International Journal of Economics, Business and Management Research

Vol. 5, No.10; 2021

ISSN: 2456-7760

TESTING THE VALIDITY OF FISHER HYPOTHESIS IN NIGERIA: AN ARDL COINTEGRATION APPROACH

Yusuf Shamsuddeen Nadabo

Department of Economics, Maryam Abacha American University of Niger
ORCID iD: 0000-0001-5023-6079

Abstract

This study investigates the validity of the Fisher hypothesis which postulates that there is a positive relationship between nominal interest rates and inflation rates while leaving real interest rate affected in the long run. It applies the Autoregressive Distributed Lag (ARDL) cointegration approach on annual time series data from 1986-2020. The results reveal the presence of partial of Fisher effect both in the short run and long run. The study conclude that Fisher hypothesis is partially valid in Nigeria. The policy implication of the results is the reliance by the monetary authorities on the use of the lending rate, which is a derivative of monetary policy rate, by the monetary authorities, to ensure low and stable inflation (price stability) in Nigeria is unlikely to produce the desired result. The paper recommends the use of appropriate measures (monetary and fiscal) aimed at reducing the prevailing high lending and inflation rates so as to promote investment, productivity; hence long run economic growth.

Keywords: ARDL Cointegration, Inflation, Nominal Interest Rate and Real interest rate.

1. Introduction

Developing countries, including Nigeria, aim to achieve macroeconomic stability through low and stable inflation coupled with low lending rate. This is because low and predictable inflation as well as lending rate promote investment, enhance productivity growth and employment hence economic growth and vice versa (Edrisinghe, Sivarasingham and Nigel, 2015). However, since the implementation of the structural adjustment programme (SAP) in 1986, Nigerian economy has been experiencing high inflation and lending rates which are inimical to economic growth through their negative effects on investment and productivity growth, among others (World Bank, 2019). This state of affairs has been attracting the attention of researchers who attempt to investigate the nature, extent and dynamics of the relationship between nominal interest rate and inflation.

The empirical relationship between nominal interest rate and inflation was initially examined by Fisher (1930). In his seminal study for the UK and US, found that there is a one-to-one relationship between nominal interest rate and expected inflation, leaving the real interest rate constant, in the long run. This finding, which is popularly known as Fisher effect (hypothesis) in the literature, implies that 1% change in inflation rate leads to 1% change in nominal interest rate without affecting the real interest rate in the long run. Another implication of the Fisher' study is that the real interest is not affected monetary policy. Rather, it is determined by the real factors of the economy (Toyoshima, Hanori, 2011; Edrisinghe et al. 2015).

Vol. 5, No.10; 2021

ISSN: 2456-7760

Subsequently, Fisher effect has been investigated in developed countries by Rapach (2003), Crowder and Hoffman (2006), Westerland (2008), Toyoshima & Hanori (2011) to investigate the Fisher hypothesis. Similarly, there are studies in developing countries which investigated the Fisher effect (see Canneiro, Divido & Rocha, 2002; Ling Venus & Wafa, 2008; Layasinghe & Udaseelan, 2008; Ahmad 2010; Mahdi & Moshood, 2011). In the context of Nigeria, (Obi, Nuruddeen & Wafure 2009; Asemota & Bala 2011; Akinko 2011; Nwosu & Oseni 2012 and Adegboyega, Olusanya and Popoola, 2013) are some of the studies which examined the validity of the Fisher hypothesis. However, the results of the foregoing studies are diverse due to the following reasons. First, researchers often used different data (panel, cross country and time series). Second, is the use of different variables of interest (nominal interest rate and inflation). For instance, bonds rates (short and long term) while others opt for Treasury bills rates (91-day and 180–day) to present nominal interest rates. With regards to the choice of inflation series, some researchers use expected inflation (contemporaneous or lagged inflation). Yet, others apply expected inflation series (obtained from the traditional standard deviation) and some methods such as the GARCH model proposed by Bollerslev (1986) to obtain expected inflation or inflation volatility.

On a general note, we observe that there is no universal consensus regarding the measurement of variables of interest, data set and method of data analysis hence the diverse results. Therefore, the objectives of this study is to examine both the short run and long run validity of the Fisher hypothesis as well as the nature and effect causality between inflation and nominal interest rates in Nigeria. The paper, therefore, intends to answer the following research questions:
(i) Does Fisher effect hold for Nigeria?
(ii) How significant have the short run and long run effects of inflation been on the nominal interest (lending) rate in Nigeria?
(iii) What is direction of the causality between nominal interest (lending) rate and inflation in Nigeria?

In order to provide answers to the research questions, the paper by applies the ARDL cointegration approach on annual time series data form 1986-2020. The rest of the paper is organised as follows. Section two presents the review of empirical studies on the long run relationship between nominal interest rate and inflation (Fisher effect). Section three discusses the methodology and data of the study. Section four presents and analyses the results of the study and section five concludes the study.

2. Literature Review

The relationship between nominal interest rate and inflation (Fisher hypothesis) has been extensively investigated by researchers in developed countries (see for example, Evans and Lewis, 1995; Choudhry, 1997; Koustras and Serlestic, 1999; Rapach, 2003; Ghazali & Ramlee, 2003; Lardic and Mignon, 2003; Granville & Mallick, 2004; Crowder & Hoffman, 2006; Westerland, 2008; Ito, 2009; Badilo, Reverte & Rubio, 2011; Arisoy, 2013; Ozcan & Ari, 2017; Payne and Ewing 1997; Carneiro, Divido & Rocha 2002; Ling, Venus & Wafa 2008; Layasinghe & Udaseelan 2008; Gul and Acikalin 2008; Ahmad (2010; Mahdi & Moshood 2011; Phiri and Lusuanga 2010; Sheefeni 2013; Yaya 2015; Edirisinghe, Sivarajasingham & Nigel 2015; He

Vol. 5, No.10; 2021

ISSN: 2456-7760

2018; Caporale & Gil-Alana 2019) have examined the validity of Fisher hypothesis in developing and emerging economies.

Furthermore, there are many studies in Nigeria (Nwafor, Nwakanma & Thompson 2007; Obi, Nuruddeen & Wafure 2009; Asemota & Bala 2011; Akinko 2011; Asemota & Bala 2011; Awomuse & Alimi 2012; Nwosu & Oseni 2012; Ogbonna 2013; Alimi & Ofonyelu 2013; Santos 2014; Uyaebo et al. 2016; Amaefula 2016; Balparda et al. 2017; Iwegbu & Adeoye 2020) which explored the interest rate and inflation.

In summary, the literature review reveals that the Fisher validity has widely tested throughout the world. These studies employed different data sets (panel, cross country data and time series) variables and different methodologies; hence gave mixed results.

We also observe that previous studies have paid very little attention to application of the Autoregressive Distributed Lag (ARDL) cointegration approach to investigate the validity of Fisher hypothesis. However, Atkins and Coe (2008), Jayasinghe & Udayaseelan (2008), Ozcan & Ari (2017) are among the few studies that examined the Fisher effect for US, Canada, Sri-Lanka respectively. They employed the ARDL cointegration framework and also produced varying results. To the best of our knowledge, there is no study which applied the ARDL cointegration approach to investigate the validity of the Fisher hypothesis except for Yaya (2015) study, which is cross country study, investigated the Fisher validity for ten (10) African countries, including Nigeria. The results of the study indicated presence of full Fisher effect for Kenya, partial Fisher effect in Cote d'voire and Gabon while there is no eveidence to support the long run relationship between nominal interest rate and inflation in remaining seven (7) countries, including Nigeria. The major weakness of this study is that being a cross country study, it failed to consider the country specific characteristics which are likely to affect the relationship between nominal interest rate and inflation hence the need for time series studies including the present one (Abubakar, 2018). Moreover, the study has not performed the conventional post-diagnostic tests in order to confirm the robustness and stability of the models, which omission casts doubt on the reliability of their results.

Sequel to this methodological gap, this present study is employs the ARDL cointegration approach and error correction model (ECM) to re-examine the validity of the Fisher's hypothesis in Nigeria from 1986-2020. The ARDL approach is chosen because it can be applied (i) irrespective of the order of integration properties of the relevant series (ii) in small samples and (iii) it produces both short run and long run coefficients simultaneously (Pesaran et al., 2011). These peculiar features make the ARDL cointegration approach to be superior to other conventional cointegration approaches (Engle & Granger 1987; Johansen 1988; and Johansen & Jesulius 1990).

Vol. 5, No.10; 2021

ISSN: 2456-7760

3. Methodology and Data

3.1 Model specification

Fisher (1930) hypothesis provides the theoretical base of this study's model. The model is represented in mathematical form as follows:

$$i_t = r_t + \pi_t^e \quad (1)$$

Where:
i is the nominal interest rate
r stands for real interest rate
π^e represents expected inflation
t is for time

The model in equation 1 submits that nominal interest rate is an aggregation of the real interest rate and the expected inflation. Furthermore, it assumes that the real interest rate is constant in the long run Fisher (1930). It can also be represented in the following stochastic or econometric model:

$$i_t = \alpha_0 + \alpha_1 r_t + \alpha_2 \pi_t^e + + \varepsilon_t \quad (2)$$

Where:

$\alpha_0, \alpha_1, and \alpha_2 are$ the contant term, coefficient on real interest rate and expected inflation respectively and t is the time. Moreover, ε_t represents the error term, which is assumed to be a white noise.

The baseline model of the study is arrived at by adopting and modifying the Fisher's (1930) in equation 2 to control for some variables, which are likely to determine nominal rate during period of the study.

$$LNLENR_t = \beta_0 + \beta_1 LNCPI_t + \beta_2 LNMS_t + \beta_3 LNGNEXP_t + \beta_4 LNOILP_t + \varepsilon_t \quad (3)$$

Where:

β_0 Stands for the constant term, $\beta_1, \beta_2, \beta_3 and \beta_4$ are the long ru parameters to be estimated.

LNLENR stands for natural log of nominal lending rate
LNCPI represents natural logarithm of consumer price index (proxy to inflation)
LNMS represents natural log of money broad supply
LNGNEXP is the natural log of government expenditure
LNOILP is representing natural logarithm of crude oil price (expressed in US Dollar and ε_t represents the error term, which is assumed to be a white noise.

Following Pesaran, Shin & Smith (2011) the model in equation (3) is specified in the following ARDL format:

$$\Delta LNLENR_t = \phi_0 + \sum_{i=1}^{n1} \phi_1 LNLENR_{t-1} + \sum_{i=0}^{n2} \phi_2 LNCPI_{t-i} + \sum_{i=0}^{n3} \phi_3 LNMS_{t-i} + \sum_{i=0}^{n4} \phi_4 LNGNEXP_{t-i} + \sum_{i=0}^{n5} \phi_5 LNOILP_{t-i}$$

$$\delta_1 LNLENR_{t-1} + \delta_2 LNCPI_{t-1} + \delta_3 LNMS_{t-1} + \delta_4 LNGNEP_{t-1} + LNOILP_{t-1} + \eta_t \quad (4)$$

Where: ϕ_0 is the coefficient of the constant term; ϕ_1 ϕ_2 ϕ_3 ϕ_4 and ϕ_5 are the short run and δ_1 δ_2 δ_3, δ_4 and δ_5 are the coefficients of lending rate, consumer price index, broad money supply, government expenditure and crude oil price respectively.

The ARDL model in equation 4 assumes that consumer price index, broad money supply, government expenditure and crude oil price have the same effects on nominal lending rate. Theoretically, for Fisher hypothesis to be valid, both in the short run and long run, coefficients on the consumer index(inflation) shoud be positive and greater than one (1), otherwise Fisher hypothesis is not valid. Moreover, the short run and long run coefficients of broad money supply, government expenditure and crude oil price inflation should carry a negative sign each.

Upon establishing cointegration (long run relationship) between the varaibles of interest (nominal lending rate, consumer price index, broad money supply, government expenditure and crude oil price inflation), the error correction model (ECM) of this study is specified as follows:

$$\Delta LNLENR_t = \varpi_0 + \sum_{i=1}^{n1} \varpi_1 \Delta LENR_{t-i} + \sum_{i=0}^{n2} \varpi_2 \Delta LNCPI_{t-i} + \sum_{i=0}^{n3} \varpi_3 LNMS_{t-i} + \sum_{i=0}^{n4} \varpi_4 LNGNEXP_{t-i} +$$

$$\sum_{i=0}^{n5} \varpi_5 LNOILP_{t-i} + \sigma ECM(-1) + \psi_t \quad (5)$$

Where: ϖ_0 is the constant term while $\varpi_1, \varpi_2, \varpi_3 and \varpi_4$ are short run coefficients while σ is the coefficient on one period lagged error correction term, ECM_{t-1}, which represent the long run dynamics of lending rate, consumer price index, broad money supply, government expenditure and crude oil price respectively in equation as shown in equation 4. The a priori theory expects σ to be negative and statistically significant.

3.2 *Data Sources*

In order to estimate both the ARDL and ECM models specified in equation 4 and 5, the study obtains annual time series data on nominal lending rate, consumer price index, broad money supply, government expenditure and crude oil price are sourced from World Bank Data Base, World Development Indicators (Wold Bank, 2020). Therefore, definitions and measurements of these varaibles areas provided the (World Bank, 2020). In addition, we transform all the variable to natural logrism for the purposes of normalisation and accounting for heteroskedasticity.

3.3. Estimation Strategy

This paper adopts a four (4) step procedure to examine the validity of Fisher hypothesis in Nigeria from 1986-2020. The first step involves conducting the Augmented Dickey-Fuller (ADF) and Phillip-Peron (PP) unit root tests with a view to ensuring that our variables of interest are stationary and that none of them is I (2), else the estimates of our ARDL will be spurious (Pesaran, 2011).

Vol. 5, No.10; 2021

ISSN: 2456-7760

In the second stage, we estimate the ARDL model in equation (4) using a maximum lag length of 4 (lags) as recommended by theory. These estimates of the selected model are subsequently used to perform the conventional ARDL bounds cointegration test so as to explore the presence or otherwise of cointegration between our variables (nominal lending rate, consumer price index, broad money supply, government expenditure and crude oil price). In particular, the test involves comparing the value of the computed or estimated F-statistic, which is compared with the critical values (lower and upper), as provided by the Eview10, to reject or accept the null hypothesis. Theoretically, the decision to reject tor accept the null hypothesis (no cointegration) is contigent upon the following outcomes:
(i) If the ccomputed F-Statistics is greater than the critical value for the upper bound, I (1), the null hypothesis of no co-integration is rejected, and this implies the presence of cointegration between the series of interest.
(ii) If the computed F-statistics is found to be less than the critical value for the lower bound, I(0), then the null hypothesis of no co-integration is cannot be rejected, which means that there is no cointegration between the series of interest.

In the third stage, we also use the estimates of the selected ARDL model (in equation 4) to obtain the long run coefficients and perform the traditional post- estimation diagnostic tests so as to ascertain the robustness and stability of the long run model. In the fourth stage and in the last stage, we estimate ECM as specified in equation 5. The estimates of the ECM are used to examine the short run dynamics and causality between nominal lending rate, consumer price index, broad money supply, government expenditure and crude oil price.

4. Results and Discussion

4.1. Results of Unit root tests

The results of the unit root tests in Table 4.1 show that the variables or series of interest (LENR, LCPI, MS, GNEXP and OILP) do have different orders of integration, I(0) and I(1). The results clearly reveal that none of our series of interest integrated of order 2, I(2). Having satisfied this condition, we are at liberty to employ the ARDL co1integration approach in this study.

Table 4.1 Result of Unit Root Tests

Test	**ADF test**		**PP test**		
Variable	Level	First Difference	Level	First Difference	Decision
LNLENR	-2.753	-6.294***	-2.723	-10.214***	I(1)
LNCPI	-3.678***	-	5.496***	-	I(0)
LNMS	-3.678**	-	-2.037	-6.037***	I(1)
LNGNEXP	-3.378**	-	-3.374**	-	I(0)
LNOILP	-2.239	-5.778***	-2.037	-6.037***	I(1)

Notes: ** and *** signify statistical significance % and 1% levels respectively

Vol. 5, No.10; 2021

ISSN: 2456-7760

4.2. Results of ARDL bounds test for cointegration

The estimates in Table 4.2 shows that the value (4.600) of the computed F-statistic is greater than the upper bound critical value (4.01) at 5% significance level. This result suggests the presence of a strong co-integration (long run relationship) between nominal lending rate, inflation, money supply, government expenditure and crude oil price.

Table 4.2. Results of ARDL bounds Test for cointegration.

Test Statistic	**Value**	**k**
F-statistic	4.600**	4
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Notes: ** signifies statistical significance 5% significance level 2. Lag lengths are automatically selected based on Schwartz Information Criterion (SIC).

4.3. Estimates of the short models (ECM)

The estimates in Table 4.3 reveal that all the short run's contemporaneous coefficients, except that of government expenditure, are statistically significant at 5% level. However, concentrating our analysis on the main variable of interest (inflation as represented by LNCPI) the results show that the short run coefficient on consumer price index (inflation) is negative and statistically significant at 5%. This means that 1% change in inflation will lead to about 0.6% decrease in nominal interest rate (lending rate) ceteris-paribus. This result indicates the absence of a short run Fisher effect which implies that Fisher hypothesis is not valid in Nigeria, in the short run.

Moreover, with regards the issue of short run causality the results reveal that the coefficients of the contemporaneous change in inflation D(LNCPI) and one period lagged inflation D(LNCPI(-1)) are statistically significant at 5% and 1% respectively. Consequently, we can conclude that there is a short run causality running from inflation to nominal interest in the former but in the latter case, the causality runs from nominal interest rate to inflation. This outcome accords with the a priori theory which presumes that the causality flows from inflation to nominal interest rate. Table 4.3 also reveals that the estimate (-1.127) of the coefficient of the one period lagged error correction term, ECT (-1) is statistically significant at 1% level. The negative sign on the ECT (-1) and its statistical significance at 1% level are consistent with a priori theory and thus confirm the presence of a long run symmetric relationship (cointegration) between nominal lending rate, inflation, money supply, government expenditure and crude oil price. Moreover, the absolute value (1.127) on the ECT (-1) implies that the speed of adjustment towards long run equilibrium is very high, which implies that about 13% of the short term's disequilibrium is corrected within a year. Furthermore, the negative sign and the statistical significance of the coefficient on the error correction term, ECT (-1) illustrate the presence of a one-way or uni-directional causality

Vol. 5, No.10; 2021

ISSN: 2456-7760

which runs from inflation to nominal lending rate the long run in tandem with Fisher's (1930) hypothesis.

Table 4.3. Coefficient of Short Run/ Error Correction Mechanism (ECM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCPI)	-0.578**	0.222	-2.601	0.020
D(LNCPI(-1))	1.227***	0.287	4.271	0.001
D(LNMS)	0.877**	0.226	3.875	0.002
D(LNMS(-1))	-0.633**	0.267	-2.367	0.032
D(LNMS(-2))	-0.403	0.280	-1.436	0.172
D(LNMS(-3))	-0.336*	0.187	-1.781	0.095
D(LNG NEXP)	-0.157**	0.150	-1.041	0.314
D(LNGNEXP(-1))	1.437***	0.326	4.414	0.001
D(LNGNEXP(-2))	0.998**	0.237	4.213	0.001
D(LNGNEXP(-3))	0.526**	0.179	2.947	0.010
D(LNOILP)	-0.228***	0.075	-3.018	0.009
C	34.565	5.190	6.660	0.000
ECT(-1)	-1.127***	0.170	-6.642	0.000

Note: *, ** and *** signify significance at 10%, 5% and 1% significance levels respectively.

4.3.1. Long run coefficients

The estimates of the long run coefficients are shown in Table 4.4, which shows that all the long run coefficients are statistically significant at either 5% or 1% levels respectively. However, we are also constrained to focus our analysis on the critical series of interest (nominal lending rate, LNLENR, and infaltion, LNCPI).

Table 4.4. Long run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCPI	-0.762***	0.132	-5.787	0.000
LNMS	1.003***	0.154	6.520	0.000
LNGNEXP	-1.704***	0.253	-6.724	0.000
LNOILP	-0.194**	0.069	-2.817	0.013

Note: ** and *** signify significance at , 5% and 1% significance levels respectively.

In regard, the long run coefficient on inflation (-0.762) is negative and it is statistically significant at 1%. This means that 1% change in infaltion will lead to a decrease of about 0.8% in nominal interest rate(lending rate). This finding, which suggests the absence of Fisher effect,

Vol. 5, No.10; 2021

ISSN: 2456-7760

demonstrates that Fisher hypothesis is not valid in the long run. Furthermore, the negative sign and statistical significance of the long run coefficient on inflation demonstrate the presence of a long run unidirectional causality which runs from inflation to nominal interest rate as hypothesized by Fisher (1930).

4.3.2. Results of Diagnostic tests

The results of the diagnostic tests performed on the estimates of the long run model are reported in Table 4. 5. It shows that the value (0.800) for Adjusted R^2 is high, which suggests that inflation, money supply, government expenditure and crude oil price account for about 80% of the total variations or changes in the nominal interest rate (lending rate) in Nigeria during the period of the study. In addition, the probability value (0.000) for the F-statistics, which is less than 5%, implies that all the independent variables (inflation, money supply, government expenditure and crude oil price) are important determinants of nominal interest (lending rate) in Nigeria. Lastly, the Durbin the value (1.973) for the Watson (D.W) statistics, which is approximately 2, reveals that the model is not having serial correlation challenge.

More importantly, the results for the post-estimation diagnostics tests performed on the long run model show that the p-values (0.920, 0.967 and 0.411) in respect of the Jarcque- Bera test for normality, Lagrange Multiplier (LM) test for serial correlation and the Bruesh-Pagan-Gofrey (BFG) test for heteroscedasticity, respectively, are greater than 5%; hence our decision to accept the null respective hypotheses. Consequently, we conclude that the residuals are nomaly distributed; they are aucorrelated and are homoskedastic.

Furthermore, the probability value (0.793) for the Ramsy Reset test which is also greater than 5% reveals that the model is free from specification error. In other words, it is corrrectly specified.

Table 4.5. Results of Diagnostic tests

R-Squared	0.900	-
Adj-R-Square	0.800	-
F-Statistic	9.029	(0.000)
DW	1.973	-
Autocorrelation	0.0352	(0.966)
Normality	0.167	(0.912)
Heteroscedasticity	15.577	(0.411)
Ramsey-RESET	0.712	(0.793)

Note: 1. *, ** and *** signify significance at 10%, 5% and 1% significance levels respectively. 2. figures in parenthesis represent probability values.

Finally, the plots or graphs of the cumulative sum (Cum sum) and cumulative sum squared (Cumsum SQ) shown below are within the critical bounds at 5% significance level. These results indicate that all the parameters of the long run model have been stable throughout the period of the study.

Vol. 5, No.10; 2021

ISSN: 2456-7760

Figure 3.1A: *Plot of CUMSUM*

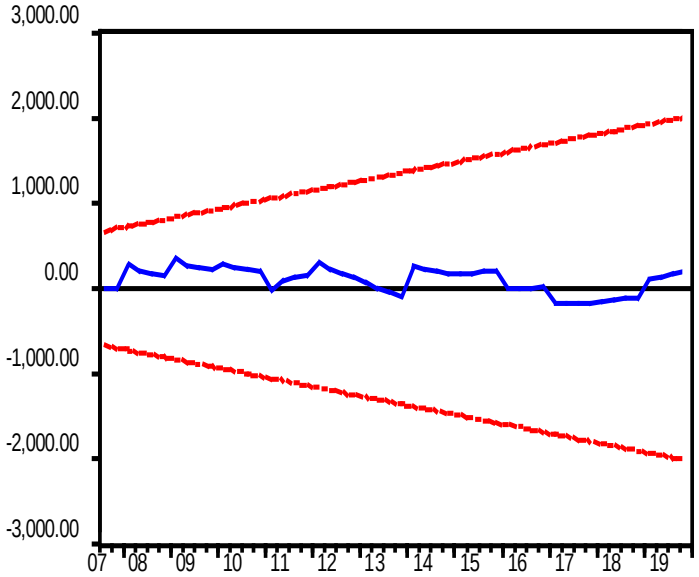
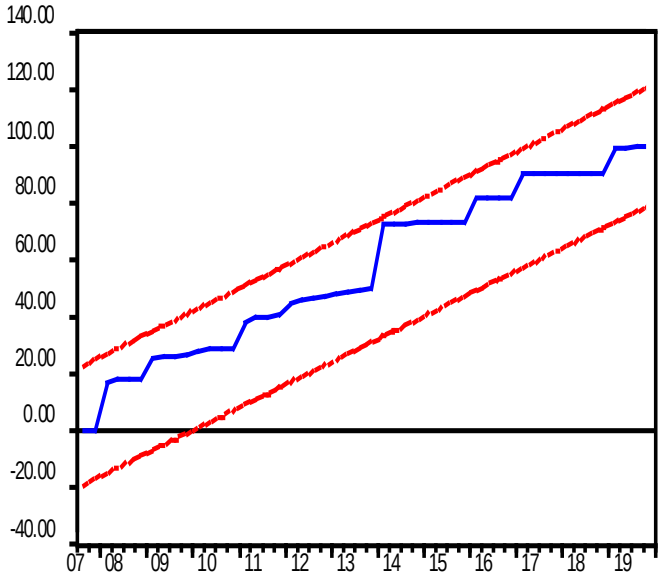


Figure 3.1B: *Plot of CUMSUMSQ*



Figures 3.1A and 3.1B: *Plots of cumulative sum (CUMSUM) and cumulative of squares (CUMSUMSQ) of the resursive residuals.*

5. Conclusion and Policy recommendation

This paper analyses the validity of Fisher hypothesis in Nigeria. It applies ARDL cointegration approach and the error correction models on annual time series data from 1986-2020. The result for the contegration test shows the presence of cointegration between inflaion and interest rate. The results further reveal the absence of the Fisher effect both in the short run and longrun. The causality test failed to provide evidence to support the presence of a long run unidirectional causality, which should run from inflation to nominal lending rate. This outcome could be traced to the implementation of the structural adjustment programme (SAP) in 1986, the global financial crisis in 2008 and frequent changes in monetary policy which have negative impact on real interest rate, savings and investment. Another reason for the absence of the Fisher effect in Nigeria is the 'wealth effect' as articulated by Mundel (1963) and Tobin (1965). They argue that during inflation people will prefer to hold less cash balances and more other assets thus reducing the nominal interest rate. In essence, the Mundel-Tobin wealth effect hypothesis presumes that nominal interest rate will be trailing behind the inflation rate because real interest rate is constantly negative arising from high inflation and high nominal interest(lending rate) thus impeding economic growth through their negative impact on investment savings, to mention a few. Therefore, the paper recommends the implementation of appropriate monetary and fiscal measures by the government and monetary authorities with a view to reducing the prevailing high lending interest and inflation rates, so as to encourage investment, boost productivity growth and income hence long term growth.

Vol. 5, No.10; 2021

ISSN: 2456-7760

References

Ahmad, S. (2010). The long-run Fisher effect in developing economies. Studies in Economics and Finance, 27(4), 268-275.

Akinlo, A, E. (2011). A re-examination of the Fisher hypothesis for Nigera. Akungba Journal of Economic Thought, 5 (1).

Alimi, S. R. (2012). The relationship between nominal interest rates and inflation: New evidence and implications for Nigeria, Journal of Economics and Sustainable Development, 3 (9), 158-165.

Alimi, S. R & Ofonyelu C. C. (2013). Toda Yammota causality tests between money market interest rate and the expected inflation. The fisher hypothesis revisited. European Scientific Journal, 9 (7), 125-142

Amaefula, C. G. (2016). Long-run relationship between interest rate and inflation: Evidence from Nigeria. Journal of Economics and Finance, 7(3), 24-28.

Arisoy, I. (2013). Testing for the hypothesis under Regime shifts in Turkey: New evidence from time-varying parameters. International Journal and Financial Issues, 3 (2), 496-502.

Asemota, J. O., & Bala, A. D. (2011). Kalman Filter Approach to Fisher Effect: Evidence from Nigeria. CBN Journal of Applied Statistics, 2(1), 71-91.

Atkins, F. J., & Coe, P. J (2002). An ARDL bound tests of the long-run Fisher effect in the United States and Canada. Journal of Macroeconomics, 24 (2), 255-266.

Awomuse, B. O., & Alimi, S. R. (2012). The relationship between nominal interest rates: New evidence and -implications for Nigeria. Journal of Economic and Sustainable Development, 5 (9), 158-165.

Badilo, R., Reverte, C., & Rubio, E. (2011). The Fisher effect in the EU revisited: New evidence using panel cointegration estimation with global stochastic trends. Applied Economics Letters, 75 (13), 1247-1257.

Bajo-Rubio, O., Diaz-Roldan, C., & Esteve, V. (2005). Is the Fisher Effect nonlinear? Some evidence from Spain, 1963-2002. Applied Financial Economics, 15, 849-854.

Balparda, B., Caporale, G. M., & Gil-Alana, L. A. (2017). The fisher relationship in Nigeria. Journal of Economics and Finance, 41(2), 343-353.

Bollerslev, T. (1986). Generalized Autoregressive conditional heteroskedasticity. Journal of Econometrics, 307-327.

Caporale, G. M., & Gil-Alana, L. (2019). Testing the Fisher hypothesis in the G-7 countries Using i (d) Techniques. International Economics, 159, 140-150.

Carneiro, F. G., Angelo, J., Divino, C. A., & Rocha, C. (2002). Revisiting the Fisher hypothesis for the cases of Argentina, Brazil, and Mexico. Applied Economics Letters, 9, 95-98.

Crowder, W. J., & Hoffman, D. L. (1996). The long-run relationship between nominal interest rates and inflation: The Fisher equation revisited. Journal of Money, Credit and Banking, 28, 102-118.

Vol. 5, No.10; 2021

ISSN: 2456-7760

Edirisinghe, N., Sivarajasingham, S., & Nigel, J.(2015). An empirical study of the Fisher and the Dynamic relationship between inflation and interest rate in Sri Lanka. International Journal of Business and Social Research, 5(1)47-62.

Engle, R.E & Granger, C. J. (1987).Cointegration and error correction-Representation, estimation and testing. Econometrica, 55, 251-278.

Evans, M. D.D., & Lewis, K. K. (1995). Do expected shifts in inflation affect estimates of the long-run Fisher relation? Journal of Finance, 50 (1), 225-253.

Fisher, I. (1930). The Theory of Interest. New York: MacMillan.

Granville, B., & Mallick, S. (2004). Fisher hypothesis: UK evidence over a century. Applied Economics Letters, 11(2), 87-90.

Gul, E., & Acikalin, S. (2008). An examination of the Fisher hypothesis: The case of Turkey. Applied Economics, 40 (24), 3227-3231.

He, Y. (2018). A Study on the International Fisher Effect: An Investigation from South Korea and China. The Journal of Industrial Distribution & Business, 9(7), 33-42.

Ito, T. (2009). Fisher hypothesis in Japan: Analysis of long-term interest rates under different monetary policy regimes- World Economy, 32 (7), 1019-1035.

Iwegbu, O., & Adeoye, B. W. (2020). Effect of inflationary expectations on stock market returns in Nigeria. Journal of Economic Studies, 17(1), 27-42.

Johansen, S. (1988). Statistical analysis of cointegration vectors. Journal of Economic Dynamics and Control, 12, 231-254.

Johansen, S., &. Juselius. K. (1990). Maximum likelihood estimation and inference on cointegration with application to the demand for money. Oxford Bulletin of Economics and Statistics, 52, 169-210.

Jayasinghe, P., & Udayaseelan,T(2008). Does Fisher hypothesis hold in Sri Lanka? An analysis with bounds testing approach to cointegration. Retrieved on Wednesday, 7th October,2019fromhttp://192.248.17.88/mgt/images/stories/research/ircmt/2010/BE/9.pdf.

Ling.T. H., Venus, K.S.L., & Wafa, S.K. (2008). DoesFisher hold for the East Asian countries? An application of Panel unit root tests. Comparative Economic Studies, 52(2), 273-285

Mahdi & Masood, S.(2011). The long run relationship between interest rates and inflation in Iran; Revisiting Fisher's hypothesis. Journal of Economics and Finance, 3(14)705-712

Mundell, R. (1963). Inflation and real interest. The Journal of Political Economy, 71, 280-283.

Muse, B., & Alimi, R. (2012). Testing an augmented Fisher hypothesis for small open economy: The case of Nigeria. Akangha Journal of Management, 4 (1), 33-44.

Obi. B., Nurudeen A., & Wafure, O. B. (2009). An empirical investigation of the Fisher effect in Nigeria: A cointegration and error correction approach. International Review of Business Research Papers, 5(5), 96-109.

Ogbonna, B. C. (2013). Testing for Fisher's hypothesis in Nigeria (1970-2012). Journal of Economics and Sustainable Development, 4(16), 163-170.

Vol. 5, No.10; 2021

ISSN: 2456-7760

Ozcar, B. & Ari, A. (2015). Does Fisher hypothesis hold for G7? Evidence from the Panel cointegration economic research.

Pavne. J. E., & Ewing, B. T. (1997). Evidence from lesser developed countries on the Fisher hypothesis: A cointegration analysis. Applied Economics Letters, 4(11), 683-687.

Pesaran, H., Shin, Y., & Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. Journal of Applied Econometrics, 16(3), 289-326.

Phillips, P. C. B., & Perron, P. (1988). Testing for a Unit Root in a Time Series Regression. Biometrika, 75(2), 555-346.

Phiri, A., & Lusanga, P. (2011). Can asymmetries account for the empirical failure of the Fisher effect in South Africa? Economics Bulletin, 31(3), 1968-1979.

Santos, A.R. (2014) Modelling ARDL bonds testing approach to cointegration: A re-examination of augmented Fisher hypothesis in an Open Economy. Asian Journal of Economic modelling.

Sheefeni, J. P. S. (2013). Testing for the Fisher Hypothesis in Namibia. Journal of Emerging Issues in Economics, Finance and Banking, 2(1), 571-582.

Tobin, J. (1965). Money and Economic Growth. Econometrica, 33, 671-684.

Toyoshima, Y., & Hamori, S. (2011). Panel cointegration analysis of the Fisher effect: Evidence from the US, the UK, and Japan. Economics Bulletin, 37(3), 2674-2682.

Uyaebo, Stephen O. U. et al. (2016): Testing the Fisher hypothesis in the presence of structural breaks and adaptive inflationary expectations: Evidence from Nigeria, CBN Journal of Applied Statistics, ISSN 2476-8472, The Central Bank of Nigeria, Abuja, Vol. 07, Iss. 1, pp. 333-358

Westerlund, J. (2008). Panel cointegration tests of the Fisher Effect. Journal of Applied Econometrics, 23(2), 193-233.

Yaya, K. (2015): Testing the long-run fisher effect in selected African countries: Evidence from ARDL Bonds Tests. International Journal of Economic and Finance: 7, (12) 168-175.