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The Dynamic Analysis Of Fiscal Policies On Consumer's Spending In Nigeria: A Time Series Approach

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Abstract

This paper examines the economic recession experienced in Nigeria that is being counteracted by aggressive fiscal policies that is geared toward encouraging spending on consumer goods or consumables. Using the ordinary least squares technique and data collected for the period 1970 – 2010, the study assessed the effectiveness of government's fiscal measures to stabilize the economy through spending. From the consumer spending model developed in this research, we assessed the effectiveness of the key variables like inflation rate, interest rate, mortgage rate and annual earning increase in percent on retail price index. The paper finds that inflation rate and interest rate were the key variables that affects consumer spending, as such we recommend that fiscal measures targeted at reducing interest rate (lending rate) as well as controlling inflation should be the policy priority of the Nigerian government.

Keywords: Consumer spending, fiscal policy, lending rate

1. Introduction

The recent recession in economic activities in most countries in the world especially in developed world (West) left some ripples in consumer spending pattern and the fiscal policies on those countries affected was not left out. The retail price index shrank as most shops suffered liquidation. The government consistently revised the interest rate to cushion the economic crunch on consumers and encourage a spending rather than a thrift in the Nigerian economy. For example, at the onset of the recession, all the Central Banks introduced inertia in their interest rate targets relative to the cyclical decline in economic activities. Hetzel (2009) observed that the European Central Bank was not left out as it focused on higher wage settlement in parts of the European Union including Portugal, Holland, Germany and Italy, but whether these measures have produced the desired outcome have remained an issue of debate to policy makers, administrators, academicians and researchers.

According to Audu (2008a), inflationary targets have been used as a mechanism of reducing inflation rate and interest rate volatility thereby injecting a transparent monetary policy in the

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Nigerian Economy. Nigeria, like other countries of the world have adopted this policy since 1992 and had maintained a target of two percent and this arguably had been used in mitigating the exchange rate volatility of the economy. Lee (2009) posits that 26 countries comprising of Australia, Peru, Israel, Chile, Canada and Sweden have also maintained inflationary targets. Therefore, the adoption of inflation targets could have a significant impact on the stock market especially if it falls below the expected level. Similarly, interest rate provides the alternative impetus or source as well as uses of fund which affect bank credit. Ezeoha et al. (2010), collaborated this preposition and argued that the expectations theory of interest rate posits that banks invest in assets with higher rates as to maximize their returns. They also held that this could impact on inflation as the quantity theory suggest that inflation is caused by increase in money supply which exceeds the growth rate of the country's economy. As a result of the foregoing, this paper examines some vital variables that are predatory on the consumers spending. The consumer spending level on goods as measured by the retail price index is affected by a range of factors. In the light of the above, the consumer spending model developed and adopted in this paper uses four variables such as Mortgage rate (MORR), annual earnings increase (ANEI), Bank interest rates (INTR) and annual inflation rate (INFR) respectively to analyze the consumer behavioral and spending pattern during economic recession (melt down).

2. Literature Review

Various studies on economics and finance have produced different models to analyze the effect of inflationary, interest, mortgage rates and earnings spending. Ward (2008) expanded this on the Hedonic pricing model to generate quality adjusted price indices and cautions against the removal of mortgage interest repayment from macroeconomic inflationary targets measures in the United Kingdom. Cansino et al. (2007) also used the simple accounting matrix model to estimate the impact of tax on retail sales and on the prices indices in Spain. Other studies such as Llop et al. (2004) developed the computable general equilibrium (CGE) model to analyze the indirect effect of taxes on spending. The retail price index (RPI) had been a very popular standard of measurement of inflation, household spending on consumables and includes mortgage interest repayments. Ward (2008) also adds that the RPI in United Kingdom and other countries of the world is also considered as a suitable benchmark in assessing the cost of living and thus used as a reference point in wage negotiations. In this regard, it is more acceptable than the consumer price index (CPI) or the harmonized index of consumer prices (HICP) as introduced among the European Union countries.

The fiscal feature of inflation is anchored on the assumption that Central banks determines the inflationary trends based on the inflation targets. This doctrine defies the exogenous strength of the market forces that influence market prices (Hetzel, 2009; Audu, 2008a and Nyong, 2004). Furthermore, the extend of control of inflation by regulatory banks has been tested by Friedman (1969), using the natural rate hypothesis which posit that while the expected inflation can stimulate economic activities, the expected inflation cannot. The interest rate must also provide incentives for individuals to change their contemporaneous demand for resources relative to their future demands. Most countries in Africa, United States of America and Europe

introduced some fiscal policies including quantitative easing technique to ameliorate the harsh economic impasse. The bank lending rate was drastically reduced as well as the value added tax (VAT) from 17.5 to 15 percent. These policies perhaps were in compliance with the suggestions of the World Bank and the European Monetary Union (EMU) on member countries to initiate fiscal measures that will facilitate a speedy adjustment to the macroeconomic shocks (Colciago et al., 2008; Audu, 2006). The focus was to encourage spending on goods as a measure of stimulating the economy. Some analysts believe that increase in bank rates and fall in full prices would help in stabilizing inflation (Kirchhoff, 2008). The key policy of Nigeria and most countries is focused on addressing the imbalance in fiscal policy, particularly budget deficits.

Therefore, knowledge of the causes of fiscal imbalances offers vital information to domestic fiscal authorities in their efforts to either achieve fiscal balances. Kollias et al. (2006) in their study outlined two alternative hypotheses of government spending and tax revenue: the spend tax and tax–spend hypotheses. While the former describes spending decisions prior to changes in tax and the latter explains how changes in government tax revenues lead to changes in expenditure. These hypotheses have consistently produced mixed results. Payne (2003) attributed this to differences in the methodology, model specification and the time frame of the studies. This notwithstanding, Hoover et al. (1992) observed that the lack of causality between revenue and expenditure is attributable to the government structure of a country.

3. Methodology

This paper develops a consumer's spending model to examine the impact of some vital variables on consumer's spending. The retail price index serves as a proxy for consumer's spending which is an acceptable standard for measuring the amount spent by household on consumables. This model is developed using the Hodrick et al. (1997) filter with a parameter lambda (λ) as the smoothing coefficient. The filter sets the potential component of output to minimize the loss function, H and represented in the function thus:

$$H = \sum_{i=1}^{a} (y_i - y_i^I)^2 + \lambda \sum_{i=2}^{a-1} (\partial y_{i+1}^I - \partial y_i^I)^2$$

The λ vector had all its elements equals to zero and therefore a non–negative scalar. The value of λ = 100 (for annual observations) and s = sample. The assumption is that the RPI is dependent on bank interest rate, inflation rate, annual earnings increase and mortgage rate. The intrinsic potentials of these variables signify that they exert influential impacts on spending.
Therefore, the consumer spending model is represented algebraically thus:

$$RPI = \alpha_0 + \alpha_1 INTR_i + \alpha_2 INFR_i + \alpha_3 ANEI_i + \alpha_4 MORR_i + \varphi_i$$

Where RPI is the retail price index at anytime i, α is the constant term, INTR is the bank interest rate, INFR is the annual inflation rate, ANEI is the annual earnings increase percent, MORR is the mortgage rate while the φ is the stochastic term

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Hetzel (2009) and Audu (2008a) in their various studies maintained that the sustained money creation by the Central Banks such as the Central Bank of Nigeria, Bank of America, Bank of England, West African Central Bank and European Central Bank will revive the spending of the public through a portfolio rebalancing mechanism. Therefore, the bank rate will rise with no increase in expected inflation as the increase in spending restores and revamps the confidence of the economy while the decline in the annual earnings increase had been less contentious. This is due largely to the fall in the demand for goods and services to the extent that profits from businesses cannot be further squeezed. Pay freezes which initially started with small firms particularly in housing related industries in the early quarter of 2008, gradually affected even the big firms (Hackworth, 2009).

4. Empirical Analysis and Results

Before modeling the RPI, it is important to determine the orders of integration for the variables considered.

Table 1: Results of ADF Stationary Tests

Variables	Levels	1st Difference	2nd Difference	Decision
RPI	–4.084957	–6.142304	–9.497492	I (0)
MORR	–1.662708	–12.58710	–10.40046	I (1)
ANEI	–1.333361	–9.552802	–10.84005	I (1)
INTR	–2.262261	–7.080814	–11.27714	I (1)
INFR	–3.144169	–6.125304	–7.881515	I (1)
Critical values				
1%	–3.610453			
5%	–2.938987			
10%	–2.607932			

As shown in the Table 1, we used the Augmented Dickey–Fuller (ADF). It was found that all the variables of the study exhibit unit root process at various critical levels but mostly at 1% level of significance. In other words, all the variables are found to be non–stationary at their levels but stationary at their first difference.

Cointegration analysis helps to clarify the long–run relationship between integrated variables. Johansen's procedure is the maximum likelihood for finite–order vector autoregressive (VARs) and is calculated for such systems, so it is used in this study. The Johansen's technique was chosen not only because it is VAR based but also due to the evidence that it performs better than single equation and alternate multivariate methods. The results of the Cointegration test are presented in Table 2.

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Table 2: Johansen Hypothesized Cointegrating Relations

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None *	0.652540	70.10799	68.52	76.07
At most 1	0.313664	29.93798	47.21	54.46
At most 2	0.231099	15.63523	29.68	35.65
At most 3	0.109256	5.649098	15.41	20.04
At most 4	0.032425	1.252555	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Max-Eigen test indicates 1 cointegrating equation(s) at the 1% and 5% levels

The max–eigenvalue test shows that there is one cointegrating equation in the analysis. The PT–matrix of the beta coefficient from the Johansen Cointegration analysis and the preferred cointegrating (CI) equation of the model are presented in Table A3 of the appendix. As shown by the chosen CI equation, which normalized the coefficient of RPI, all the explanatory variables are significant in influencing changes in prices and the most significant of the determinants of prices are annual earnings increase, bank interest rate and mortgage rate. The relationship depicted in the CI equation shows that in the long–run expected bank interest rate, mortgage rate and annual inflation rate exert positive influences on general retail prices while annual earnings increase affects retail price negatively.

Having ascertained that the variables are non–stationary at their levels but stationary after first differentiating once, and they are cointegrated, the stage is set to formulate an error correction model. The intuition behind the error correction model is the need to recover the long–run information lost by differencing the variables. The error correction model rectifies this problem by introducing an error term. The error correction term is derived from long–run equation based on economic theory. The error correction term enable us to gauge the speed of adjustment of inflation rate to its long–run equilibrium. It gives us the proportion of the disequilibrium errors accumulated in the previous period which are corrected in the current period. The result shows that the speed of adjustment of the consumer retail price index to the long–run equilibrium part is high. Specifically, about 75 percent of the disequilibrium errors, occurred in the previous year are corrected in the current year consumer spending model. Also, the means of the variables and their standard deviations as shown in Table A.1. The means of INTR, INFR, ANEI and MORR are 8.09, 14.97, 17.28 and 19.10 respectively with standard deviations show that the mean of the variables are similar with a marginal value in their standard deviation. Table A.1 shows the mean of the variables with a marginal value in the standard deviation. First the study establishes the correlation between the RPI and the other vital consumer spending variables. The correlations in Table A.2 show that the bank interest rate and annual inflation rate have significant correlation with the RPI, while the INTR has a negative correlation with the RPI, the INFR had a positive correlation. This implies that an

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increase in bank rate depletes consumer spending with inflationary trend has an effect on spending. The table indicates that RPI has a significant correlation of 0.619 with INTR and 0.641 with INFR respectively.

Preceding the dynamic analysis, the result from the estimated static model shows that mortgage, bank interest rate, inflation rate and annual earnings increase are the long–run determinants of retail price index in Nigeria. The result of the parsimonious ECM is presented in Table 3.

Table 3: Results from the Error Correction Model

Dependent Variable: RPI

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RPI(-1)	0.756849	0.135659	5.579054	0.0000
C	2.516819	2.794795	0.900538	0.3761
MORR(-1)	-0.022041	0.050516	-0.436320	0.6634
ANEI	0.164932	0.198460	0.831056	0.4135
ANEI(-2)	0.216324	0.182724	1.183879	0.2472
INTR	-0.002545	0.000813	-3.130622	0.0063
INTR(-1)	0.190448	0.172818	1.102013	0.2806
INFR	0.185242	0.029596	6.258924	0.0000
INFR(-1)	0.006936	0.001596	4.344686	0.0000
ECM(-1)	-0.227873	0.067587	-3.371555	0.0007

R-squared	0.771175	Durbin-Watson stat	2.864660
Adjusted R-squared	0.691966	F-statistic	9.735975
S.E. of regression	0.753310	Prob. (F-statistic)	0.000002

The over parameterized model from which the parsimonious ECM emanated is presented in Table A.4. The adjusted R^2 of the estimated model shows that about 69 percent of the variations in RPI are explained by the combined effects of all the determinants while the F–statistics shows the overall regression is significant at the 5% level. Also, the equation's standard error of 0.75 signifies that in about two-thirds of the time, the predicted value of RPI would be within 75% of the actual value.

As show in Table 3, the lagged value of RPI marginally influences the volatility of inflation over time with a strong inertia of 75.7%. Current expectations about future levels of prices significantly influenced the volatility of inflation. Specifically, the coefficient of expected inflation (INFR) is positive and significant at 5% critical level. This notwithstanding, it is important to note that various studies undertaken on inflationary effect on retail prices accentuate its critical role, yet researchers are open to admit that much remain to be investigated about inflation (Audu, 2008a; Wynne et al, 2004 and Huasman, 2004). This study therefore leans support to Colciago et al (2008) that inflation has a stimulatory effect on spending. Another interesting result from the analysis is the impact of bank interest rate on

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general prices. As shown in the table, the current value of bank interest rate (INTR) exerts a significant negative impact on the level of current inflation. The variable had a low coefficient of –0.0025. This is supported by Arneric et al (2009) when he observed that bank interest inadvertently affects economic activities. Audu, (2010 & 2008b) posits that the current Nigeria inflation rate is not only a result of the globalization, but a result of the foreign imports and appreciation of the naira. The study warns that caution must be exercised on over reliance of past interest rate as the guide for estimating future rates. The coefficient of annual earnings increase and mortgage rate is not significantly different from zero, though they are negative and positive respectively are less forceful in the stimulating spending model but their inclusion is crucial for the model to be significant.

Having presented the results from the empirical analysis, it is also necessary to examine the statistical properties of the estimated model. The model was tested for normality, serial correlation, autoregressive conditional heteroskedascity, heteroskedascity, specification error and stability. The result reported in Table B, suggest that the model is well specified. The diagnostics indicates that the residuals are normally distributed, homoskedascity and serially uncorrelated and the parameter appear stable.

Table 4: Diagnostic Test

S/No.	Tests	F–Statistics	Probability
1.	Normality (Jarque–Bera Stattistics)	0.4081	0.9724
2.	Serial Correlation (Breusch–Geodfrey Serial Correlation LM Test)	0.2103	0.4158
3.	Autoregressive Conditional Heteroskedasticity (ARCH LM Test)	4.7799	0.0155
4.	Heteroskedascity (White Heteroskedasticity Test)	1.8120	0.1134
5.	Stability		
	Chow Breakpoint test (Mid Sample)	2.5260	0.0477
	Chow Forecast Test (1970 – 2010)	2.1637	0.4972
6.	Specification Error (Ramsey Rest Test	10.0668	0.3599

5. Conclusion

This paper has attempted to identify the key determinants of inflation in Nigeria using the framework of error correction mechanism. The empirical results reveals that mortgage rate and annual earnings increase has no significant effect in stimulating consumer spending. This is not surprising as the National Bureau of Statistics and the Central bank of Nigeria also incorporates bank interest rate in the estimation of mortgage rate matrix (CBN, 2010). Also, while bank interest rate has a significant but negative impact on spending, the reverse was the case for inflation rate as it exerts a positive impact on spending. Therefore, to stimulate the economy through consumer spending, the Nigerian government fiscal policy must be geared towards stabilizing or curbing the inflationary trend in the economy. The consumer spending model as

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used in this study portrays the key spending variables of interest rate, inflation rate, mortgage rate and annual earnings increase. The study reveals that a high correlation exist between inflation rate and interest rate with the retail price index which is a key factor for measure of consumer's spending on consumables.

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Table A.1 Summary Statistics Variables

Sample: 1970 – 2010					
	RPI	MORR	ANEI	INTR	INFR
Mean	6.207317	8.095366	14.97366	17.28707	19.10244
Median	4.400000	5.490000	16.52000	17.60000	13.40000
Maximum	25.00000	19.19000	29.80000	36.09000	72.80000
Minimum	1.200000	3.000000	6.000000	6.000000	3.200000
Std. Dev.	5.433663	5.080902	6.734897	7.162151	16.35339
Skewness	1.616759	0.807204	0.176145	0.549050	1.619913
Kurtosis	5.237691	2.214154	1.965359	2.674924	4.976317
Jarque-Bera	26.41579	5.507441	2.040760	2.240479	24.60393
Probability	0.000002	0.063690	0.360458	0.326202	0.000005
Sum	254.5000	331.9100	613.9200	708.7700	783.2000
Sum Sq. Dev.	1180.988	1032.622	1814.353	2051.856	10697.33

List of variables

Table A.2: Correlation matrix

	RPI	INTR	INFR	ANEI	MORR
RPI	1.000000				
INTR	-0.619456	1.000000			
INFR	0.641104	-0.873031	1.000000		
ANEI	-0.039017	0.316755	-0.478091	1.000000	
MORR	0.326633	0.621943	0.282185	0.628192	1.000000

Table A.3: Unrestricted Cointegrating Coefficient (normalized by b'*S11*b=I)

(PT –matrix of the beta coefficients from the Johansen cointegrating analysis)

RPI	MORR	ANEI	INTR	INFR
-0.037168	-0.208305	0.249883	-0.211168	0.085238
-0.199289	0.092409	0.107950	-0.302502	-0.006638
0.216559	-0.017591	0.492819	-0.341252	-0.016650
-0.027719	0.279106	-0.084197	0.013675	-0.002115
-0.011312	-0.135865	0.300061	-0.096215	-0.014355

The first cointegrating equation (standarderror in parentheses)

RPI	MORR	ANEI	INTR	INFR
1.000000	5.604425	-6.723078	5.681463	-2.293324
	(1.33709)	(2.08920)	(1.80388)	(0.30516)

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Table A.4: The General/Overparametized EC model

Dependent Variable: RPI
Method: Least Squares
Date: 04/10/11 Time: 15:28
Sample(adjusted): 1975 2010
Included observations: 36 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ΔRPI(-1)	0.909021	0.191154	4.755435	0.0001
ΔRPI(-2)	-0.258832	0.199388	-1.298138	0.2090
C	4.822168	3.237373	1.489531	0.1519
MORR	-0.038846	0.180268	-0.215488	0.8316
ΔMORR(-1)	-0.182333	0.193870	-0.940491	0.3582
ΔMORR(-2)	0.096923	0.203410	0.476489	0.6389
ANEI	0.215859	0.220516	0.978882	0.3393
ΔANEI(-1)	-0.097911	0.290883	-0.336600	0.7399
ΔANEI(-2)	-0.118950	0.264671	-0.449427	0.6580
INTR	-0.206977	0.193054	-1.072120	0.2964
ΔINTR(-1)	0.284729	0.230748	1.233942	0.2315
ΔINTR(-2)	-0.199074	0.216972	-0.917511	0.3698
INFR	0.047721	0.056780	0.840458	0.4106
ΔINFR(-1)	0.099836	0.102463	0.974362	0.3415
ΔINFR(-2)	-0.137999	0.136051	-1.014321	0.3225
ECM(-1)	-0.128297	0.104758	-1.224704	0.2349

R-squared	0.804349	Mean dependent var	5.744444
Adjusted R-squared	0.657610	S.D. dependent var	5.465342
S.E. of regression	3.197996	Akaike info criterion	5.464028
Sum squared resid	204.5436	Schwarz criterion	6.167814
Log likelihood	-82.35251	F-statistic	5.481507
Durbin-Watson stat	2.311018	Prob. (F-statistic)	0.000292

Note: Δ represents the first difference operator