+n}$= α + β*yieldspread$_t$ + OBB+ £$_t$ (5)

to capture impact on RGDP

Inflation$_{t+n}$ = α + β*yieldspread$_t$ + OBB + £$_t$ (6)

to capture impact on Inflation
Where real GDP$_{t+n}$ is a prediction of the real GDP in time t + 1
n is the lag of spread, value of the lag can be 2,3,4,5,6…
Spread$_t$ is the yield or interest spread between 10-year and 3mth-NTB in time t
£$_t$ is a white noise.

3. RESULT AND DISCUSSION

3.1 Predictive Power of the Yield Curve for Output Growth

OLS regression estimation was carried-out on real GDP and yield spread from 2010Q1 to 2020Q1 as modelled in equation 1 and Table 5 below. Result shows the estimation result of OLS regression of future real GDP growth on the yield spread and one period lagged real GDP growth i.e. 2010Q1 to 2020Q1.

The regression shows the strength and nature of the relationship between the yield spread and economic activity, measured in terms of output as well as the predictive information contained in the yield spread. The result shows that yield spread is statistically significant, considering the predictive powers of the model i.e adjusted R2 of (86.74 percent), then we can say the model is a good predictor for output growth. The Adjusted R2 is relatively high in the models and represent that the percentage of the sample can be explained by the model.

Furthermore, comparing the relative strength of the yield with output and Inflation, the regression for output holds the most predictive value. This relative value of the regression model is determined by comparing R^2 values and number of significant regressions. The Adjusted R2 is relatively high in the models which represent that the percentage of the sample that can be explained by these models. The adjusted R^2 for the first model (GDP growth) is 86.74 percent, while the second model (Inflation) gave 80.89 percent. This infers that the yield spread would explain more changes in GDP better than in inflation.

3.2 Forecasting Output Growth Using OLS Regression Model

In verifying the information content imbedded in the yield spread, we attempted an eight (8) quarters (2018Q4 to 2020Q2) forecast of the

yield curve on output. A close range between the actual and the predicted figures are established with minimal errors for both the dynamic and the static forecasts. For instance, actual output in 2019Q2 stood at 2.10 per cent, while the dynamic and the Static forecasts recorded a close target of 2.08 and 2.25 per cent, repetitively. Similar, for the period (2019Q4, the actual output which stood at 2.55 percent was estimated to be 2.35 and 11.04 percent in both forecasting models. In 2020Q3, there was a negative of -3.62 per cent. The model, however projected 4.05 and -3.55 per cent in both scenarios. This, however, indicates that the yield curve is a good predictor of output. The static model captured the movement more than the dynamic model. The model lies within the 95 percent confidence level, except from 2020Q2.
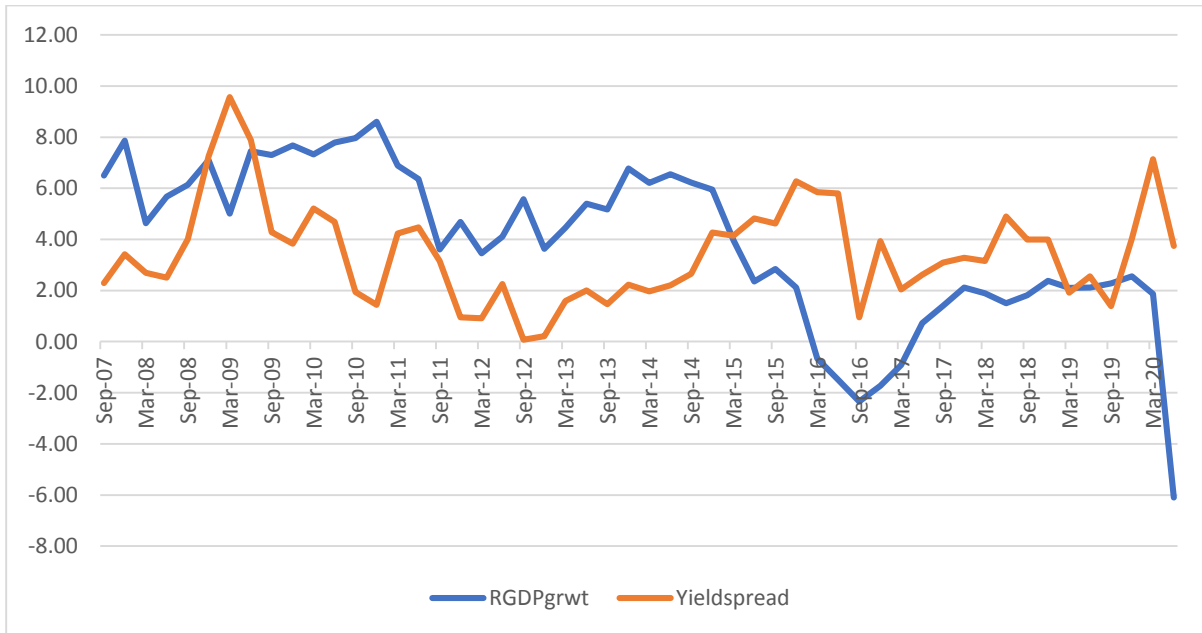

Chart 4. Showing the relationship between yield spread and GDP Growth
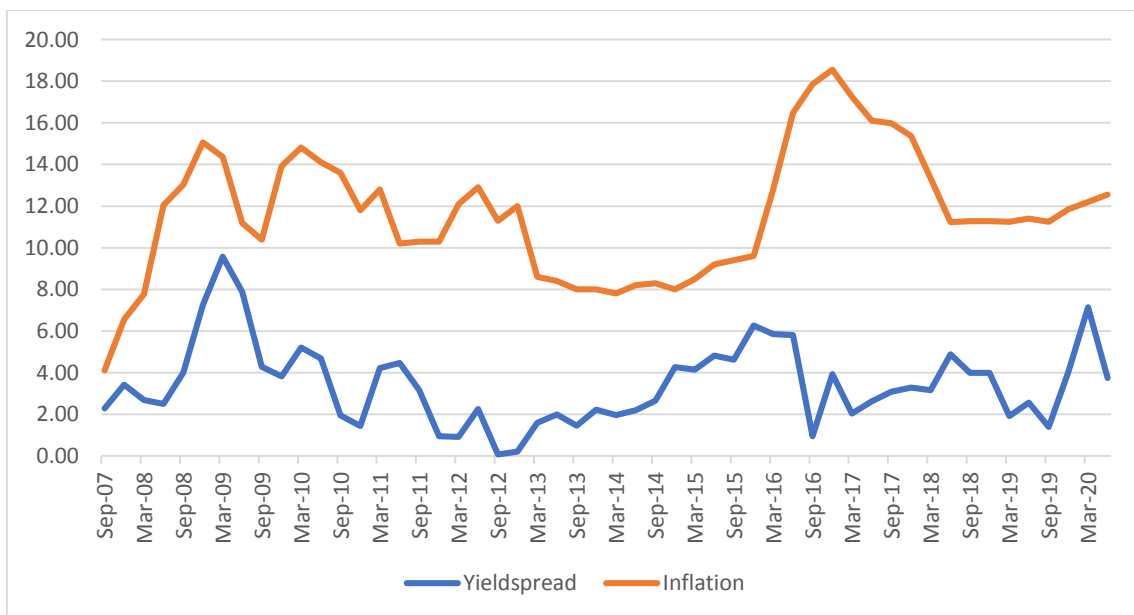*Source: CBN Statistical database*

Chart 5. Showing the relationship between yield spread and Inflation
Source: CBN Statistical database

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Table 2. Parameter estimates: OLS regression of Yield Spread on Real GDP

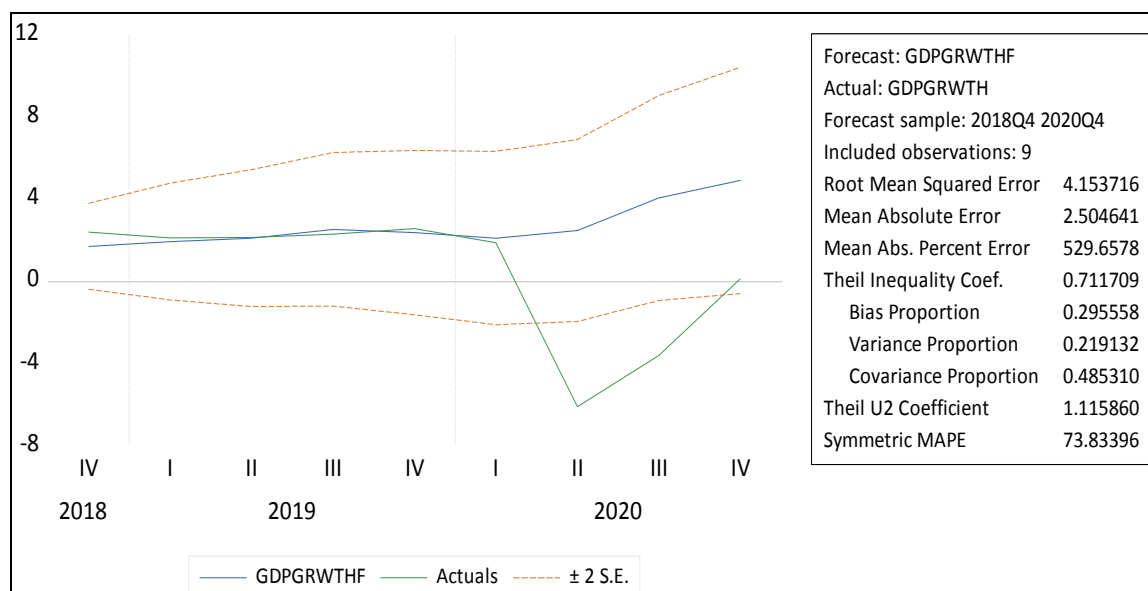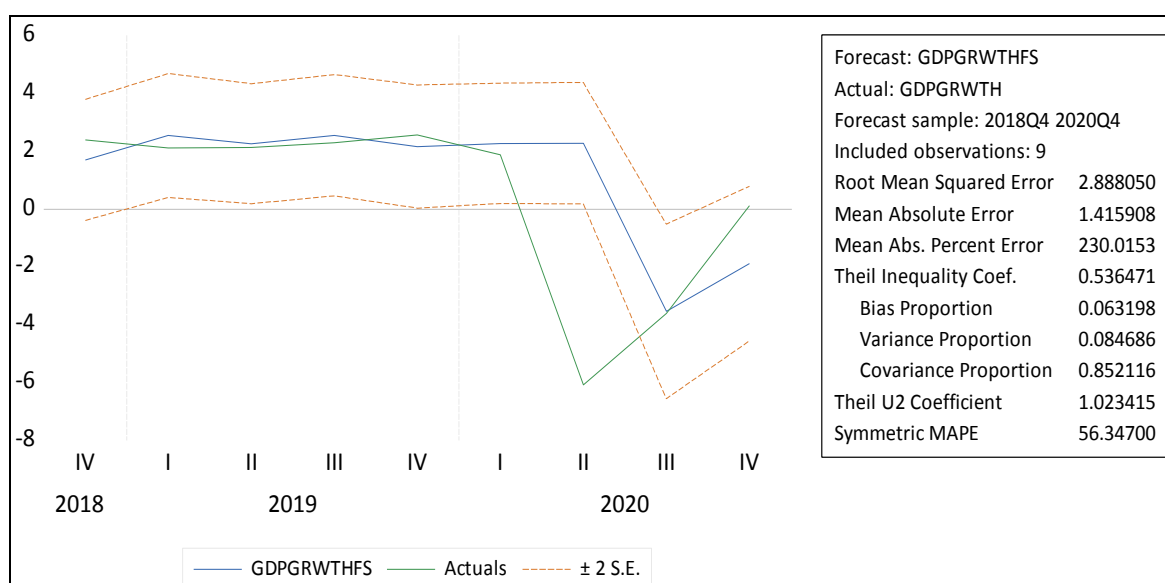| Variables	Coefficient	Std. Error	t-Statistics	Prob-Values
Dependent Variable: **GDPGRWTH**				
Selected Model: OLS (3,2,1,2,0,2,1,4)				
GDPGRWTH(-1)	0.887202	0.061789	14.35851	0.0000
YIELDSPREAD	-0.248444	0.108353	-2.292921	0.0276
OBB	-0.011786	0.029136	-0.404504	0.6882
C	1.165220	0.685314	1.700272	0.0975
R2				**0.877417**
Adjusted R2	**0.867477**			
Durbin-Watson stat	**2.227084**			

Chart 6. Showing Actual Versus Forecast (Dynamic)

Chart 7. Chart showing Actual Versus Forecast (Static)

Table 3. Parameter estimates: OLS regression of Yield Spread on inflation

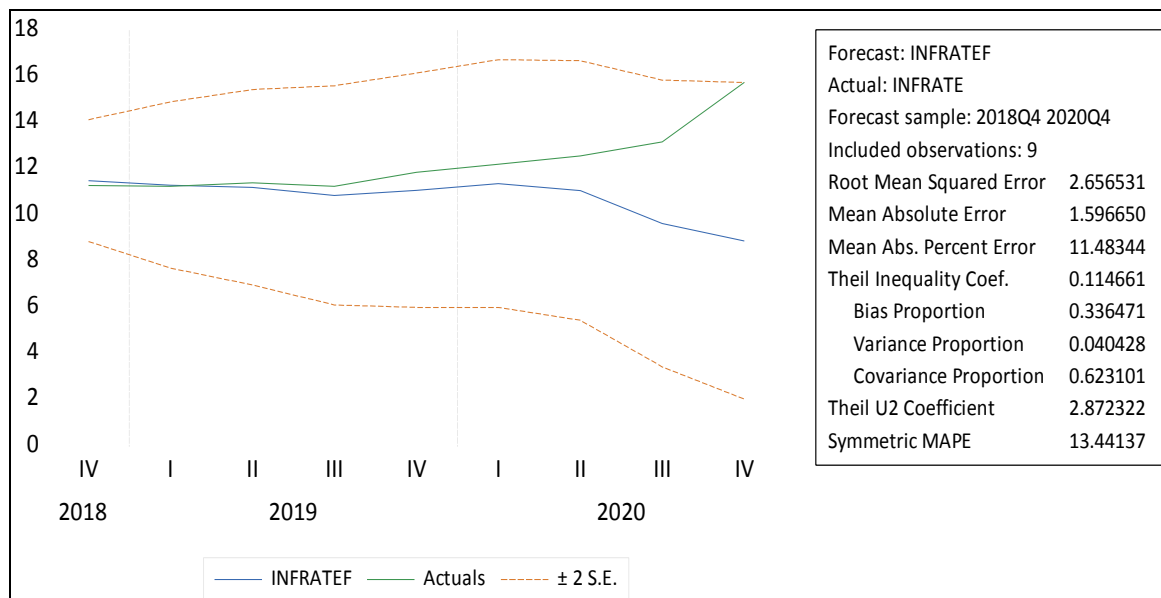| Variables	Coefficient	Std. Error	t-Statistics	Prob-Values
Dependent Variable: INFRATE				
Selected Model: OLS (3,2,1,2,0,2,1,4)				
INFRATE(-1)	0.898279	0.068893	13.03866	0.0000
YIELDSPREAD	0.232754	0.134414	1.731625	0.0917
OBB	0.007347	0.033831	0.217164	0.8293
C	0.365455	1.048839	0.348437	0.7295
R2				**0.823294**
Adjusted R2	**0.808966**			
Durbin-Watson stat	**1.486853**			

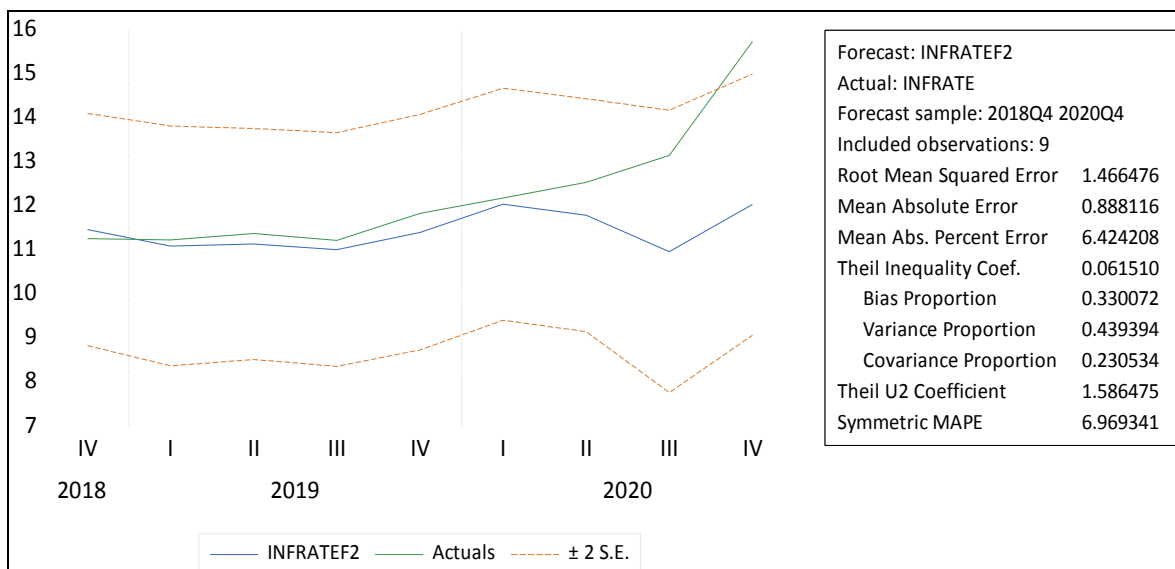**Chart 8. Showing Inflation -Actual Versus Forecast (Dynamic)**

Chart 9. Showing Inflation - Actual Versus Forecast (Static)

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Table 4. Actual Versus Forecast (Dynamic & Static)

Period	Actual GDP	Forecast GDP (dynamic)	Forecast GDP (Static)
2018Q4	2.38	1.69	1.69
2019Q1	2.1	1.92	2.53
2019Q2	2.12	2.08	2.25
2019Q3	2.28	2.51	2.54
2019Q4	2.55	2.35	2.15
2020Q1	1.87	2.08	2.26
2020Q2	*-6.10*	*2.45*	*2.26*
2020Q3	*-3.62*	*4.03*	*-3.55*
2020Q4	0.11	4.89	-1.90

Table 5. Showing Actual and Forecast Inflation Figures

Period	Actual GDP	Inflation Forecast (dynamic)	Inflation Forecast (Static)
2018Q4	11.28	11.49	11.49
2019Q1	11.25	11.30	11.11
2019Q2	11.40	11.20	11.16
2019Q3	11.24	10.85	11.03
2019Q4	11.85	11.07	11.42
2020Q1	12.20	11.36	12.06
2020Q2	12.56	11.06	11.81
2020Q3	13.17	9.63	10.99
2020Q4	15.75	8.88	12.05

3.3 Forecasting Inflation Using the OLS Regression Model

In verifying the information content imbedded in the yield spread, we attempted eight (8) quarters (2018Q4 to 2020Q4) forecast of the yield curve on inflation. A close range between the actual and the predicted figures are established with minimal errors for both the dynamic and the static forecasts. For instance, actual inflation in 2019Q1 stood at 11.25 per cent, while, the dynamic and the static predicts stood at 11.30 and 11.11 per cent, respectively. For the period 2020Q1, the inflation rate which was 12.20 percent in 2020Q1 was estimated to be 11.36 and 12.06 percent in the forecasting models. This indicates the yield curve is a good predictor of inflation. The forecast, however, lies within the 95 percent confidence region [25].

4. CONCLUSION

This research study examined the effectiveness of the yield curve in forecasting level of economic activities, especially output and inflation in Nigeria. It was found that the yield spread i.e. (10-year less 3-month bond) using lags of eight quarters has a significant predictive prowess in providing accurate forecast about the future of

economic activity. Hence, it established the existence of information content imbedded in the yield spread of long and short-term instruments. The results presented from the yield spread OLS models indicate that the yield spread has a robust predictive power to forecast output and inflation. However, the dynamic and static forecasting models demonstrated efficient influence of the spread in predicting future economic activities, with the static model reflecting more reliable results in most periods of study.

5. FURTHER STUDIES

This study is limited to the Nigerian economy, the Authors, however, recommend for further cross-sectional studies in the area of yield spread's predictive powers, taking cognizance of other countries' experiences especially, in the emerging market economies.

6. POLICY RECOMMENDATIONS

- Due to the significant information contained in the yield spread in predicting future movements in the output and inflation, market investors can base their

decisions on the forecasts of real activity and inflation.

❧ Furthermore, the Central Bank can use information in the yield spread to predict inflation and output growth in the future and serve as lead indicators for decision making.

❧ The fiscal authorities can also adopt the policy recommendation for critical decision making in the economy.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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