Journal of Management and Administration

# [4]

### HOW MUCH IS TOO MUCH? THE THRESHOLD EFFECTS OF INTEREST RATE ON GROWTH AND INVESTMENT IN NIGERIA

**Evans Olaniyi** 

School of Management and Social Sciences, Pan-Atlantic University, Lagos, Nigeria *olaniyievans@gmail.com* 

#### ABSTRACT

This study establishes whether there is a threshold above which the effect of the interest rate on economic and investment growth changes. Hansen's (2000) threshold estimation approach is used for Nigeria over the period 2006–2017. The findings show that that there are two thresholds that are well-identified by the data. The estimated values of the interest rate thresholds are 21.1% for GDP growth and 22.6% for investment growth. That is, the interest rate contributes positively to economic growth when it is below 21.1%, but becomes a major concern beyond the 21.1% level. Similarly, the interest rate contributes positively to investment growth when it is below 22.6%, but becomes a major concern beyond the 22.6% level. The logical conclusion is that Nigeria, and other developing countries as well, should aim to achieve interest rate levels that do not inhibit growth and investment by adopting polices that put interest rates on the right trajectory below the estimated thresholds.

Keywords: economic growth, interest rate, investment, threshold model

#### **1. INTRODUCTION**

Contemporary monetary literature (Barsky, Justiniano & Melosi, 2014; Eichengreen, 2015; Fischer, 2016; Jelilov & Maiga, 2016; Pigou, 2016; Bofinger & Ries, 2017; Borio, Disyatat, Juselius & Rungcharoenkitkul, 2017; Galesi, Nuño & Thomas, 2017; Walsh, 2018; Garín, Lester & Sims, 2018; Vines & Wills, 2018) has started to ask an age-old question in a completely new way: is growth or investment feasible for all possible levels of interest rate, or is there a threshold level of interest rate, above which growth or investment turns negative? The application of Hansen's (2000) threshold estimation approach to the case of Nigeria in this paper provides affirmative evidence to these questions.

With the removal of all controls on interest rates since 1987, and the Central Bank of Nigeria's (CBN) policy adoption of fixing only its minimum rediscount rate to show the desired direction of interest rate changes, the Nigerian government, through the CBN, has interfered in every aspect of the financial system, such as directives on the required spreads between deposit and lending rates. This includes the maximum margin between each bank's average cost of funds and its maximum lending rates, and prescriptions of savings deposit rate and maximum lending rate. Both partial deregulation and total deregulation of interest rates have been adopted, with consequent negative economic effects.

The governments' efforts at controlling interest rates have undermined financial depth and, subsequently, growth of the Nigerian economy (Imoisi, Chika & Moses, 2010). While lending interest rates edged up from 1970 to 1994, fell in the late 1990s, rose again in the early 2000s and eventually fell to 18% by the first quarter of 2016, the trend of GDP growth rates exhibited a major drop till 1987, then rose again till 2004 and finally fell to -0.36% in the first quarter of 2016.

As shown in Figure 1, the GDP growth rate seems to be high in periods when the lending interest rate is low, and low when the lending interest rate is high.



#### Figure 1. GDP Growth and Lending Interest Rate in Nigeria Source: CBN Statistical Bulletin (2017)

The literature suggests indiscriminate distortions of financial prices, such as interest rates, and tends to reduce the real rates of investment and growth (Shaw, 1973; Oriavwote & Oyovwi, 2014; Agwu, 2015; Bagus, 2015; Eke, Eke & Inyang, 2015; Udoka & Bassey, 2015; Ayeomoni, Olajide, Agbaje & Aladejana, 2016; Hogan & White, 2016; Adeola & Evans, 2017; Hoffmann, 2017). In the case of Nigeria, it is crucial to ask whether the interest rate level is appropriate and when, if possible, it can be harmful. This study hence provides evidence of a threshold level of interest rate above which the effect of interest rate is negative and statistically significant, using Hansen's (2000) threshold estimation approach to estimate the threshold points, their values and their coefficients.

Moreover, an exhaustive review of the interest rate literature has shown that the problem of threshold estimation of the interest rate has received surprisingly little or no attention, both empirically and methodologically, except a little mention in *Sound Finance and Sustainable Development in Asia*, where Stiglitz (1998) proposed that any increase in the real interest rate reduces the private sector's investment. In other words, from the perspective of Stiglitz, "the effect of real interest rate on investment of the private sector

is not always positive or negative, and there is a threshold level for the real interest rate, to less than which reduction of real interest rate decreases the private sector's investment" (as cited in Tehranchian & Behravesh, 2011: 42).

Tehranchian and Behravesh (2011) found that an increase of more than 2 percent (2%) in real interest rate reduces the private sector's investment in Iran, in line with Stiglitz's argument about a one-threshold level (close to zero) of the real interest rate. However, the span of interest rates used in Tehranchian and Behravesh's study (i.e. 0% - 2%) is too small, and the incorporation of GDP and government expenditure in the same model subjected the model to multi-collinearity, thus marring the study. However, Hansen's (2000) threshold framework will lend a relative completeness to the assessment of the interest rate dynamics (i.e., 0% - 30%) on economic growth and investment growth, and is quite informative; hence its adoption for the current study.

The remainder of this paper is organised as follows: Section 2 provides an overview of recent studies on interest rate, its thresholds, and on economic as well as investment growth. Section 3 describes empirical specification, procedures for estimation and inference, and the dataset use. Section 4 contains the empirical results. Finally, Section 5 presents the main conclusions of the study and policy recommendations.

#### **2. LITERATURE REVIEW**

Keynesian investment theory, McKinnon (1973) and Shaw's (1973) saving and investment hypotheses inform the resolve for interest rate deregulation in many developed and developing countries. The implication of the Keynesian theory is that low interest rate, as a component of cost, is unfavourable to increased savings and thus investment demand (Guerrieri & Lorenzoni, 2017; Holston, Laubach & Williams, 2017; Johnson, 2017). The argument is that an increase in the real interest rate has significant positive effects on savings. These savings, as well, can be channelled to investment, and those who have excess liquidity are encouraged to save as a result of the high interest rate. This way, banks can have excess money to loan out to investors, thereby increasing the quantum of productive investment. Likewise, Fry (1995) supports the hypothesis that interest rate determines investment. There are two possible transmission channels here: interest rate as cost of capital and as incentive for loans (external finance).

The classical theory (i.e., the supply and demand theory of savings) posits that supply and demand of capital determine the rate of interest as a result of the expected productivity of capital (Johnson, 2017). Both productivity of capital and time preference depend on saving or thrift. In contrast, the Keynesian liquidity preference theory emphasizes the rate of interest as a purely monetary phenomenon. Yet, the fact that the latter theory considers the supply of money as given in the short-run and that the liquidity preference or demand for money determines the interest rate, makes it a stock analysis. The loanable funds theory happens to be a flow theory; it posits that the demand for and supply of loanable funds determine the interest rate (Jakab & Kumhof, 2015; Ogbulu, Uruakpa & Umezinwa, 2015; Taylor, 2017; Thomas, 2018; Fiebinger & Lavoie, 2018). Since it marries bank money on the supply side, interest rates with savings, and dis-hoarding, this theory can be said to be moored to the Keynesian theory.

The significance of the interest rate is well-recognized in finance and development literature, as traceable to McKinnon (1973) and Shaw's (1973) hypotheses (Çiftçioğlu & Almasifard, 2015; Ogbulu et al., 2015; Hajilee & Al Nasser, 2017; Obstfeld & Taylor, 2017; Salces, 2017; Loizos, 2018; Ofori & Asumadu, 2018). The McKinnon-Shaw model is an investment function which is a negative function of the rate of interest and a positive function of the rate of growth. Both McKinnon (1973) and Shaw (1973) show that the interest rate, through financial liberalization or financial repression, has important effects on savings and investment (i.e. via credit availability; see Agenor & Montiel, 1996; Obawuyi & Demehin, 2012; Evans, 2017). What studies such as McKinnon (1973) and Shaw (1973) achieved is the portrayal of regulations and impositions of ceilings on deposit and lending rates at a

low level relative to inflation as the cause of financial repression, because the consequent low or negative interest rate spreads, dampen saving mobilization and the conduit of mobilized savings through the financial system. This inhibition, as well, has a negative effect on the size and scope of investment and hence economic growth (Obawuyi & Demehin, 2012; Evans, 2017).

Most of the theoretical models in the monetary literature agrees that the interest rate is a fundamental constituent of monetary policy formulation as well as asset valuation (McKinnon, 1973; Shaw, 1973; Fry, 1995). Interest rate is one of the most significant factors affecting private investment. According to traditional monetarists, with respect to expansionary monetary policies, a reduction in the interest rate leads to increased investment (Hellwig, 2015; Sumner, 2015; Mishkin, 2017; Tobin, 2017; Fiebinger & Lavoie, 2018; Thornton, 2018; Twinoburyo & Odhiambo, 2018). Yet the impact of interest rate on investment and growth is not often positive, as there is a threshold level at which reduction or increase in interest rate leads to decrease in investment and growth.

There are four principal predictions in the literature regarding the effects of interest rate:

- It plays a key role in the term structure of interest rate;
- The real interest rate is an important determinant of the savings and investment behaviours of households and enterprises;
- It is of key importance in terms of cyclical development and longterm economic growth, and
- Real interest rates contain important information about investment conditions in the capital market and the economy's financing terms.

What level of interest rate is harmful to investment and economic growth? Economic theories come to various conclusions about the response of investment and output growth to interest rate. An exhaustive review of the interest rate literature has shown that there is no unanimous view on the impact of interest rate, but there is a vast amount of literature from multiple [74] JMA – Issue I – 2019

domains dealing with interest rate (McKinnon, 1973; Shaw, 1973; Ucer, 1997; Soyibo & Olayiwola, 2000; Aron & Muellbauer, 2002; Favero & Giavazzi, 2005; Blanchard, 2005; Obawuyi & Demehin, 2012; Corrêa & Caetano, 2013; Kelikume & Evans, 2015; Nwaogwugwu & Evans, 2016). In short, a considerable body of evidence has focused on interest rates in relation to the performance of the economy and other macro-economic variables, as different authors with diverse background trace the idea from different intellectual origins.

With the general growth of policies of financial sector liberalization, it is hardly surprising that interest rate reform has occupied a crucial spot in the achievement of efficiency in the financial sector, as well as in stimulating financial deepening of economies all over the world (Xiaochuan, & Li, 1987; Onvishi, Arene & Ifiorah, 2015; Arteta, Kose, Stocker & Taskin, 2016; Henisz & Mansfield, 2016; Kuttner & Shim, 2016; Nemoto, 2017; Evans, 2017). McKinnon (1973) and Shaw's (1973) core argument is that an increase in the real interest rate encourages savers to save more, thus creating more investment. In other words, the expectation from interest rate deregulation is to boost domestic savings and loanable funds (Obawuyi & Demehin, 2012). Ucer (1997, as cited in Obawuyi & Demehin, 2012) also concurred that positive real interest rates led to financial deepening, higher level of intermediation, more demand for money, more savings and more investment, which in turn, promotes growth. However, Obawuyi and Demehin (2012) argued that the "tunnel-like" structure of interest rates in Nigeria can discourage savings and retard growth vis-à-vis the connection between savings, investment and economic growth. The tunnel-like structure of interest rates discourages savings, and negatively affects funds mobilization by the banks, which in turn affects the size of funds available for investment and hence economic growth (Obawuyi & Demehin, 2012). Conversely, high interest rates discourage investment and hence economic growth; it discourages borrowers with worthwhile investments from seeking loans and shrinks the quality of applicants, and it creates a moral hazard where borrowers seek loans in order to escape bankruptcy instead of investing (Soyibo & Olayiwola, 2000). Economic theory as well advocates

that higher interest rates restrain consumer and investment spending directly, through their indirect impact on asset values and income expectations (Aron & Muellbauer, 2002; Evans, Adeniji, Nwaogwugwu, Kelikume, Dakare & Oke, 2018). Many studies such as Sims (1980, 1987, 1996), Todd (1990), Bernanke (1990) and Aron and Muellbauer (2002) have used Vector Autoregressive Models (VARs) to study the impacts of interest rates on output growth. Aron and Muellbauer (2002) find that both levels and changes in nominal interest rates have a negative impact on future output. Using a differenced VAR, Sun et al. (2010) found that an exogenous, unexpected and temporary increase in the growth rate of money market short-term interest rates has insignificant impact on the change rates of the real GDP and the price level.

Blanchard (2005) established a connection between interest rate and default probability in an economy with high public debt. In such economies, under an inflation targeting framework, increasing the interest rate in order to stem the tide of rising inflation would lead to a more depreciated exchange rate and thus, to much higher inflation (Corrêa & Caetano, 2013). Favero and Giavazzi (2005) established an empirical model where there is possibility for change from a good equilibrium to a bad equilibrium in the economy, when the share of public debt to GDP crosses over a delimited threshold. In Favero and Giavazzi's model, any attempt by policy-makers to increase the interest rate in order to stem the tide of inflation when the ratio has passed the threshold, leads to increase in debt payments, and therefore worsens the default probability (as cited in Corrêa & Caetano, 2013).

It must be reiterated that the history of interest-rate rules suggests that targeting a nominal interest rate could lead to unstable inflation dynamics, especially when inflation expectations are close to recent inflation experience. As depicted in Knut Wicksell's (2016) elucidation of the "cumulative process," a rise in expected inflation leads to a lower perceived real interest rate, which fuels demand, breeds higher inflation, increases expected inflation more and drives inflation higher in a self-fulfilling spiral. Woodford (2001) argued that this classic analysis makes an implicit assumption of an exogenous target path for the nominal interest rate, and [76] JMA – Issue I – 2019

Taylor (2017) rules that inflation and output gap is in fact capable of dampening such an inflationary spiral. Woodford (2001) specifically argued for more gradual adjustment of the level of interest rates.

In addition, existing studies have predicted that higher deposit interest rates due to liberalisation increase savings, thereby improving economic growth, but if financial markets are frail, effective transmission of interest rates policy will be limited (Udoka & Anyingang, 2012; Taylor, 2004). Nigerian economists have done several works in this regard. They have posited, for instance, that a direct relationship exists between interest rate and the growth of the Nigerian economy that interest rate deregulation aids economic performance, and that growth after interest rate deregulation is greater than growth after de-regulations (Udoka & Anyingang, 2012; Akinlo, 2005).

In short, many studies have examined Nigeria's monetary policy mechanism, focusing on the effectiveness of intermediate targets, M1 and M2 (Evans, 2019), yet the literature has contended that monetary aggregates are no longer appropriate intermediate targets, because the money multiplier is not stable, and monetary aggregates cannot be easily controlled by the monetary authorities. Consequently, studies such as Borio et al. (2017), and Ho (2008) suggest that all central banks in advanced countries implement monetary policy by means of "market-oriented instruments geared to influence closely short-term interest rates as operating targets" (as cited in Sun, Gan & Hu, 2010:173). According to Ho (2008), focusing on short-term money market interest rates as operating objectives and using interest rate corridors with penalty rates, have become broad themes across central banks' policy implementation.

However, measuring real interest rates is problematic as the expected cannot be observed directly. Therefore, any attempt by the central bank to regulate real interest rates often causes a number of problems. According to Imoisi et al. (2010:648), there are two major reasons:

Monetary policy has a direct effect only on the short end of the interest rate spectrum. The attempt to use an expansionary monetary policy to drive long-term real interest rates below their equilibrium value would merely lead, in the medium term, to price increases which would, in turn, be reflected in a higher inflation risk premium and therefore in higher capital costs.

Based on the aforementioned problems of measuring interest rates, it can be seen how extensive the difference of opinion is on the way that interest rates series should be modelled in econometric literature. Unlike other financial time series, the interest rate is often accompanied by positive correlation of volatility and interest rate levels, but the phenomenon of volatility clustering is always present. Modelling the level-volatility relationship has been problematic in various GARCH-types, regime-switching models and Markov-switching approaches (Dellaportas, David & Holmes, 2007). For the fact that they are crucial in hedging interest rate risk and in the pricing of bond derivatives, the most prominent models have been developed in continuous-time financial theory. Chan, Karolyi, Longstaff and Sanders (1992) developed a general model framework of such models.

However, as a result of the apparent inadequacy of Chan et al. (1992), and other popular models to capture the peculiar behavior of the data, some recent studies such as Dellaportas et al. (2007), explore more complex nonlinear dynamics in the time series of short-term interest rates. This fact has been motivated by the apparent inadequacy of the popular models to capture the peculiar behavior of the data. For example, Dellaportas et al. (2007) suggested automatic model determination with the aid of Bayesian inference via the reversible jump Markov Chain Monte Carlo algorithm, allowing the thresholds in the volatility to be determined not only by the interest rate but also by other economic factors.

Overall, the existing literature is mostly limited to investigating the interestrate rules, the effects of interest rate on savings, investment and growth, and interest rate deregulation and economic performance. The threshold estimation of the interest rate is a scarcely studied issue. Most of the studies [78] JMA – Issue I – 2019 in the literature have explored the effects of interest rate on savings, investment and growth, to the disregard of the threshold effect of interest rate on growth and investment in Nigeria. This study fills that gap in the literature. Hence, it attempts to show empirically the threshold effect of interest rate on growth and investment in Nigeria.

#### **3. RESEARCH METHODOLOGY**

In order to establish a threshold model between interest rate and economic growth for the Nigerian economy, the following threshold least square regression model is considered:

$$y_{t} = \gamma_{t}(R_{t} \leq R^{*}) + \gamma_{t}(R_{t} > R^{*}) + \lambda_{1t}X_{1t}(R_{t} \leq R^{*}) + \lambda_{2t}X_{2t}(R_{t} > R^{*}) + \lambda_{3t}R_{1t}(R_{t} \leq R^{*}) + \lambda_{4t}R_{1t}(R_{t} > R^{*}) + \xi_{t}$$
(1),

Where  $y_{it}$  is the dependent variable (i.e. growth rate of GDP or growth rate of investment),  $X_{it}$  is a matrix of controls,  $R_t$  is the interest rate, and  $R^*$  is the interest rate threshold; thus  $R_t \leq R^*$  is an indicator function.

A vast array of variables has been employed in growth empirics with regard to the choice of control variables. Yet a number of these are inapplicable to a developing country such as Nigeria. Therefore, a survey of the literature on developing countries, especially work done on Nigeria, guided the choice of the variables. These are interest rate (R), inflation (CPI), growth rates of GDP and investment (INV).

However, using the model in (1) would hamper the need to derive the threshold levels in a non-arbitrary way, because the study would have to try different ranges of interest rates. This might lend a relative completeness to the assessment of the interest rate dynamics on economic growth and investment growth, and is informative. On the other hand, it fails to permit a precise calculation of the statistical significance of the thresholds.

In order to remove this predicament, this study employs the Hansen (2000) threshold framework as follows:

$$GDP_t = \gamma_1 R_t + \gamma_2 D(R_t - R^*) + \gamma_3 CPI + \xi_t$$
(2)

$$INV_{t} = \gamma_{1}R_{t} + \gamma_{2}D(R_{t} - R^{*}) + \gamma_{3}CPI + \zeta_{t}$$
(3)

$$I_{it}^{D^*} = \begin{cases} 1 \text{ if } D_{it} > D'' \\ 0 \text{ if } D_{it} < D'' \end{cases} \quad i = 1, ..., N \quad t = 1, ..., T$$
(4)

$$I_{it}^{D^{*}} = \begin{cases} 1 \text{ if } D_{it} > D^{"} \\ 0 \text{ if } D_{it} < D^{"} \\ (4), \end{cases} \quad i = 1, ..., N \quad t = 1, ..., T$$

Where  $R^*$  is the threshold level of interest rate and *D* is a dummy variable that takes the value of one for interest rate level greater than  $R^*$  and zero otherwise. The second terms in (2) and (3) allow for thresholds effects, subject to the actual level of interest rate. Since  $R^*$  is not known, (2) and (3) are estimated repeatedly with a threshold search over the range 0 to 30% in increments of 0.1%. So, interest rate threshold among the following values of  $R^*$ , {0%, 1%, 2%, ..., 29%, 30%}, is explored for both economic and investment growth, making a total of 620 regressions. Then, based on the Residual Sum of Squares (RSS) of each individual regression, the optimal level of threshold is selected.

Further, as part of the robustness in checking the empirical results, this study examines the causal relationships between interest rate and economic growth on the one hand, as well as interest rate and investment growth, on the other. Is it interest rate that is powering economic growth? Or, is it economic growth that is driving interest rate? These questions can be answered appropriately, using the conventional model for testing causality proposed by Granger (1969), which is designed to detect a correlation between the current value of one variable and the past values of another variable (as cited in Chiou-Wei, Chen & Zhu, 2008). The Granger causality test, a statistical hypothesis test, determines whether one-time series can forecast another. In other words, it measures the facility of predicting the future values of one

variable using past values of another. A time series R is said to Grangercause GDP if R values provide statistically significant information about future values of GDP, through a series of F-tests on lagged values of R and GDP.

The Granger causality test is performed using the level values of the variables if the variables are stationary processes. The test uses higher differences if the variables are non-stationary. Using an information criterion, such as the Schwarz information criterion or Akaike information criterion, the number of lags is chosen. Then, if lagged values of an explanatory variable jointly add explanatory power to the model, according to an F-test, can the null hypothesis of no Granger causality be rejected.

Consider a bivariate VAR model with the two time-series  $R_t$  and  $GDP_t$ ,

$$\Delta GDP_{t} = \alpha_{11} + \sum_{i=1}^{t_{11}} \beta_{11} \Delta GDP_{t-i} + \sum_{j=1}^{t_{12}} \beta_{12} \Delta R_{t-j} + v_{1t}$$
(5)  
$$\Delta R_{t} = \alpha_{20} + \sum_{i=1}^{t_{21}} \beta_{21} \Delta R_{t-i} + \sum_{j=1}^{t_{22}} \beta_{22} \Delta GDP_{t-j} + v_{2t}$$
(6)

Where t is the lag order;  $\Delta$  is the difference operator;  $\alpha$  and  $\beta$  are parameters for estimation, and v is the error term.

Finally, this study centres on interest rate threshold in Nigeria. Quarterly data from 2006 to 2017 of prime lending rate, inflation, investment and GDP growth rate for Nigeria are used and were obtained from the databanks of Central Bank of Nigeria (CBN, 2016).

#### 4. RESULTS

The empirical estimates from equations (1) and (2), depicted in Tables 1 to 3 and illustrated in Figures 2, 3, 4 and 5, show that there are threshold effects in the relationship between interest rate and economic growth on one hand, and interest rate and investment growth, on the other. For economic growth, the threshold impacts appear at 21.1% interest rate levels (see Table 1 and

Figure 2). A similar pattern exists for investment growth, except that the tipping point is an interest rate level of 22.6% (see Table 2 and Figure 2).

R*	VARIABLE	CO-EFF	STD. ERROR	T- STAT	PROB	<b>R</b> <sup>2</sup>	ADJ. R <sup>2</sup>	RSS
21.0%	Rt	-0.08	0.03	-2.67	0.00			
	D(Rt-R)	-0.02	0.01	-1.34	0.12	0.50	0.42	242.87
	СРІ	0.15	0.06	2.26	0.01	0.50	0.42	243.07
	INV	0.07	0.01	4.41	0.01			
21.1%	Rt	-0.07	0.03	-2.58	0.00			
	D(Rt-R)	-0.02	0.01	-1.16	0.17			
	СРІ	0.15	0.06	2.14	0.02			
	INV	0.07	0.01	4.51	0.01	0.42	0.24	102 72
21.2%	Rt	-0.08	0.03	-2.59	0.00	0.42	0.34	193.73
	D(Rt-R)	-0.01	0.01	-0.72	0.37			
	СРІ	0.16	0.06	2.32	0.01			
	INV	0.06	0.01	4.68	0.01			

Table 1: Threshold Effects of Interest Rate on Economic GrowthDependent Variable: GDP Growth

R*	VARIABLE	CO-EFF	STD. ERROR	T- STAT	PROB	R <sup>2</sup>	ADJ. R <sup>2</sup>	RSS
21.3%	Rt	-0.08	0.03	-2.59	0.00			
	D(Rt-R)	-0.01	0.01	-0.71	0.38	0.42	0.24	270.05
	СРІ	0.16	0.06	2.34	0.01	0.42	0.34	279.95
	INV	0.06	0.01	4.77	0.01			
21.4%	Rt	-0.07	0.03	-2.50	0.01			
	D(Rt-R)	0.00	0.01	-0.17	0.75	0.41	0.22	271.20
	СРІ	0.16	0.06	2.30	0.01	0.41	0.32	2/1.29
	INV	0.05	0.01	4.60	0.01			
21.5%	Rt	-0.07	0.03	-2.56	0.00			
	D(Rt-R)	-0.01	0.01	-0.93	0.27		0.25	260.12
	СРІ	0.16	0.06	2.34	0.01	0.44	0.33	209.15
	INV	0.06	0.01	5.38	0.01			
21.6%	Rt	-0.08	0.03	-2.65	0.00			
	D(Rt-R)	-0.02	0.01	-1.62	0.06	0.50	0.42	750.05
	СРІ	0.17	0.06	2.43	0.01	0.30	0.42	238.83
	INV	0.06	0.01	6.00	0.01			
21.7%	Rt	-0.08	0.03	-2.67	0.00			
	D(Rt-R)	-0.02	0.01	-1.65	0.06	0.47	0.20	220 12
	СРІ	0.17	0.06	2.42	0.01	0.47	0.39	556.12
	INV	0.06	0.01	6.14	0.01			
21.8%	Rt	-0.08	0.02	-2.77	0.00			
	D(Rt-R)	-0.02	0.01	-2.29	0.01	0.45	0.37	306 74
	СРІ	0.15	0.06	2.22	0.01	0.45	0.37	500.74
	INV	0.07	0.01	6.63	0.01			
21.9%	Rt	-0.08	0.02	-2.85	0.00			
	D(Rt-R)	-0.02	0.01	-2.24	0.01			
	СРІ	0.15	0.06	2.31	0.01			
	INV	0.06	0.01	6.65	0.01	0.49	0.40	350.20
22.0%	Rt	-0.08	0.02	-2.79	0.00	0.40	0.40	330.30
	D(Rt-R)	-0.02	0.01	-2.09	0.02			
	СРІ	0.15	0.06	2.25	0.01			
	INV	0.06	0.01	6.63	0.01			

Journal of Management and Administration

ISSN 1728 – 9157

R*	VARIABLE	CO-EFF	STD. ERROR	T- STAT	PROB	<b>R</b> <sup>2</sup>	ADJ. R <sup>2</sup>	RSS
22.1%	Rt	-0.08	0.03	-2.77	0.00			
	D(Rt-R)	-0.02	0.01	-1.93	0.03	0.44	0.26	261.28
	CPI	0.15	0.06	2.24	0.01	0.44	0.30	304.28
	INV	0.06	0.01	6.55	0.01			
22.2%	Rt	-0.08	0.02	-2.75	0.00			
	D(Rt-R)	-0.02	0.01	-2.23	0.01	0.43	0.25	284 20
	CPI	0.16	0.06	2.40	0.01	0.43	0.35	364.39
	INV	0.06	0.01	6.83	0.01			
22.3%	Rt	-0.04	0.02	-1.53	0.02			
	D(Rt-R)	-0.08	0.02	-1.55	0.04	0.46	0.28	202.22
	СРІ	0.06	0.02	1.57	0.03	0.40	0.38	373.32
	INV	0.13	0.02	1.59	0.08			

<b>Table 2: Threshold Effects of Interest Rate on Investment Growth</b>
Dependent Variable: Investment Growth

R*	VARIABLE	CO-EFF	STD. ERROR	T- STAT	PROB	R <sup>2</sup>	ADJ. R <sup>2</sup>	RSS
22.0%	Rt	-0.10	0.03	-3.55	0.00			
	D(Rt-R)	-0.03	0.02	-1.78	0.16	0.70	0.65	612.60
	CPI	0.21	0.08	3.01	0.01	0.79	0.05	012.00
	GDP	0.09	0.02	5.87	0.02			
22.1%	Rt	-0.10	0.03	-3.44	0.01			
	D(Rt-R)	-0.02	0.02	-1.55	0.23	0.76	0.62	580.85
	CPI	0.20	0.08	2.86	0.02	0.70	0.02	389.83
	GDP	0.09	0.02	6.01	0.02			
22.2%	Rt	-0.10	0.03	-3.45	0.00			
	D(Rt-R)	-0.01	0.01	-0.96	0.50			
	CPI	0.21	0.08	3.09	0.01			
	GDP	0.08	0.01	6.23	0.02	0.71	0.57	580.00
22.3%	Rt	-0.10	0.03	-3.45	0.00	0.71	0.37	389.09
	D(Rt-R)	-0.01	0.01	-0.95	0.50			
	СРІ	0.21	0.08	3.11	0.01			
	GDP	0.08	0.01	6.35	0.01			

R*	VARIABLE	CO-EFF	STD. ERROR	T- STAT	PROB	R <sup>2</sup>	ADJ. R <sup>2</sup>	RSS
22.4%	Rt	-0.10	0.03	-3.33	0.01			
	D(Rt-R)	0.00	0.01	-0.23	1.00	0.01	0.00	425.20
	CPI	0.21	0.08	3.07	0.01	0.81	0.68	435.29
	GDP	0.07	0.01	6.13	0.01			
22.5%	Rt	-0.10	0.03	-3.42	0.01			
	D(Rt-R)	-0.01	0.01	-1.24	0.35	0.92	0.00	410.12
1	CPI	0.21	0.08	3.11	0.01	0.82	0.08	410.12
	GDP	0.08	0.01	7.17	0.01			
22.6%	Rt	-0.10	0.03	-3.53	0.00			
	D(Rt-R)	-0.02	0.01	-2.16	0.08	0.74	0.00	220.00
	CPI	0.22	0.08	3.23	0.01	0.74	0.60	329.09
	GDP	0.08	0.01	7.99	0.01			
22.7%	Rt	-0.10	0.03	-3.55	0.00			
	D(Rt-R)	-0.02	0.01	-2.20	0.08	0.94	0.70	15( 22
	CPI	0.22	0.08	3.23	0.01	0.84	0.70	450.23
	GDP	0.08	0.01	8.17	0.01			
22.8%	Rt	-0.10	0.03	-3.70	0.00			
	D(Rt-R)	-0.03	0.01	-3.05	0.01	0.71	0.57	452 59
	CPI	0.20	0.08	2.96	0.02	0.71	0.57	452.58
	GDP	0.09	0.01	8.83	0.01			
22.9%	Rt	-0.11	0.03	-3.79	0.00			
	D(Rt-R)	-0.03	0.01	-2.99	0.02	0.00	0.54	515.02
1	CPI	0.21	0.08	3.07	0.01	0.09	0.34	515.85
	GDP	0.09	0.01	8.86	0.01			
23.0%	Rt	-0.11	0.03	-3.72	0.00			
	D(Rt-R)	-0.03	0.01	-2.79	0.02	0.74	0.50	510.07
	CPI	0.20	0.08	3.00	0.01	0.74	0.39	510.07
	GDP	0.08	0.01	8.83	0.01			
23.1%	Rt	-0.10	0.03	-3.68	0.00			
	D(Rt-R)	-0.02	0.01	-2.57	0.04	0.94	0.70	170 70
	CPI	0.20	0.08	2.99	0.02	0.84	0.70	4/0./8
	GDP	0.08	0.01	8.73	0.01			
23.2%	Rt	-0.10	0.03	-3.66	0.00			
	D(Rt-R)	-0.03	0.01	-2.97	0.02	0.72	0.50	616 17
	CPI	0.21	0.08	3.20	0.01	0.72	0.39	040.42
	GDP	0.08	0.01	9.10	0.01			
23.3%	Rt	-0.05	0.03	-2.04	0.03			
	D(Rt-R)	-0.10	0.03	-2.07	0.06	0 77	0.64	661 12
	СРІ	0.08	0.03	2.09	0.04	0.//	0.04	001.43
	GDP	0.17	0.03	2.12	0.10			

Journal of Management and Administration

The empirical estimates from equations (1) and (2) are illustrated in Figures 2, 3, 4 and 5.



Figure 2: Sum of Squared Residuals as a Function of Interest Rate Threshold - Dependent Variable: GDP Growth



**Figure 3: Sum of Squared Residuals as a Function of Interest Rate Threshold - Dependent Variable: Investment Growth** 

	F-STATISTIC
R ──→GDP	5.94**
GDP → R	1.77***
R−−−−► INV	
INV—→ R	2.39***

**Table 3: Pairwise Granger Causality Tests** 

Notes: \*\* and \*\*\* indicate statistical significance at 5 and 10%.

#### **5. DISCUSSION AND IMPLICATIONS**

For economic growth, the threshold impacts appear at 21.1% interest rate levels. Increases in interest rate up to the threshold value are accompanied with faster economic growth of roughly 9 percentage points when interest rate is lower than the threshold value of 21.1%. Nine (9) percentage points is the average of the interest rate coefficients between 0 and 21.1% levels of interest rate. Emerging markets such as Nigeria tend to be resource-constrained, and so interest rates as high as 21.1% can lead to higher growth rates.

As the interest rate continues to rise beyond the 21.1% threshold value, economic growth effects switch from positive to negative as the high interest rates become a hindrance to economic growth. There are one or two reasons for this threshold. At this point, the economy may begin to suffer from what can be termed "wealth swallow", and borrowing is discouraged, while saving is encouraged. It can dry up the stock market and thus swallow all the wealth effects for individuals, as a result of loss of confidence. The inflation-growth effect is also at the mercy of the 21.1% threshold. At interest rate levels below this threshold, inflation has a negative impact on economic growth, while beyond the threshold the impacts are not significant.

A similar pattern exists for investment growth, except that the tipping point is an interest rate level of 22.6%. The high interest rate threshold of 22.6 % is important for the effects of investment on economic growth. At interest rate levels below 22.6%, investment growth is positive. As the interest rate levels beyond this threshold, the positive investment growth effect weakens and becomes significantly negative. At interest rate levels below this threshold, greater investment has a positive impact on growth, while the impacts are not significant once interest rate levels cross the threshold.

To put the 21.1% and 22.6% interest rate thresholds in perspective, consider Figures 4 and 5, which show the interest rate contributions to annual economic and investment growth as a result of the thresholds. It shows the growth losses and gains over the period 2016 to 2016 Q1 far surpassing or staying below the thresholds for prolonged periods. It suggests that it is very dear for Nigeria to go beyond the threshold for a prolonged period. The evidence shows that this has a negative impact on economic growth as well as investment growth over the 2006 to 2016 Q1 period.



## Figure 4: Stylized Shape of the Threshold Effects of Interest Rate on Economic Growth



## Figure 5: Stylized Shape of the Threshold Effects of Interest Rate on Investment Growth

The findings show that emerging markets like Nigeria face higher thresholds of interest rates and that high levels of interest rate, especially for developing countries, can have adverse effects on investment and growth levels. The empirical results indicate that interest rate contributes positively to growth when it is below 21.1%, but can raise major concerns for growth beyond the 21.1% level. Further, between 0 and 21.1% levels, the incremental impact of interest rate shrinks, where its contribution to growth from each extra rise in interest rate reduces up to the 21.1% threshold, and then becomes negative.

Moreover, there is a bidirectional causality between interest rate, GDP growth and investment growth. In order words, the lagged values of interest rate have predictive power on the future values of GDP growth rates as well as investment growth rates in Nigeria. Alternatively, or at the same time, higher interest rates constrain the amount of funds available for investment and in turn growth. As well, there is a possibility that increasing the level of interest rate increases investors' uncertainty about the policy direction of the government and thus is a disincentive to investment. This shows the nature and extent to which interest rate impacts prospects for macro-economic performance in developing countries, especially Nigeria.

#### 6. CONCLUDING REMARKS

This study has contributed to interest rate literature by identifying the threshold effects of interest rate on economic and investment growth rates in Nigeria. The study adopted Hansen's (2000) threshold estimation approach. The findings show that emerging markets such as Nigeria face high thresholds of interest rates and that high levels of interest rate can have negative effects on growth levels.

The logical conclusion is that Nigeria, and other developing countries as well, with prime lending rates above 22.6%, should aim to achieve interest rate levels that do not inhibit growth by adopting polices that put interest rates on the right trajectory below the 22.6% threshold.

Emerging markets have been identified in the literature to have much higher interest rate levels than developed countries. Since Nigeria, which is under investigation currently, has high interest rates far above the recommended threshold in some sectors, it is crucial for them and other emerging markets to engage in interest rate reform. However, with prolonged impacts from the current oil slide, including higher inflationary and unemployment levels, interest rate reform would become more challenging. For that reason, to realize faster and sustained economic and investment growth paths, the government and the private sector need to engage with more innovative ideas, and devise a stronger monetary policy for Nigeria.

#### REFERENCES

Adeola, O. and Evans, O. 2017. The impact of microfinance on financial inclusion in Nigeria. *The Journal of Developing Areas*, 51(4), pp. 193-206. Agenor, P. and Montiel, P. 1996. *Development Macro-economics*, Princeton University Press.

Agwu, C. 2015. Determinants of Investment in Nigeria. An Econometrics Analysis. *Journal of Studies in Management and Planning*, *1*(3), pp.418-430.

Aron, J. and Muellbauer, J. 2002. Interest rate effects on output: evidence from a GDP forecasting model for South Africa. *IMF Staff papers*, 49(1), pp.185-213.

Arteta, C., Kose, M.A., Stocker, M. and Taskin, T. 2016. *Negative interest rate policies: Sources and implications*. The World Bank.

Asamoah, G. N. 2008. The Impact of the financial Sector reforms on savings, investments and growth of Gross Domestic Product (GDP) in Ghana, *International Business & Economic Research Journal*, 7(10), pp.73-84.

Ayeomoni, I.O., Olajide, G.F., Agbaje, W.H. and Aladejana, S.A. 2016. Analysis of interest rate volatility on the real sector in Nigeria: The Case Study of Agricultural Sector. *Journal of Empirical Economics*, *5*(2), pp.114-128.

Bagus, P. 2015. The ZIRP Trap - why low interest rates are a tax on recovery. *Institute for Research in Economic and Fiscal Issues*. IREF Working Paper Series No. 201502.

Barsky, R., Justiniano, A. and Melosi, L. 2014. The natural rate of interest and its usefulness for monetary policy. *American Economic Review*, *104*(5), pp. 37-43. BIS Working Paper No. 685.

Bernanke, B. 1990. On the predictive power of interest rates and interest rate spreads. *New England Economic Review, 3486.* pp.51-68.

Blanchard, O.J. 2005. Fiscal dominance and inflation targeting: Lessons from Brazil. In F. Giavazzi, I. Goldfajn, and S. Herrera. (Eds.), *Inflation Targeting, Debt, and the Brazilian Experience*. Cambridge: MIT Press.

Bofinger, P. and Ries, M. 2017. Excess saving and low interest rates: Theory and empirical evidence. *SSRN*. No. DP12111.

Borio, C.E., Disyatat, P., Juselius, M. and Rungcharoenkitkul, P. 2017. Why so low for so long? A long-term view of real interest rates. *BIS Working Papers*. No 685. Available: https://www.bis.org/publ/work685.pdf

Central Bank of Nigeria. 2016. Statistical Bulletin. Central Bank of Nigeria. Available: https://www.cbn.gov.ng/Out/2017/SD/2016%20Statistical%20Bulletin%20 Contents%20and%20Narratives.pdf. [Accessed 24 April 2019]

Chan, K.C., Karolyi, G.A., Longstaff, F.A. and Sanders, A.B. 1992. An empirical comparison of alternative models of the short-term interest rate. *The Journal of Finance*, *47*(3), pp.1209-1227.

Chiou-Wei, S.Z., Chen, C.F. and Zhu, Z. 2008. Economic growth and energy consumption revisited—evidence from linear and nonlinear Granger causality. *Energy Economics*, 30(6), pp.3063-3076.

Çiftçioğlu, S. and Almasifard, M. 2015. The response of consumption to alternative measures of financial development and real interest rate in a sample of central and east European countries. *Journal of Economics*, 3(2), pp. 1-6.

Corrêa, W.L.R. and Caetano, S.M. 2013. Monetary policy and transmission mechanism in Brazil: an empirical model. *Empirical Economics*, *45*(1), pp.115-135. Doi: 10.1007/s00181-012-0610-4

Dellaportas, P., Denison, D.G. and Holmes, C. 2007. Flexible threshold models for modelling interest rate volatility. *Econometric reviews*, *26*(2-4), pp.419-437.

Eichengreen, B. 2015. Secular stagnation: the long view. *American Economic Review*, 105(5), pp.66-70.

[92]

Eke, F.A., Eke, I.C. and Inyang, O.G. 2015. Interest rate and commercial banks' lending operations in Nigeria: A structural break analysis using chow test. *Global Journal of Social Sciences*, *14*(1), pp.9-22.

Evans, O. 2017. Threshold effects in the relationship between interest rate and financial inclusion in Nigeria. *Journal of Economics and Business Research*, 23(1).

Evans, O. 2019. Money, inflation and output in Nigeria and South Africa: Could Friedman and Schwartz Be Right? *Journal of African Business*, pp.1-15.

Evans, O., Adeniji, S., Nwaogwugwu, I., Kelikume, I., Dakare, O. and Oke, O. 2018. The relative effect of monetary and fiscal policy on economic development in Africa: A GMM approach to the St. Louis equation. *Business and Economic Quarterly*, *2*, pp.3-23.

Favero, C.A., and Giavazzi, F. 2005. Inflation targeting and debt: Lessons from Brazil. In: Giavazzi F., Goldfajn I., Herrera S. (Eds.), *Inflation targeting, debt, and the Brazilian experience, 1999 to 2003*. MIT Press.

Fiebinger, B. and Lavoie, M. 2018. *Helicopter Ben, monetarism, the New Keynesian credit view and loanable funds* (No. 20). FMM Working Paper.

Fischer, S. 2016. Monetary policy, financial stability, and the zero lower bound. *American Economic Review*, 106(5), pp. 39-42.

Fry, M.J. 1995. Financial development in Asia: some analytical issues. *Asian-Pacific Economic Literature*, 9(1), pp.40-57.

Galesi, A., Nuño, G., and Thomas, C. 2017. The natural interest rate: Concept, determinants and implications for monetary policy. *Banco de Espana Article*, 7(17).

Garín, J., Lester, R., and Sims, E. 2018. Raise Rates to Raise Inflation? Neo-Fisherianism in the New Keynesian Model. *Journal of Money, Credit and Banking*, 50(1), pp. 243-259.

Guerrieri, V., and Lorenzoni, G. 2017. Credit crises, precautionary savings, and the liquidity trap. *The Quarterly Journal of Economics*, 132(3), pp. 1427-1467.

Hajilee, M., and Al Nasser, O. M. 2017. The Impact of Interest Rate Volatility on Stock Market Development: Evidence from Emerging Markets. *The Journal of Developing Areas*, 51(2), pp. 301-313.

Hansen, B.E. 2000. Sample splitting and threshold estimation. *Econometrica*, 68(3), pp. 575-603.

Hellwig, M.F. 2015. Financial stability and monetary policy. *SRRN*, No. 2015/10.

Henisz, W. J. and Mansfield, E. D. 2016. *The Political Economy of Financial Reform: de Jure Liberalization vs. de Facto Implementation*. Working paper. The University of Pennsylvania.

Hoffmann, A. 2017. Beware of Financial Repression: Lessons from History. Leipzig University. Available at https://dx.doi.org/10.2139/ssrn.3124184

Hogan, T. L. and White, L. H. 2016. Hayek, Cassel, and the Origins of the Great Depression. GMU Working Paper in Economics. No. 16-41.

Holston, K., Laubach, T., and Williams, J. C. 2017. Measuring the natural rate of interest: International trends and determinants. *Journal of International Economics*, *108*, pp. S59-S75.

Imoisi, A.I., Chika, U.P. and Moses, O.L. 2012. An analysis of interest and exchange rates effect on the Nigerian economy: 1975–2008. *Asian Economic and Financial Review*, 2(6), pp.648-657.

Jakab, Z. and Kumhof, M. 2015. Banks are not intermediaries of loanable funds – and why this matters. Bank of England. https://www.bankofengland.co.uk/-/media/boe/files/workingpaper/2015/banks-are-not-intermediaries-of-loanable-funds-and-why-thismatters.pdf?la=en&hash=D6ACD5F0AC55064A95F295C5C290DA58AF 4B03B5

#### Journal of Management and Administration

Jelilov, G. and Maiga, K. 2016. The impact of interest rate on economic growth example of Nigeria. *African Journal of Social Sciences*, 6(2), pp. 51-64.

Johnson, H. G. 2017. *Macro-economics and monetary theory*. 1<sup>st</sup> Ed. New York: Routledge.

Kelikume, I. and Evans, O. 2015. Inflation targeting as a possible monetary framework for Nigeria. *The International Journal of Business and Finance Research*, 9(5), pp. 71-81.

Kuttner, K. N. and Shim, I. 2016. Can non-interest rate policies stabilize housing markets? Evidence from a panel of 57 economies. *Journal of Financial Stability*, 26, pp. 31-44.

Loizos, K. 2018. The Financial Repression-Liberalization Debate: Taking Stock, Looking for a Synthesis. *Journal of Economic Surveys*, 32(2), pp. 440-468.

McKinnon, R.I. 1973. *Money and capital in economic development*. Brookings Institution Press.

Mishkin, F.S. 2017. Making discretion in monetary policy more rule-like. *National Bureau of Economic Research*. No.24135. Available at https://www.nber.org/papers/w24135.pdf [Accessed 11 April 2019].

Nemoto, Y. 2017. Comment on "Banking system reform in China: The challenges to improving its efficiency in serving the real economy". *Asian Economic Policy Review*, *12*(2), pp.323-324.

Nwaogwugwu, I. and Evans, O. 2016. A sectoral analysis of fiscal and monetary actions in Nigeria. *The Journal of Developing Areas*, 50(4), pp. 211-230.

Obawuyi, T. M. and Demehin, J. A. 2012. Interest rate reforms and financial deepening in Nigeria. *The International Journal of Business and Finance Research*, 6(2), pp. 81-90.

Obstfeld, M. and Taylor, A. M. 2017. International monetary relations: Taking finance seriously. *Journal of Economic Perspectives*, 31(3), pp. 3-28.

Ofori, D. and Asumadu, G. 2018. Real Interest Rate and Investment Nexus: The Case of Ghana. *Global Journal of Management and Business*, 18(3C).

Ogbulu, O. M., Uruakpa, P. C. and Umezinwa, C. L. 2015. Empirical Investigation of the Impact of Deposit Rates on Fund Mobilization by Deposit Money Banks in Nigeria. *Journal of Finance*, 3(1), pp. 77-89.

Onyishi, L. O., Arene, C. J. and Ifiorah, C. M. 2015. Impact of interest rate reform on agricultural finance and growth in Nigeria. *Russian Journal of Agricultural and Socio-Economic Sciences*, 37(1).

Oriavwote, V. E. and Oyovwi, D. O. 2014. Interest Rate and Investment Decision in Nigeria: A Co-integration Approach. *American Journal of Business and Management*, 3(1), pp. 21-27.

Owoye, O. and Onafowora, O.A. 2007. M2 targeting, money demand, and real GDP growth in Nigeria: Do rules apply? *Journal of Business and Public affairs*, 1(2), pp.1-20.

Pigou, A. C. 2016. *Keynes's General Theory-A Retrospective View*. Read Books Ltd.

Salces, A. M. 2017. *Financial market liberalization in Chile*, *1973-1982*. 1<sup>st</sup> Ed. Routledge.

Shaw, E.S. 1973. Financial deepening in economic development. *The Journal of Finance*. (29)4, pp. 1345-1348.

Sims, C.A. 1980. Macroeconomics and reality. *Econometrica: Journal of the Econometric Society*, pp.1-48.

Sims, C. A. 1987. Vector Auto-regressions and Reality: Comment. *Journal* of Business and Economic Statistics, 5(4), pp. 443-49.

Sims, C. A. 1996. Macro-economics and methodology. *Journal of Economic Perspective*, 10, pp. 105- 20.

[96]

JMA – Issue I – 2019

Soyibo, A. and Olayiwola K. 2000. Interest rate policy and the promotion of savings investment and resource mobilisation in Nigeria, *Research Report 24*, Development Policy Centre, Ibadan.

Stiglitz, J.E. 1998. Sound finance and sustainable development in Asia. Washington DC: World Bank. Available: http://www.worldbank.org/html/extdr/extme/jssp031298.htm [Accessed 21 May, 2002].

Sumner, S. 2015. What would Milton Friedman have thought of the Great Recession? *American Journal of Economics and Sociology*, 74(2), pp. 209-235.

Sun, S., Gan, C. and Hu, B. 2010. The effects of short-term interest rates on output, price and exchange rates: recent evidence from China, *The International Journal of Business and Finance*, 4(1).

Taylor, L. 2017. The "Natural" Interest Rate and Secular Stagnation: Loanable Funds Macro Models Don't Fit Today's Institutions or Data. *Challenge*, 60(1), pp. 27-39.

Tehranchian, A.M. and Behravesh, M. 2011. Threshold effects of real interest rate on investment of the private sector in Iran: Testing Stieglitz's Theory. In *International Conference on Management (ICM 2011) Proceeding.* Conference Master Resources.

Thomas, D. G. 2018. The rate of interest and the new monetary Theory of Loanable Funds. *The Creators of Inside Money*, pp. 63-76. Palgrave Macmillan.

Thornton, S. 2018. Bucking the deficit: Economic Policy-making in America. New York: Routledge.

Tobin, J. 2017. Keynes's policies in theory and practice. *The Policy Consequences of John Maynard Keynes*, pp. 13-21. Routledge.

Todd, R.M. 1990. Vector auto regression evidence on monetarism: Another look at the robustness debate. *Federal Reserve Bank of Minneapolis*. *Quarterly Review-Federal Reserve Bank of Minneapolis*, 14(2), p.19.

JMA – Issue I - 2019

Twinoburyo, E. N. and Odhiambo, N. M. 2018. Monetary policy and economic growth: A Review of International Literature. *Journal of Central Banking Theory and Practice*, 7(2), pp. 123-137.

Ucer, E. M. 1997. Notes on financial liberalisation: Background notes prepared for an EDI seminar on micro-economic management: New methods and current policy issues' Nairobi, Kenya and Ankara, Turkey. Available:

www.econ.chula.ac.th/public/members/sothitorn/liberalization\_1.pdf [Accessed 6 April 2011].

Udoka, C. O. and Anyingang, R. 2012. The effect of interest rate fluctuation on the economic growth of Nigeria, 1970-2010. *International Journal of Business and Social Science*, 3(20), pp. 295-303.

Udoka, C. O. and Bassey, I. I. 2015. Interest rate: A key variable in deposit money banks' lending behaviour in Nigeria. *Archives of Business Research*, 3(4).

Udoka, C.O. 2000. Community banking as a catalyst for rural economic transformation in Nigeria. *International Journal of Social Science and Public Policy*, 3(2), pp. 175-182. Available: www.unctad.org/templates/download.asp?docid=204&lang=1 [Accessed 6 April 2011].

Vines, D. and Wills, S. 2018. The financial system and the natural real interest rate: Towards a 'new benchmark theory model'. *Oxford Review of Economic Policy*, 34(1-2), pp. 252-268.

Walsh, C. E. 2018. 4rd Ed. Monetary theory and policy. MIT Press.

Woodford, M. 2001. The Taylor Rule and Optimal Monetary Policy. *The American Economic Review*, 91(2), pp: 232-237.

Xiaochuan, Z. H. O. U. and Li, Z. 1987. China's Banking System: Current status, perspective on reform. *Journal of Comparative Economics*. (11)3, pp. 399-409.