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EFFECT OF EXPANSIONARY MONETARY POLICY ON HOUSEHOLD CONSUMPTION IN NIGERIA: EVIDENCE FROM MONEY SUPPLY

By

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Abstract
This paper examined the effect of expansionary monetary policy on Nigeria's household consumption using annual data covering the period 1981 to 2019 by applying econometric techniques to test empirically the hypotheses developed. Cointegration analysis is introduced to capture long-run & short-run relationships among variables using systems simultaneous equation. This is because Vector Autoregressive (VAR) treats all variables as endogenous. Following this approach, employing VAR through Vector Error Correction Mechanism (VECM) procedure, the simultaneous equation was simulated. The study further conducted forecasting involving impulse response and variance decomposition simulations to evaluate the period under study. Also the study examined causality relationships among series using the VECM Granger causality approach to understand short-run causality among variables via F-/Wald test simulation. Later, the systems simultaneous equation aforementioned is estimated employing Ordinary Least Square (OLS). Empirical results indicate that money supply has a positive and significant relationship with household consumption, whereas inflation has a negative relationship with household consumption in its two lags. The VECM Granger causality result also shows that money supply and inflation does not cause household consumption. A further review of the impulse response function indicates that money supply will positively contribute to household consumption in the short-run and long-run. Based on the findings, this study recommends that money supply should be watched out so as to maintain stable prices, especially if government wants to keep household consumption on track.

Keywords: *Money supply; Inflation; Household consumption; VECM.*
Jel Codes: E51, E31, E21 & C53

Introduction

Consumption is one of the most popular determinants of living standards, it depicts the aggregate demand of goods and services in the country. Measuring consumption over a week or month provides an indication of a household's consumption habits over a year because it has a smooth flow to it in order words it is steady. Income however, tends to vary widely from week to week or month to month. Consumption data is much easier to collect than income data, particularly in agricultural communities like Nigeria or with self-employed persons. Consumption is therefore a better indicator of

the level of welfare and poverty that a nation is experiencing.

In compiling gross domestic product (GDP), the amount of money spent on a country's consumables are used in the computation of final household expenditure and in most cases it constitutes about 60 percent of the total GDP. It is worth noting that, when a country is experiencing a downturn trend, it implies that the aggregate demand (consumption) is very low, poverty incidence is on the increase, unemployment rate rises, investments fall drastically and prices of goods and services will most likely rise too (NBS, 2020). So enhancing household consumption is among the fundamental goals of many developing countries, Nigeria inclusive.

To capture the real balance effect of money on consumption, Friedman (1957) included money as an explanatory factor in consumption function. However, the existence of money supply in the consumption function may give some insight especially, in developing countries like Nigeria. The quadrupling of oil prices which started 1973/74 has benefitted the economy by providing financial resources for investment and to further economic growth and development. The oil windfall also influenced private consumption in a positive manner. For example, according to the World Bank (2020), Nigeria household consumption increased from 13.7 billion in 1981 to 87.5 trillion in 2019. Its ratio to GDP increased from 9.8 percent in 1981 to 60.0 percent in 2019 representing an increase of over 500 percent see figure 1. Money supply increased from 16.2 billion in 1981 to 25.5 trillion in 2018 (CBN, 2018).

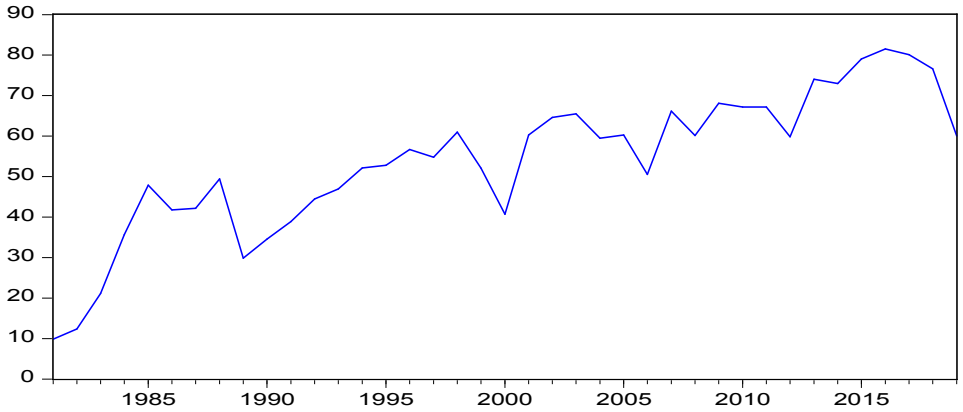


Figure 1: Ratio of Household Consumption to GDP
Source: Computed by the Researchers, 2020

Applying the right monetary policy (expansionary) to manage money supply, a Central Bank either buys treasury notes, decrease interest rates on loans to banks, or reduce the reserve requirement. All of these actions increase the money supply and lead to lower interest rates. This creates incentives for banks to loan and businesses to borrow which can positively affect consumer spending and investment through employment, thereby increasing aggregate demand. This policy also makes consumption more attractive relative to savings. Exporters benefit from inflation as their products become relatively cheaper for consumers in other economies.

Due to the reasons stated above, the key hypothesis that will be tested in this paper is whether empirical evidence from Nigeria on the effects of money supply and inflation on household consumption using vector error-correction modelling methodology accords with the existing theoretical explanations and empirical findings. Specifically, it will be tested whether money supply is exogenous (that is, money supply causes household consumption), whether household consumption and inflation

declines following money supply shock, whether the reaction of household consumption to money supply is faster than the reaction of inflation to money supply, whether money supply contracts following an increase in household consumption, and finally, whether the inflation rate increases following an increase in money supply. Any findings on this issues are likely to add to the body of literature.

The rest of the paper is organized as follows. Section 2 sets up the conceptual and theoretical frameworks. Section 3 discusses the data, and specifies the econometric model. Section 4 reports the empirical estimates and results. Finally, conclusion and recommendation are presented in section 5.

2.0 Conceptual Framework

2.0.1 Household Consumption

Household consumption expenditure is typically the largest component of final uses of GDP, representing in general around 60% of GDP. It is therefore an essential variable for economic analysis of demand. According to BPS (2010) as reported by (Aryusmar, 2020), household consumption expenditure is the expenditure on goods and services by households for consumption purposes. In this case the household functions as the end user (final demand) of various types of goods and services available in the economy. It covers all purchases made by resident households (home or abroad) to meet their everyday needs: food, clothing, housing services (rents), energy, transport, durable goods (notably cars), spending on health, on leisure and on miscellaneous services. It also includes a number of imputed expenditures, for example agricultural products produced for own consumption but the most significant imputation is typically owner-occupiers' imputed rents. By convention, apart from dwellings, all goods and services bought by households to meet their own everyday needs are recorded as final consumption. Purchases of dwellings are recorded as gross fixed capital formation. Partial payments for goods and services "provided" by general government are included in household final consumption. This covers cases in which households have to pay a part of the public services provided, for example prescription medicines and medical services partly reimbursed by government (OECD, 2013). On a macroeconomic basis, consumption expenditure is directly proportional to income, the greater the income the greater consumption.

2.0.2 Money Supply

Expansionary monetary policy is when a central bank uses its tools to stimulate the economy. That increases the money supply, lowers interest rates, and increases demand. It boosts economic growth. It also lowers the value of the currency, thereby decreasing the exchange rate (Amadeo, 2020). If the rate of increase in money supply is consistently greater than the rate of increase in total output of goods and services in the economy, there could be a general increase in the domestic prices of goods and services: a situation generally referred to as inflation thereby decreasing the purchasing power of households. It is the opposite of contractionary monetary policy.

In Nigeria, the circulation of money is managed by the Central Bank. An increase in money supply causes interest rates to drop and makes more money available for customers to borrow from banks. The Central Bank increases the money supply by buying government-backed securities, which effectively puts more money into banking institutions. An increase in paper money reduces the value of the naira, but increases the money banks can lend to consumers. When banks have more money to loan, they reduce the interest rates consumers pay for loans, which typically increases consumer spending because money is easier to borrow(CBN, 2016). The government will request an increase in the money supply when the economy begins to slow to spur additional spending by consumers and build confidence in the economy (Holmes, 2020).An increase in money supply can also have negative effects on the economy. It causes the value of the naira to decrease, making foreign goods more expensive and domestic goods cheaper. With the complex global economy, this can ripple out and affect

other nations. Steel, automobiles, and building materials can all cost more. As a result, the prices for home building and real estate increase because of increased material and building expenses. It does make it easier for customers to get loans, however, because banks are more willing to loan money(Holmes, 2020).

2.0.3 Inflation

Inflation is a decrease in the purchasing power of currency due to a rise in prices across the economy. Within living memory, the average price of a cup of garri in Nigeria was less than a kobo. Today the price is closer to one hundred naira. Such a price change could conceivably have resulted from a surge in the popularity of garri, or price pooling by a cartel of garri producers, or years of devastating drought/flooding/conflict in the production of cassava. In those scenarios, the price of cassava products would rise, but the rest of the economy would carry on largely unaffected. That example would not qualify as inflation since only the most garri consumers would experience significant depreciation in their overall purchasing power. Inflation requires prices to rise across a "basket" of goods and services, such as the one that comprises the most common measure of price changes, the consumer price index (CPI). When the prices of goods that is non-discretionary and impossible to substitute-food and fuel-rise, they can affect inflation all by themselves. For this reason, economists often strip out food and fuel to look at core inflation, a less volatile measure of price changes.

If inflation-induced capital losses in non-interest-bearing assets are not accounted for, personal income is, therefore, perceived as higher than observed income. This leads to excess sensitivity of consumption to changes in current, rather than permanent, income. These wealth effects tend to outweigh the corresponding intertemporal substitution effect, which would encourage consumers to divert resources away from consumption towards saving (De-Mello & Carneiro, 2010).

2.1 Theoretical Framework

Wealth accumulation involves a considerable macroeconomic adjustment on the aggregate level, such as consumption. Keynesian theory (1935) explains that, current income is the main determinant of the level of the current consumption expenditure and that the marginal propensity to consume out of income is less than one. The theory postulates that consumption depends on income and the interest rates. The assumption of this theory is that, the spending unit is not highly responsive to change in the rate of interest over the economically meaningful range, and that its behavior is especially inelastic at the lower end of the range (Suits, 1970).The first objection to Keynesian Theory came from Kuznets (1952), who analyzed the long run relationship between consumption and income in US and he found contradictory results with Keynes. According to the results of his study, consumption does not decline as income increases. These findings revealed the existence of short run and long run consumption functions (Gulcin, & Aycan, 2014).

According to Mankiw (2010) as reported by Gulcin, & Aycan, (2014), Keynes consumption function in the short-run gives accurate results but in the long run consumption function has a constant average propensity to consume. During the period of a business cycle or in the short run, because of the fluctuations in income, marginal propensity to consume is smaller than average propensity to consume as Keynes indicated. The Intertemporal Choice theory propounded by Irving Fisher is the foundation for subsequent work of other scholars on consumption theory. His model is based on a two period model where Period 1 represents the present and Period 2 represents the future. Fisher (1930) assumes that consumer is forward-looking and chooses consumption for the present and future to maximize lifetime satisfaction and that consumers' choice are subject to an intertemporal budget constraint (a measure of resources available for present and future consumption). The timing of income is irrelevant as consumers can borrow at real

interest rate r. If consumer is a saver, the rise in r makes him better off since he becomes richer. This tends to increase consumption in both periods (Onanuga, Oshinloye & Onanuga, 2015).

Permanent income hypothesis of Friedman (1975), postulates that the relationship between personal consumption and permanent income is proportionally constant. He observed that income can be broken into permanent and transitory components. The life-cycle hypotheses developed by Modigliani & Brumberg (1990) tried to reconcile the differences between long and short-run consumption. The theory states that individuals seek to smooth consumption over the course of a lifetime – borrowing in times of low-income and saving during periods of high income. The two theories stress the importance of wealth as a factor that influences consumption. The two theories stress the importance of wealth as a factor that influences consumption. In our attempt to provide evidence on the relationship between expansionary monetary policy and household consumption in Nigeria, this study considers the absolute income hypothesis (AIH) as propounded by Keynes.

3.0 Methodology

The study examines the impact of expansionary monetary policy (money supply) on household consumption in Nigeria along with one control variable; inflation rate, covering 1981 to 2018 within Framework of Vector Error Correction model. The data employed for this study was secondary data source obtained from the Central Bank of Nigeria and the World Bank, see table 1. The justification for selection of this period would ensure conformity to central limit theorem which required sample requirement for a minimum of 30 observations (Gujarati, 2007).

Table 1: Variables Measurement and Sources of Data

S/No	Variables	Measurement	Sources of Data
1.	Household consumption (HCON)	Measures all purchases made by resident households (home or abroad) to meet their everyday needs: food, clothing, housing services (rents), energy, transport, durable goods (notably cars), spending on health, on leisure and on miscellaneous services. It also includes a number of imputed expenditures, for example agricultural products produced for own consumption but the most significant imputation is typically owner-occupiers' imputed rents. (In billions).	https://data.worldbank.org/indicator
2.	Money supply (MS)	Money Supply (in billions), total quantity of money in circulation at a point in time. (in billions)	Central bank of Nigeria (CBN) statistical bulletin volume 29, December 2018
3.	Inflation rate (INF)	Annual percentages of average consumer prices a year- on - year changes	https://data.worldbank.org/indicator

Source: Researcher's Compilation, 2020

3.1 Model Specification

According to (Hall, 2019),monetary policy is enacted by Central Banks to manipulate money supply in the economy, influence interest rate and inflation. Interest rate and inflation been the major determinants of consumption levels, interest rate will be substituted by money supply in this study because money supply is a major determinant of interest rate by identifying three variables in our model, which hypothesize that household consumption is a function of money supply (a proxy of expansionary monetary

policy) and inflation rate. The relationship is expressed implicitly as:

$$HCON = f(MS, INF)$$

The economic expectations of each the parameters of the explanatory variables in relationship with the dependent variable is stated below as

$f_1 > 0, f_2 < 0;$

This means that money supply has positive relationship with household consumption, while inflation is expected to exert negative influence on household consumption.

Where:

HCON = Household Consumption;

MS= Money Supply a proxy for expansionary policy;

INF= Inflation Rate;

Equation 1 can be written in the econometric model and in their respective natural log form as thus; (1)

$$LHCON_t = \beta_0 + \beta_1 LMS_t + \beta_2 INF_t + \varepsilon_t$$

LHCON is the natural log of household consumption; LMS is the natural log of money supply; L is natural logarithm; β_0 is the intercept or autonomous parameter estimate; $\beta_1 \ldots\ldots \beta_2$ is the Parameter estimate associated with the determinants of household consumption in Nigeria and ε_t is the stochastic error term.

To estimate this model, Vector Error Correction Model was used. As stated by Engle & Granger (1987) there is an existence of both Short-run and long-run equilibrium in VECM once variables are co-integrate of order 1(1). The VECM specifications for this study are presented in equation 3 to 5 below:

$$\Delta(LHCON)_t = \alpha_0 + \alpha LHCON\phi_{t-1} \sum_{i=1}^{g_1} \alpha_{1i} \Delta(LHCON)_{t-1} + \sum_{i=1}^{h_i} \rho_{1i} \Delta(LMS)_{t-1} + \sum_{i=1}^{r_i} \lambda_{1i} \Delta(INF)_{t-1} + \varepsilon_{1t} \quad (3)$$

$$\Delta(LMS)_t = \rho_0 + \rho LMS\phi_{t-1} \sum_{i=1}^{g_2} \rho_{1i} \Delta(LMS)_{t-1} + \sum_{i=1}^{h_2} \alpha_{1i} \Delta(LHCON)_{t-1} + \sum_{i=1}^{r_2} \lambda_{1i} \Delta(INF)_{t-1} + \varepsilon_{1t} \quad (4)$$

$$\Delta(INF)_t = \lambda_0 + \lambda INF\phi_{t-1} \sum_{i=1}^{g_3} \lambda_{1i} \Delta(INF)_{t-1} + \sum_{i=1}^{h_3} \rho_{1i} \Delta(LMS)_{t-1} + \sum_{i=1}^{r_3} \alpha_{1i} \Delta(LHCON)_{t-1} + \varepsilon_{1t} \quad (5)$$

3.2 Techniques of Estimation

3.2.1 Stationarity Test

Stationarity of a series is an important phenomenon because it can influence its behaviour. If x and y series are non-stationary random processes (integrated), then modelling the x and y relationship as a simple OLS relationship as in equation 6 will only generate a spurious regression.

$$Y_t = \alpha + \beta X_t + \varepsilon_t \quad (6)$$

Time series stationarity is the statistical characteristics of a series such as its mean and variance over time. If both are constant over time, then the series is said to be a stationary process (i.e. is not a random walk/has no unit root), otherwise, the series is described as being a non-stationary process (i.e. a random walk/has unit root). Differencing a series using differencing operations produces other sets of observations such as the first-differenced values, the second-differenced values and so on.

$$x\,level \qquad x_t$$

$$x1^{st} - differenced\ \ value \qquad x_t - x_{t-1}$$

$$x2^{nd} - differenced\ \ value \qquad x_t - x_{t-2} \quad (7)$$

If a series is stationary without any differencing it is designated as $I(0)$, or integrated of order 0. On the other hand, a series that has stationary first differences is designated $I(1)$, or integrated of order one (1). Augmented Dickey-Fuller test suggested by Dickey &Fuller (1979) and the Phillips-Perron test recommended by Phillips & Perron (1988) have been used to test the stationarity of the variables.

3.2.2. Lag Selection Criteria

Several lag selection criteria have been proposed in the econometric and statistic literature for this purpose. The three most widely used information criteria are: The Akaike Information Criterion (AIC), the Schwarz-Bayesian Criterion (SBC) and the Hannan-Quinn Criterion (HQC). It is known that the more the lags there are, the less the degrees of freedom. When we determine the number of lags, we choose the one with the minimum AIC and SBC value. If the AIC and SBC value are not minimized using the same model, we instead apply a likelihood ratio (LR) test (Johansen 1995).

3.2.3. Johansen Cointegration

This study adopts a dynamic vector autoregressive regression (VAR) which explores cointegration. The essence is to capture the causal dynamics relationship between expansionary monetary policy and household consumption, and at the same time to observe the long run and short dynamics. For instance, given a VAR with possible long run cointegration amongst a set of variables. Therefore, we start with the Johansen cointegration equation which starts with the vector autoregression (VAR) of order is given by:

$$y_t = \mu + A_1 y_{t-1} + \cdots\cdots + A_p y_{t-p} + \varepsilon_t \qquad (8)$$

If the variables under consideration are in log form and are integrated at order one- commonly denoted as $I(1)$ $n = 3$ are the parameters to be estimated. This (VAR) can be re-written as;

$$\Delta y_t = \mu + \Pi y_{t-1} + \sum_{i=1}^{p=1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \qquad (9)$$

Where,

$$\Pi = \sum_{i=1}^{p} A_i - 1 \; and \; \Gamma_i = -\sum_{j=i+1}^{p} A_j \qquad (10)$$

Johansen & Juselius (1990) procedures uses two tests to determine the number of cointegration vectors: the Maximum Eigen value test and the Trace test. The Maximum Eigen value statistic tests the null hypothesis of r cointegrating relations against the alternative of $r+1$ cointegrating relations for $r = 0, 1, 2.....n-1$. This test statistics are computed as:

$$LR_{\max}(r/n+1) = -T * \log(1-\lambda) \qquad (11)$$

Where λ is the Maximum Eigen value and T is the sample size. Trace statistics investigate the null hypothesis of r cointegrating relations against the alternative of n cointegrating relations, where n is the number of variables in the system for $r = 0, 1, 2.....n-1$. Its equation is computed according to the following formula:

$$LR_{tr}(r/n) = -T * \sum_{i=r+1}^{n} \log(1-\lambda) \qquad (12)$$

In some cases Trace and Maximum Eigen value statistics may yield different results and Alexander (2001) suggests that in this case, the results of trace test should be preferred.

3.2.4. Vector Error Correction Model (VECM)

If cointegration has been detected between series we know that there exists a long-term equilibrium relationship between them so we apply VECM in order to evaluate the short run properties of the cointegrated series. In case of no cointegration VECM is no longer required and we directly precede to Granger causality tests to establish causal links between variables. The regression equation form for VECM is as follows:

$$\Delta x_t = \alpha_1 + b_1 ect_{t-1} + \sum_{i=1}^{m} c_1 \Delta x_{t-i} + \sum_{i=1}^{n} d_1 \Delta y_{t-i} + \varepsilon_{1t} \quad (13)$$

$$\Delta y_t = \alpha_2 + b_2 ect_{t-1} + \sum_{i=1}^{m} c_2 \Delta x_{t-i} + \sum_{i=1}^{n} d_2 \Delta y_{t-i} + \varepsilon_{2t} \quad (14)$$

Where $: x_t, y_t, =$ *Variables* $; \Delta =$ *Operator difference* $; m, n =$ var *iable lag lenghts* $; ect_t =$ *Co* int *egration equation residuals* $; \varepsilon_1 \varepsilon_2 =$ *White noise residuals* .

In VECM the cointegration rank shows the number of cointegrating vectors. For instance a rank of two indicates that two linearly independent combinations of the non-stationary variables will be stationary. A negative and significant coefficient of the ECM (ect_{t-1}) in Equations 13 & 14 indicates that any short-term fluctuations between the independent variables and the dependent variable will give rise to a stable long run relationship between the variables.

3.2.5. Granger Causality

This model bagged from the vector error correction model resulting from the long-run cointegration (Granger, 1986). The Pairwise Granger causality has probable shortcomings of specification bias and spurious regression. Engel and Granger (1987) pointed out that when two variables are not stationary and cointegrated, the standard Granger causal inference will be invalid. To mitigate these problems, Granger Causality Block Exogeneity Wald test will be used. This procedure has been found to be superior to ordinary Pairwise Granger causality tests since it does not require pre-testing for the cointegrating properties of the system and thus eludes the potential bias related to unit roots and cointegration tests as it can be applied irrespective of series is I(0) or I(1). (Granger, 1986). The null hypothesis is rejected when test statistic from the test is larger than critical value. The text hypothesis is that;

H_{10}: money supply (MS) does not Granger Cause household consumption (HCON).

H_{20}: Inflation (INF) does not Granger Cause household consumption (HCON).

H_{30}: money supply (MS) does not Granger Cause Inflation (INF).

3.2.6. Variance Decomposition (VDC) and Impulse Response (IRF)

VDC technique focuses on the dynamics of series due to innovative shocks stemming from other series along with its own shock and also reflecting, whether the series is strongly impacting each other over the time periods. In this way, the use of VDC analysis could be more beneficial for the researchers to isolate the relative dynamic effects of its own shock and innovative shocks stemming from other independent variables towards dependent variable of the estimation process. Also, IRF is likely to occur when we use a system of equation in order to evaluate the effects of standard deviation shocks causing each other. The advantage of IRF is that, it enables us to identify the impacts of shocks on variables over the time in a Vector Autoregressive (VAR) framework.

3.2.7. Diagnostic Test

An evaluation of the model consists of deciding whether the estimated co-efficient are theoretically meaningful and statistically satisfactory. For this study there is need for all results to satisfy both statistical criteria (first order test) and econometric criteria (Second order test).

4.0 Data Presentation and Analysis

The analysis will be divided into two namely; descriptive statistics and empirical analysis.

4.1 Descriptive Statistics

Table 2. Summary Statistics of the variables (1981-2019).

	LHCON	LMS	INF
Mean	12.45	2.93	19.12
Median	12.47	3.02	12.10
Maximum	14.00	4.41	72.84
Minimum	10.14	1.21	5.38
Std. Dev.	1.19	1.11	17.08
Skewness	-0.35	-0.13	1.78
Kurtosis	1.83	1.59	5.00
Jarque-Bera	3.04	3.35	27.17
Probability	0.22	0.19	0.00
Sum	485.36	114.20	745.56
Sum Sq. Dev.	54.23	46.42	11080.04
Observations	39	39	39

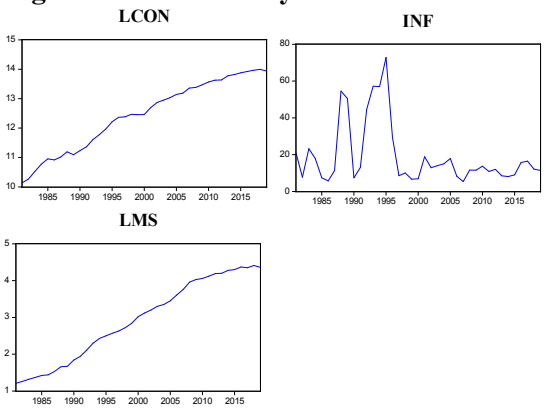
Source: Authors computation using Eviews 9, 2020.

Table 2 above provides the summary descriptive statistics, namely, sample means, maximums, minimums, medians, standard deviations, skewness, kurtosis and the Jarque-Bera tests with their p-values. It is clear that all the statistics show the characteristics common with most time series, for instance, normality in the form of platykurtic there are a number of noticeable differences, between the variables. Firstly, inflation has the largest unconditional average of 19.12% while money supply has the least unconditional average of 2.93%. The standard deviation shows the level of volatility in the variables. It displays the rate at which each variable deviates from the mean value. From the table above, inflation is the most volatile at 17.08% while money supply is the less volatile 1.11%. The skewness measures the asymmetric nature of the data.

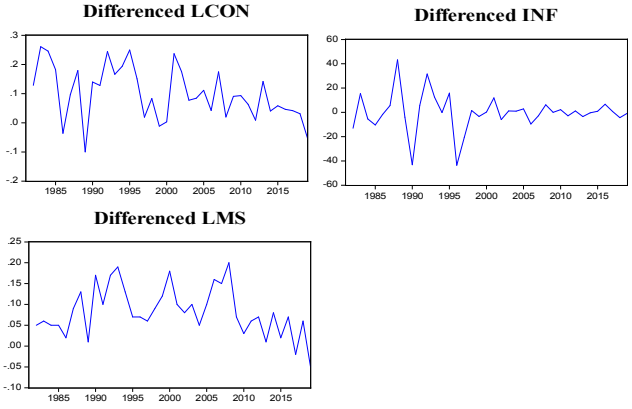
4.2 Series Trend Analysis

Times series data often exhibits increasing or decreasing trends, with fluctuations. As such, trend analysis is necessary before unit root testing, to establish whether the series have a unit root or not. The results of graphical display in Figure 2A indicate that the series exhibit a random walk with drift and trend except inflation rate. Figure 2B show that the series reflect a trend with a pattern of large fluctuations, meaning that the series are non-stationary.

Figure 2: Trend Analysis



2A: The Series In Their Raw (Undifferentiated) Form
Source: Researcher's Computation Using Eviews 9



2B: Results Of The Series Trend Test After First Difference
Source: Researcher's Computation Using Eviews 9

4.3 Stationarity Test

4.3.1 Unit Root Tests

Unit root tests will be conducted based on the Ender (2014) approach. The second ADF test at level involved a trend and intercept, while in the third, none were included. Later data was tested at first difference. Following Dickey & Fuller (1979) and Phillips–Perron (1988) methods, the series are estimated. The results of the ADF tests at level, constant & trend, none and first difference are summarized in table 3 below.

As indicated by the asterisk, the variables are not stationary when tested at level, with a constant and constant and trend. However, as indicated by the asterisk, we therefore conclude that the series are non-stationary, because data is stationary when the ADF test statistics are less than the test critical values at 5% ($ADF\ test\ statistics\ <\ test\ critical\ value\ at\ 5\%$). The corresponding probability value for stationary data is less than 0.05 ($P-value\ <\ 0.05$). Following the ADF test, all series are non-stationary at level but stationary at first difference. However, ADF tests are often affected by the choice of the lag length (p) and lose power while estimating a large sample. As such, the ADF tests results are validated by the Phillips–Perron (PP) test.

Table 3: Unit Root Tests Result

Variables	ADF Test Statistic				PP Test Statistic			
	Constant	Constant & Trend	None	First Difference	Constant	Constant & Trend	None	First Difference
LHCON	-2.93	-0.75	2.84	-4.50*	-2.93	-0.75	4.96	-4.48*
LMS	-1.38	0.52	0.47	-3.66*	-1.12	-0.41	3.77	-3.71*
INF	-2.91	-2.29	1.70	-5.68*	-2.79	-2.86	-1.79	-9.69*

Notes (ADF): Test critical values at 5% (At level: constant = -2.94, Constant and trend = -3.50, none = -1.94 while at First difference = -2.92); P-value= Probability value, * signifies stationarity.
Notes (PP): Test critical values at 5% (At level: constant = -2.94, Constant and trend = -3.50, none = -1.94 while at First difference = -2.92); P-value= Probability value, * signifies stationarity.

4.3.2 The Phillips–Perron Unit Root Test

The advantage of the PP test over the ADF test is that the test corrects any heteroscedasticity and serial correlation in the errors terms (u_t). Also, PP tests do not require lag selection and are based on a serially correlated regression error term. Similar to the ADF test, the null for PP is also based on the null that the series are non-stationery. The results of the PP test are indicated in Table 3 above. The results indicate that the series are non-stationary at level but stationary at first difference. Figure 2B shows the variables in their differenced form. This result justifies the use of VAR model for estimation.

4.4 Determination of Lags

Table 4 reports lag-order selection statistics. Criteria of SC FPE, HQIC, LR, and AIC show lag order of three. AIC has the lowest value. So the study will proceed further tests with lags (2).

Table 4: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-172.1411	NA	3.375254	9.730059	9.862019	9.776116
1	-42.73382	230.0573*	0.004211	3.040768	3.568608*	3.224998*
2	-33.38747	15.05802	0.004182*	3.021526*	3.945245	3.343929
3	-24.67715	12.58158	0.004379	3.037619	4.357218	3.498195

Source: Researcher's calculations from Eviews 9, 2020. * indicates lag order selected by the criterion

4.5 CointegrationTest

Having verified that all variables are integrated to order one $I(1)$, the next step is to perform cointegration test. Due to the fact that there are multivariate time series, the multivariate cointegration technique proposed by Johansen (1995) is applied to determine whether there are stable long-run relationship.

Table 5: Cointegration Results

Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value	Prob.**	Hypothesized No. of CE(s)	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	35.85210	29.79707	0.0089	None	19.83161	21.13162	0.0752
At most 1 *	16.02049	15.49471	0.0417	At most 1	10.10648	14.26460	0.2050
At most 2 *	5.914009	3.841466	0.0150	At most 2 *	5.914009	3.841466	0.0150

Source: Researcher's calculations from Eviews 9, 2020. * Denotes rejection of the null hypothesis at the 0.05 level

The major aim of this test is to ascertain whether a linear combination of the integrated variable is becoming stationary over the long-run, if this hold, then it means cointegration exists among the variables, this further implies that there is existence of long run relationship among the variables. Table 5 indicates the presence of a long-run economic relationship among all the variables as the trace statistic indicates 3 cointegrating equation among the variables while the Max-Eigen statistic indicates no cointegration.

Vector Error Correction Model (VECM) Estimation

In an attempt to determine the appropriate model on the empirical relationship between expansionary monetary policy and household consumption in Nigeria, two Vector Auto-regression Models (VAR and VEC) were built using the same variables. The VEC model, although non- structural as the VAR, served as its restricted counterpart. Meanwhile, the existence of cointegration relationship between the variables as reported in Table 6, invalidated the adoption of the VAR. The Vector Error Correction Model (VECM) becomes the appropriate model under this condition. The result is presented in two sections, the first section shows the cointegrating equations and the second section presents the result of the Vector Error Correction models. The regression result is presented in Table 7.

Table 6: The Result of Vector Error Correction Model

Error Correction:	D(LHCON)	D(LMS)	D(INF)
ECT	-0.37369	0.14638	2.737232
	-0.11973	-0.08822	-21.9373
	[-3.12118]	[1.65927]	[0.12478]
D(LHCON(-1))	0.095909	-0.04817	0.135339
	-0.15418	-0.11361	-28.2501
	[0.62205]	[-0.42403]	[0.00479]
D(LHCON(-2))	0.033609	-0.04658	-43.5915
	-0.15488	-0.11412	-28.3788
	[0.21700]	[-0.40814]	[-1.53606]
D(LMS(-1))	0.133791	0.299077	76.72424
	-0.25481	-0.18775	-46.6881

	[0.52506]	[1.59292]	[1.64334]
D(LMS(-2))	0.503502	0.42893	-12.7912
	-0.26434	-0.19478	-48.4344
	[1.90474]	[2.20216]	[-0.26409]
D(INF(-1))	-0.00183	0.00017	0.086219
	-0.00099	-0.00073	-0.18105
	[-1.85303]	[0.23311]	[0.47622]
D(INF(-2))	-0.00164	0.000382	-0.35551
	-0.00096	-0.00071	-0.17593
	[-1.70692]	[0.54016]	[-2.02070]
C	0.025777	0.030831	-1.3584
	-0.03331	-0.02454	-6.10292
	[0.77390]	[1.25623]	[-0.22258]

Source: Researcher's calculations from Eviews 9, 2020.

Note: The upper, middle, and lower figures estimated coefficient, standard error, and t-statistic, respectively. Table 6 above shows that the error correction term of the target equation D(LHCON) is negative while that of D(LMS) and D(INF)are positive.

Simultaneous equation has been established and estimated by VAR through the VECM procedure in Table 6. However, the simultaneous equation estimated under VAR through VECM procedure only provides the coefficients, standard errors and t-statistics but there is no provision for probability values. Therefore, there is the need to estimate the simultaneous equation as a basis for measuring the relationship between expansionary monetary policy and other explanatory factors on household consumption. This is because t-statistic is first appropriate for a study involving two samples and within-groups design. As such, this being a simultaneous model interpreting results based on t-statistics results becomes inappropriate. Second, t-statistics are not appropriate for a sample size greater or equal to 30 ($n \geq 30$) as in this study. The independent variables have the variances of the two groups but are not homogeneous (Engle & Granger, 1987). To establish the impact of the explanatory variables on Nigeria's household consumption, the study estimates the simultaneous equation by employing OLS.

Table 7: Error Correction Result

	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
ECT	-0.373690	0.119727	-3.121177	0.0042
D(LHCON(-1))	0.095909	0.154181	0.622051	0.5389
D(LHCON(-2))	0.033609	0.154883	0.216996	0.8298
D(LMS(-1))	0.133791	0.254810	0.525062	0.6037
D(LMS(-2))	0.503502	0.264341	1.904742	0.0671
D(INF(-1))	-0.001831	0.000988	-1.853029	0.0744
D(INF(-2))	-0.001639	0.000960	-1.706916	0.0989
C	0.025777	0.033308	0.773895	0.4455

Source: Researcher's calculations from Eviews 9, 2020.

Table 7 accounts for an error correction of -0.373690. Having a negative sign attached to this term explains how the disequilibrium gradually disappears between the short to the

long-run. As a result of this, the short run values of output will gradually converge to the long run path by 37% level of adjustment yearly. However, the result further reveal that the coefficient of money supply has a significant positive relationship with household consumption in the second lag which is in line with the a priori expectation. The result indicate that a 1% increases in LMS will increase LHCON by 0.50% in the second lag. The first lag of inflation (INF) has a significant negative relationship with household consumption which is in line with our a priori expectation. The result indicate that a 1% increases in INF will decrease LHCON by -0.002% in the first lag. In the second lag of inflation (INF), a 1% increase in INF will decrease household consumption by -0.002% which is in line with our a priori expectation. Furthermore, R^2 measures the joint statistical influence of explanatory variables in explaining the dependent variable as shown by the coefficient of determination value of 0.42, which account for 42% of the variation in LHCON between the year 1981 to 2019 are explained by the variables controlled in the model, while the remaining 68% percent is explained by other variables not captured in the model i.e. error term.

4.7 Simultaneous Equation Short-Run Simulation and Analysis

Granger causality test can be performed using Wald statistics. It is done to see the short run causality running from independent variable to dependent variable. It is found that test statistics for granger test should follow chi-square distribution instead of F distribution. So we would follow Chi-square result.

Hypothesis:

Null H_0. Lagged values of coefficients in each equation are zero;

Alt H_1: Not zero

The results of the short-run test are presented below:

Table 8: Granger Causality/Wald Statistics and Short-run Test

Independent Variables	Dependent Variables			ALL
	D(LHCON)	**D(LMS)**	**D(INF)**	
D(LHCON)	-	Chi-square test=5.01 Prob.=0.08 **No short-run causality**	Chi-square test=5.33 Prob.=0.07 **No short-run causality**	Chi-square test=7.88 Prob.=0.09 **No short-run causality**
D(LMS)	Chi-square test=0.43 Prob.=0.81 **No short-run causality**	-	Chi-square test=0.31 Prob.=0.86 **No short-run causality**	Chi-square test=0.66 Prob.=0.96 **No short-run causality**
D(INF)	Chi-square test=2.45 Prob.=0.89 **No short-run causality**	Chi-square test=2.77 Prob.=0.25 **No short-run causality**	-	Chi-square test=5.88 Prob.=0.21 **No short-run causality**

Source: Researcher's calculations from Eviews 9, 2020.

Since all values are not significant (greater than 0.05, the null hypotheses (H_1): β5=0 will not be rejected) according to our findings in Table 8, we cannot reject null meaning that there is no short-run causality running from independent variables to dependent variables in all the Equations (3-5). The next step is to conduct ex-ante forecasting involving impulse response and variance decomposition tests.

4.8 Impulse Response Function

The impulse response function serves the pivotal role in assessing how and to what extent shocks on independent variables influence household consumption. Table 9 displays the dynamic effects of one standard deviation shock

from the independent variables in Nigeria over a range of 5 years period to shock on LHCON.

Table: 9: Impulse Response Analysis

Response of LHCON:				Response of LMS:		Response of INF:	
Period	LHCON	LMS	INF	LHCON	INF	LHCON	LMS
SHORT-RUN	0.071114	0.01344	0.002357	0.024968	-0.00455	4.889608	1.302568
LONG-TERM	0.0732	0.056951	0.01097	0.038684	-0.01807	3.4207	1.599325

Source: Researcher's calculations from Eviews 9, 2020.

In Nigeria, household consumption forecast indicate positive trend through shocks and innovations with fluctuations. Results in table 9 indicate that household consumption own shock (LHCON); money supply (LMS) and inflation will account for increasing household consumption in the country. The result is further explained in figure 3.

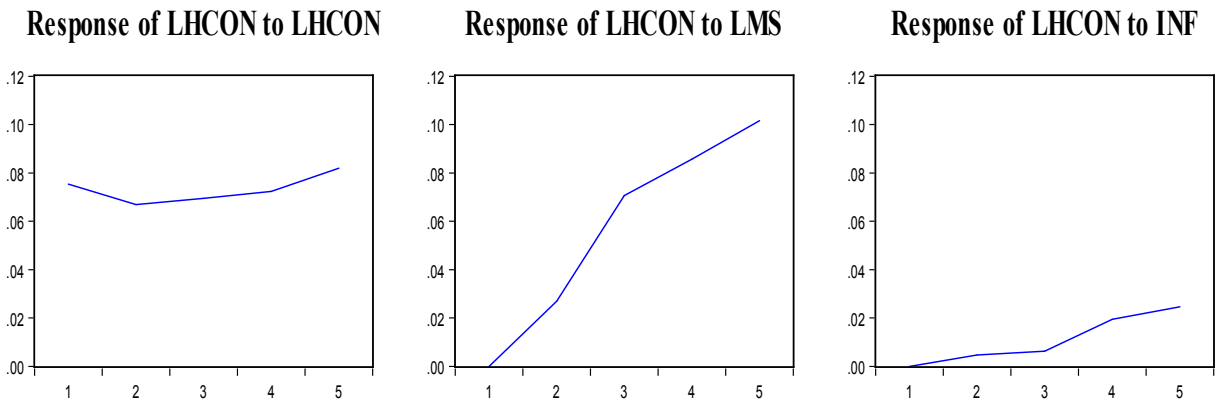


Figure 3: Impulse Response of LHCON to Dependent Variables

4.9 Variance Decomposition

Variance decomposition is adopted to forecast the error variance effects for each endogenous variable within a system. In a simple linear equation, for any change in x at time (t) there is a corresponding change in y as a dependent variable (Wickremasinghe 2011). In this study, based on the Monte Carlo procedure and ordering by Cholesky, the forecast is comprised of short-run (two years), medium-term (five years) and long-run (ten years). The results of variance decomposition forecast for endogenous variables are household consumption, money supply and inflation.

Table 10: Variance Decomposition

PERIOD	LHCON	LMS	INF
SHORT-RUN	96.58208	3.316002	0.101923
MEDIUM-TERM	75.55206	23.68426	0.763682
LONG-RUN	61.63249	37.3515	1.016005

Source: Researcher's calculations from Eviews 9, 2020.

4.10 VAR Model Checking

Employing VAR, the model was estimated via VECM procedure using two lags, where the endogenous variables were transformed to first difference via the error correction term. The error correction term which indicates the long-run equilibrium has been reported in Table 7, while the short-run relationship is reported in Table 8. Before discussing the findings, the VECM model will be validated for normality, serial correlation and stability.

4.10.1 Test for Normality

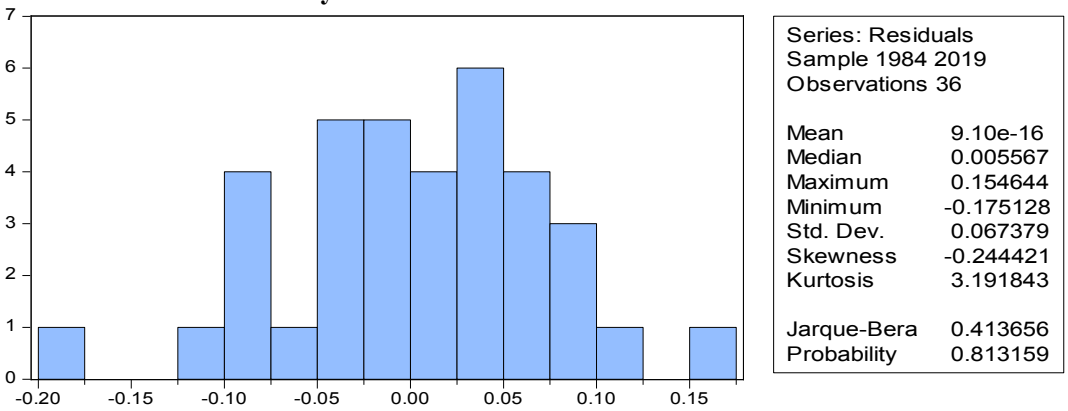


Figure 4: Test Results for Normality

According to our results in figure 4, skewness is -0.24 while the kurtosis indicates 3.19. The JB is indicated by 0.41, with a corresponding probability value not significant at 5% critical value. Based on this test, our model is normally distributed.

Autocorrelation Residual LM Test

The LM Test is commonly used to test for serial correlation in autoregressive model-one $[AR(1)]$. LM Test statistic computes lag order p based on an auxiliary regression of the residuals of the estimated regression under the hypothesis that there is no serial correlation from lag two. The results of the LM are indicated below.

Table 11: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.361353	Prob. F(2,26)	0.7002
Obs*R-squared	0.973607	Prob. Chi-Square(2)	0.6146

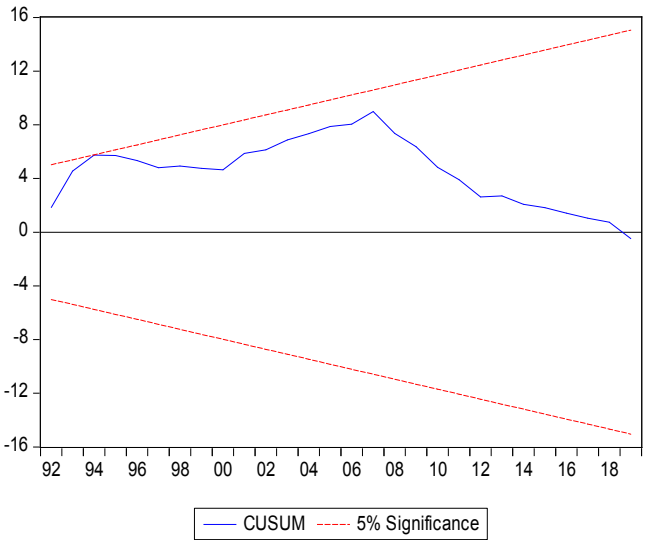
Source: Researcher's calculations from Eviews 9, 2020.

The results of Table 11 shows that the null hypothesis of no serial autocorrelation will be accepted for Godfrey LM test for 2 lags since their p-values are greater than the significance values of 0.05 and 2 lags rejects the null hypothesis that there is serial autocorrelation. Hence we can conclude that there is no serial autocorrelation since the majority of the lags accept the null hypothesis.

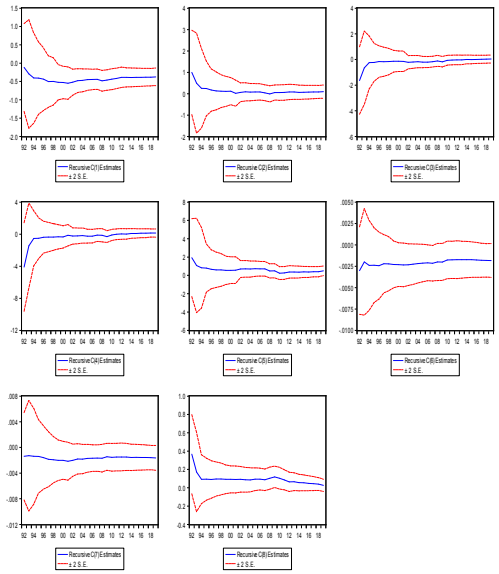
4.10.2 Test for Stability

Stability is tested by conducting CUSUM test and recursive coefficients stability test.

A



B



The results are indicated in Figures 5A &5B. All tests indicated that the systems equation is valid and provides sufficient results for economic analysis. Recursive residual estimates was employed to check structural change instability. Findings indicate an absence of any instability because the Cusum plots test statistic and the recursive coefficients are confirmed within the 5% critical bounds of parameter stability. This means that we accept the null hypothesis and conclude that our parameters are stable, and as such are without misspecification. In conclusion, following the diagnostic tests conducted, normality and serial correlation, all probability values are greater than 5% critical values which suggests that our model is valid because all probability values for the tests are greater than 5%, meaning that our household consumption equation is valid for economic analysis.

5.0 Discussion of Findings

To investigate the determinants of short- and long-run household consumption in Nigeria, the study estimated a series of VECM specifications for the growth rate of money supply in this study together with inflation. The model specification is explained in section III. Tables 7 and 8 presents the estimated short and long-run relations from the VECM. Results from Table 7 illustrate that in the short-run the main driving force behind household consumption is expansionary monetary policy proxied by money supply. The coefficient of its second lag is statistically significant and can increase household consumption by 50%. This is in line with Kaynes(1935) findings that, current income is the main determinant of the level of the current consumption expenditure. The findings also support Friedman (1957) inclusion of money as an explanatory factor in consumption function because of its statistical significance in this study. The first and second lags coefficients of inflation is statistically negative, a one percent increase in its first lag will reduce household consumption by 0.002%. This findings show that rising prices of goods and services has really affected the amount of goods and services consumed by households in Nigeria. These findings show that inflation encourages consumers to divert resources away from consumption towards saving (De Mello & Carneiro, 2000).

The long-run causality from the independent variables to household consumption indicates that there is causality. This is because the error correction term coefficient (ECT) of 0.373690is

negative and significant meaning that there is long-run causality from the dependent variables to household consumption in Nigeria. Short-run causality relationship findings between expansionary monetary policy variable and household consumption variable as indicated by the Chi-square statistics probability value is not in line with Holmes (2020) law, that an increase in the size of money supply is a natural consequence of household consumption. In other words, money supply does not cause household consumption (not exogenous).

Table 9 shows that a one standard deviation positive own shock from household consumption will cause a change from 0.07 in the short-run, and remain the same in the long-run. Second, forecast indicate positive impact from money supply (LMS) to household consumption (LHCON) in both the short-run & long-run. According to the simulation, a one positive standard deviation shock from money supply (LMS) will cause household consumption to increase by 0.013 in the short-run. The shocks will increase to 0.057 in the long-run, thus decreasing LMS affects household consumption negatively in the short run and long run. This means that expansionary monetary policy is important for the nation to experience increase in household consumption throughout the five year periods but does not accelerated household consumption. According to the third forecast, a one positive standard deviation shock from inflation (INF) will cause household consumption to equally increase by 0.002 in the short-run. The shocks will increase to 0.010 in the long-run.

A one standard deviation positive shock from household consumption (LHCON) to money supply (LMS) will cause a change from 0.02 in the short-run, and slightly increase to 0.04 in the long-run while a shock from inflation (INF) to money supply (LMS) will cause a negative change of 0.00 in the short-run, and further decrease to 0.02 in the long-run. Further forecast shows that, one standard deviation positive shock from household consumption (LHCON) to inflation (INF) will cause a change from 4.89 in the short-run, and slightly decrease to 3.42 in the long-run while a shock from money supply (LMS) to inflation (INF) will cause a positive change of 1.30 in the short-run, and further increase to 1.60 in the long-run. The above findings show an increase in household consumption will increase inflation both in the short and long-run while money supply, also increases the rate of inflation both in the short and long-run.

In the short-run, variance decomposition result shows that innovations or shocks to household consumption account for 96.58% of fluctuations in household consumption own shock. However, the household consumption own shock fluctuations continuously decline to 61.63% in the long-run. Meanwhile, shocks to money supply account for 3.32% of fluctuations of household consumption in the short-run. The fluctuations of household consumption due to money supply expenditure increase in the long-run to 37.35%. In the short-run, shocks to inflation account for 0.10%. In the long-run, shocks to inflation accounts for 1.02%. Shocks to household consumption will account for the highest fluctuations in Nigeria's household consumption, followed by money supply (see table 10).

5.1 Conclusion and Recommendation

The objective of this research paper is to scrutinize through empirical observation the effect of expansionary monetary policy on household consumption in Nigeria covering the period of 1981-2019. Money supply variable is regarded as independent variable while household consumption is regarded as dependent variable while inflation rate serves as control variable. The data tested for stationarity using ADF and PP; the results showed that they became stationary under both ADF and PP after converting them into the first difference. Also, the paper found lag order selection criterion and the results showed that the lag selection criterion was 2. Moreover, Johansen Co-integration test and VECM were used to check long-run and the short-run relationship between

variables and the results revealed long-run associations and short-run relationship running from independent variables toward household consumption using Trace statistics values tests indicating 3 co-integrating equation(s) at the 0.05 levels. Finally, we checked diagnostic test of the residuals and stability of the model. The results showed that the residuals were free from serial correlation, normally distributed and the model was stable as well. The paper recommends that money supply should be watched out by government so as to maintain stable prices, especially if we want to keep household consumption on track.

References

Amadeo, K. (2020). Expansionary monetary policy: How low interest rates create more money for you. Retrieved from https://www.thebalance.com/expansionary-monetary-policy-definition-purpose-tools-3305837 @ 9.00pm 21/07/2020.

Alexander, C., 2001. Market models: A guide to financial data analysis. John Wiley & Sons Ltd.

Aryusmar, D. (2020). The effect of the household consumption, investment, government expenditures and net exports on Indonesia's GDP in the Jokowi-jk era. *Journal of Critical Reviews*. Vol. 7, Issue 5.

De-mello, R. L. & Carneiro, F. G. (2010). Consumption behaviour and persistently high inflations: Evidence from Latin America. University of Keut at Canerbury, UK. Available from: https://www.researchgate.net/publication/342619534.

Dickey, D. and W. Fuller, 1979. Distribution of the estimators for autoregressive time series with a Unit Root. J. the American Statistical Association, 74(366): 427-431.

Engel, R.F. And Granger C.W. (1987). "Cointegration and error correction: Representation Estimation and Testing". *Econometrica*, 55(2): 251-276

Fisher, I. (1930).The theory of Interest. *London MacMillan*.

Friedman, M. (1975).A theory of the consumption function. Princeton, NJ: *Princeton University Press*.

Friedman, M.(1957). A theory of the consumption function.*National Bureau of Economic Research*, Princeton, NJ.

Granger, C. W. J. (1986), "Developments in the study of co-integrated economic variables", *Oxford Bulletin of Economics and Statistics*. 68: 213-228.

Gulcin T. &Aycan, H. (2014). An analysis of household consumption expenditures in EA-18. *European Scientific Journal*. vol.10, No.16. June.

Gujarati, D. N., & Porter, D. C. (2009). Basic econometrics. Boston, Mass, *McGraw-Hill*.

Hall, M. (2019). How do fiscal and monetary policies affect aggregate demand? Retrieved from https://www.investopedia.com/ask/answers/040315/how-do-fiscal-and-monetary-policies-affect-aggregate-demand.asp @ 2.00pm 18/7/2020.

Holmes, T. (2020). What are the effects of an increase in money supply? Retrieved from https://www.wisegeek.com/what-are-the-effects-of-an-increase-in-money-supply.htm @ 18/7/2020.

Johansen, S. (1995). Likelihood-based inference in cointegrated vector autoregressive models. *Oxford University Press*: oxford.

Modiglinai, F.&Brumberg, R. H. (1990). Utility analysis and aggregate consumption functions: an attempt at integration. In Andrew Abel, ed., The collected papers of Franco Modigliani: Volume 2, The Life Cycle Hypothesis of Saving, *Cambridge, MA. The MIT* Press. Pp 128–197.

National Bureau of Statistics (2020). Consumption expenditure pattern in Nigeria. Retrieved from

https://www.proshareng.com/news/NIGERIA%20ECONOMY/Total-Household-Expenditure-on-Food-and-Non-food-Was-Put-At-N40.21bn-in-2019---NBS/50930 @ 1.30pm 19/07/2020.

OECD, (2013). Household consumption. Retrieved from https://www.oecd-ilibrary.org/docserver/na_glance-2013-12-en.pdf?expires=1595357713&id @ 8.00pm 21/7/2020.

Onanuga, A., Oshinloye, M. &Onanuga, O. (2015). Income and household consumption expenditure in Nigeria. *Munich Personal RePEc Archive.* Online at https://mpra.ub.uni-muenchen.de/83334/. 14th January.

Phillips, P.C. & Perron, P.(1988). Testing for a unit root in time series regression. *Biometrika*, 75(2): 335-346.

Suits, D. (1970). The determinants of consumer expenditure: A review of present knowledge. In Johnson, W., Kamerschen, D. (Eds.). Macroeconomics. Selected Readings. *Houghton Miffin Company*. 1970.