

Consumer Confidence Indices and Short-term Forecasting of Consumption for Nigeria

Olorunsola Emmanuel Olowofeso and Sani Ibrahim Doguwa¹

Abstract

This paper examines the link between consumer sentiment and consumption expenditures in Nigeria. It assesses the predictive ability of consumer confidence indices and selected macroeconomic indicators using a simple autoregressive model which addresses the issue of how confidence indicators bring additional information beyond economic fundamentals. Given the paucity of monthly data, cubic spline interpolation algorithm was used to convert quarterly indicators from 2008Q2 – 2014Q2 into monthly series. From the analysis of the consumption model estimated, we find that the in-sample forecast performed well with little error margin and the out-of-sample values for the next six month were estimated. The results show that the confidence indicator could influence economic performance and be a good predictor of household consumption growth in Nigeria. The paper stressed that care must be exercise particularly during period of economic uncertainty and fluctuations in using the best model for decision making.

Keywords: Consumer expectations, short-term forecasting, consumption, retail trade index

JEL classification: C22, C32, E27, E37

¹ Statistics Department, Central Bank of Nigeria, Abuja.

The views expressed in this work are those of the authors and do not necessarily represent those of the Central Bank of Nigeria.

1. Introduction

The last two decades have witnessed tremendous development on the use of surveys data to take policy decisions. For many years, indices of consumer sentiment have been used to provide stakeholders, particularly, government policy makers and business leaders with timely and important information on consumer attitudes and perceptions. A number of researchers have also conducted research studies to assess the predictive power of consumer confidence in forecasting household spending over the past few decades. For example, in the United States, Mishkin (1978) reported that Index of Consumer Sentiment (ICS) published by the University of Michigan possesses good explanatory power for changes in durable goods. Carroll *et al.* (1994) also found that the Michigan ICS has good predictive capability with regard to household expenditure but that its forecasting power decreased considerably when the Index was used along with other macroeconomic variables.

Interest in consumer perceptions and attitudes reflects general belief that the sentiments and expectations of individual consumers directly affect the direction of the economy. Empirical research has shown that measures of consumer confidence are collated with consumption and may have some short-term forecasting capability (see, for example Carrol *et al.*, 1994 and Al-eyd, *et al.*, 2009). Also, some economists have developed renewed interest in evaluating the potential link between confidence indicators derived from household based survey and some microeconomic variables. In another study, Acemoglu and Scott (1994) employed Granger causality and regression analyses to determine whether consumer confidence, as measured by the Gallup Poll in the United Kingdom, can predict future consumption and found that consumer confidence is a leading indicator of future consumption growth. In a subsequent study, Delorme, *et al.* (2001) conducted a study on consumer confidence and rational expectations in the United States compared with the United Kingdom. They reported that the predictive ability of the United Kingdom consumer confidence index is greater than that of the United States.

Using French data, Belessiotis (1996) also reported that consumer confidence index provides decent explanatory power for future consumer spending. Other studies include that of Kwan and Cotsomitis (2005) in Canada that reported that though consumer sentiment is a reliable predictor of consumer expenditures at the national level, results obtained using regional data were quite mixed. Unlike the case in the United States or the United Kingdom, Fan and Wong (1998) found that confidence indicators in Hong Kong have little or no explanatory power in forecasting household spending. Choi (2002) reported that (consumer sentiment index) CSI provides significant information about future consumption, but Kim and Goo (2005) observed that the CSI in Korea did not have reliable predictive power for future consumption.

Despite the importance of CSI, there have been a few studies on the CSI in Nigeria, apart from the work of Olowofeso and Doguwa (2012) that assesses the consumer confidence indices and the inter-linkages between consumer confidence and selected macroeconomic variables in Nigeria. Most of the studies considered focused on developed countries and studies on Africa and Nigeria in particular are sparse. This study therefore is an attempt to address issue relating to whether consumer confidence data could be used to forecast consumption in Nigeria. In

particular, the paper examines whether the inclusion of confidence data and other relevant economic indicators improve the fit of consumption model. To the best of our knowledge, our study represents the first endeavour in Nigeria to assess the usefulness of consumer confidence in predicting consumption. The rest of the paper is structured in four sections. Section 2 reviews related literature. The methodology is presented in section 3, while section 4 presents the empirical results. The fifth section presents the concluding remarks of the paper.

2. Literature Review

Many researchers have explored both theoretical and empirical ways in which consumer sentiment could influence economic performance. With regard to consumers, low expectations for the future may affect different types of spending in different ways. One would expect, for example, spending on more expensive, durable items to be more sensitive to consumer sentiment, whereas outlays on essential day-to-day goods would fluctuate less in response to expectations.

So far, most studies on consumer attitudes as a leading indicator of household spending have focused primarily on the predictive power of the Michigan Index of Consumer Sentiment (ICS). The results of these studies have, however, been varied. For example, an early study by Lovell (1975) found that measures of consumer attitudes based on the Michigan Survey of Consumers are unreliable predictors of future consumption. Mishkin (1978), using a stock adjustment model, showed that the ICS provided good explanatory power for changes in consumer durables. In another development, Souleles (2001), using the microdata of the Michigan Survey, reported that consumer sentiment is useful in forecasting future consumption, even when controlling for a number of macroeconomic variables. On the other hand, Howrey (2001) found that both lagged and current-quarter monthly values of the ICS were generally insignificant when control variables were presented in the equations of total personal consumption expenditures (PCE), consumer spending on durable goods as well as on services.

Ludvigson (2004) examined the main issues surrounding the measurement and reporting of consumer confidence, as well as its relationship with the real economy. The study concluded that the most popular surveys do help predict future consumer expenditure, but the extra predictive power beyond that of other economic and financial indicators is modest.

In another related study, Lovell (2001) suggested that the Index of Consumer Expectations (ICE) developed by the University of Michigan may be a better proxy for consumer confidence than the ICS. Many other studies particularly for developed countries give emphasis on the forecasting power of sentiment indices on macroeconomic trends of the economies. With the pioneers of Acemoglu and Scott (1994) and Carroll *et al.* (1994), the studies result in having attention on consumer confidence indices since the predictive power of the indices are generally noticed via several analysis. Matsusaka and Sbordone, (1995) employed US quarterly data within the period 1953–1988 to analyze the relationship between consumer sentiment and GNP. Using Granger causality, they find that there is causality from consumer sentiment to GNP. In a related development, Utaka (2003) used vector autoregression to analyzed consumer confidence as a factor in explaining the economy using quarterly Japan data. He discovered that confidence only has an

effect on short-term economic fluctuations; however, no effect is detected in the long run. Afshar and Zomorrodian (2007), using quarterly data for the U.S. from 1980 to 2005, analyze the relationship between three confidence measures and economic fluctuations. They find causality from confidence measures to GDP and that these three measures play crucial roles in economic fluctuations. Nadenichek (2007) investigates whether expectation can play a role in the creation of economic downturns using Japan's stagnation period of 1990s. Olowofeso and Doguwa (2012) developed and estimated the consumer sentiment model and conference board confidence model for Nigeria. They cited several factors that can affect the consumer confidence in an economy like Nigeria. Using simulation techniques, they discovered that consumer or business confidence indices take a part in explaining the economic fluctuations. Our approach here concentrates on monthly data instead and uses a related but somewhat different methodology.

3. Methodology

3.1 The Data

The data used in this paper are obtained from the surveys of the Consumer Expectations Survey (CES) of Central Bank of Nigeria from Q2 2008 to Q2 2014. Other data are obtained from the surveys of business expectations and Statistical Bulletin of the Central Bank of Nigeria. The confidence data were taken from consolidated quarterly expectations surveys data of both households and firms in the six-geopolitical zones of Nigeria. The sectors covered for the firms include industry, construction, wholesale and retail trade, financial intermediation, hotels and restaurants, renting and business activities and community and social services. In addition, some of the secondary data collected were obtained from various publications of the National Bureau of Statistics, the consumer price index and national accounts data. The consumer confidence index (CCI) collected reflects the short-term trend of activity and major movements in overall economic activity. Most of the data are current and expectations values for next quarter and one year ahead. In both the consumer and business expectations surveys, the results are reported as differences between positive and negative answers (net balances), which are then aggregated into a single confidence index, with each net balance receiving the same weight. The choices of the indicators are based on the relevance of the variables to this study.

3.2 Method of Data Analysis

The data collected were analyzed using the Eviews and WinSolve. Given the paucity of monthly data, cubic spline interpolation algorithm was used to convert the quarterly indicators to monthly series.

3.2.1 Computation of Confidence Indices

Overall Consumer Confidence Index is computed as the average of three indices: Economic condition index (ECI), Family financial condition index (FFCI) and Family income index (FII). The ECI, FFCI and FII are diffusion indices computed as the percentage of respondents that answered in the affirmative less the percentage

share of the respondents that answered negative in a given indicator. A negative diffusion index indicates that the respondents with unfavourable view outnumber those with favourable view except for unemployment, change in prices and interest rate for borrowing money, where a negative index indicates the opposite.

The retail trade confidence index is based on the following three questions from the business expectations survey: We consider the present volume of business activity index with volume of total order book index as well as business trend over the next 3 months; the retail trade confidence index is calculated as the unweighted average of the scores for the three questions.

Table 1 below presents the summary of Consumer Confidence Indicator and the other macroeconomic indicators, the corresponding IDs and the corresponding sources from which the data are collected.

Macroeconomic factors, respective IDs and data sources			Table 1
Economic Factor	ID	Source	
Real consumption	GRC_t	National Bureau of Statistics	
Growth rate of consumption	ΔGRC_t	National Bureau of Statistics	
Real personal disposable income	RPDI	National Bureau of Statistics	
Financial deepening	FD	CBN, Statistical Bulletin	
Consumer confidence	CC	CBN, Statistical Bulletin	
Retail trade confidence	RTC	CBN, Statistical Bulletin	

3.2.2 Pearson Correlation Analysis

Pearson correlation analysis is the statistical analysis tool used to study the relationship between the consumer confidence indicators and the other macroeconomic indicators examined in this work. The null hypothesis of the test for CCI and each macroeconomic indicator is that there is no association between CCI and other macroeconomic indicators.

3.2.3 Unit Roots

In order to evaluate the forecasting ability of the confidence, we need to get adequate information on the stationarity properties of the data being used in the forecast. Augmented Dickey-Fuller (ADF) tests proposed by Dickey and Fuller (1979), the Phillips–Perron (1988) test (PP) are used for the identification of the order of integration of the macroeconomic indicators and the Consumer confidence indicators used in this study. The null hypothesis is that the time series under study is not stationary and the alternative hypothesis is that the time series is stationary. A time series is stationary if its statistical properties do not change after being time-shifted (Brockwell and Davis, 2002). Critical values recommended by Banerjee *et al.* (1993) are used for the unit root test. In addition, we also employ several unit root tests like Dickey-Fuller Test with GLS Detrending (DFGLS), The Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test, Elliot, Rothenberg, and Stock Point Optimal (ERS) Test, Ng and Perron (NP) tests to the consumer confidence indicators and other macroeconomic variables considered (For brevity of this paper only the ADF and PP results are presented in this paper, the other unit root tests are available on request).

3.3 Econometric Model of the Consumer Sentiment and Consumer Confidence

This section clearly describes the econometric models developed for this work. The quarterly consumer sentiment and consumer confidence regressions in a structured time series framework formulated are presented below. We adopted a simple autoregressive model which was used by Carrol *et al.* (1994), to assess the predictive ability of the selected indicators. The nature of the question contained in the expectations questionnaire of the CBN makes it possible that the indicators contain information captured by other macroeconomic variables. Based on this, the standard equation adopted is specified as follows:

$$\Delta GRC_t = \alpha + \sum_{i=1}^n \beta_i \Delta GRC_{t-i} + \varepsilon_t \quad (1)$$

where ΔGRC_t represents the growth rate of consumption and ε is the error term that is identically and independently normally distributed with zero mean and constant variance. Consequently, by adding consumer confidence index (CCI) and retail trade index (RTI) to equation (1) separately, we have equations (2) and (3) respectively. In this paper we restrict the number of lags for the indicators to two quarters because the surveys deal mainly with current and the next quarters' views of the respondents. Thus, the two confidence-augmented equations are respectively written as:

$$\Delta GRC_t = \alpha + \sum_{i=1}^n \beta_i \Delta GRC_{t-i} + \sum_{i=1}^2 \theta_i \Delta CCI_{t-i} + \varepsilon_t \quad (2)$$

$$\Delta GRC_t = \alpha + \sum_{i=1}^n \beta_i \Delta GRC_{t-i} + \sum_{i=1}^2 \theta_i \Delta RTI_{t-i} + \varepsilon_t \quad (3)$$

We adopted the technique used by Nahuis and Jansen (2004) to investigate whether incorporating consumer confidence or retail confidence improve the model, the relative reduction in the unexplained variance of equations (3) and (4) compared to that of equation (1). This measure shows the survey indicator's relative contributions to the explanation of consumption growth besides lagged values of consumption growth itself. The F-statistic testing ($F: \beta_0 = \beta_1 = \beta_2 = \dots, \beta_n = 0$) will be used to examine if all the coefficient and jointly zero. This test shows whether the relative reduction in unexplained variance is statistically significant. In order to assess the value of other information, we add the two indicators of CCI and RTI to equation 1 to give a model stated as:

$$\Delta GRC_t = \alpha + \sum_{i=1}^n \beta_i \Delta GRC_{t-i} + \sum_{i=1}^2 \theta_i \Delta CCI_{t-i} + \sum_{i=1}^2 \phi_i \Delta RTI_{t-i} + \varepsilon_t \quad (4)$$

Again, to be able to examine the in-sample forecast and out of sample performance of the confidence indices and the confidence indicators of household consumption, we estimated unrestricted VAR model and obtain the representations of the estimated model by obtaining the corresponding behavioural equations in Winsolve for the forecast.

4. Empirical Results

Table 2 summarizes the results of the unit root carried out. The results show that and RCG, CCI, RPDI and FD are all I(1) and needs to be differencing to be stationary. Meanwhile, RTI is I(0) at 5 per cent level of significance. In this case, causality and predictive testing are appropriate between I(0) variable and differences of the I(1) indicators. Thus, a vector error correction mechanism (VECM) technique is inappropriate for assessing confidence since all the variable are not I(1) series that may cointegrate. Therefore we adopted the simple ARMA technique presented in equations (2) and (3).

Unit Root Tests (Augmented Dickey-Fuller and Phillip-Perron)

Table 2

Order of Integration: I(1) for all series												
			CCI		FD		RCG		RPDI		RTI	
			t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.81659	0.0611	-5.02427	0.0001	-6.04847	0.00000	-5.53244	0.00000	-3.31595	0.018
Test critical: 1% level			-3.52705		-3.52289		-3.52289		-3.52289		-3.53159	
5% level			-2.90357		-2.90178		-2.90178		-2.90178		-2.90552	
10% level			-2.58923		-2.58828		-2.58828		-2.58828		-2.59026	
			CCI		FD		RCG		RPDI		RTI	
			t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Phillip Perron test statistic			-3.9835	0.0025	-5.05458	0.0001	-6.09752	0.00000	-5.77286	0.00000	-9.92777	0
Test critical: 1% level			-3.52289		-3.52289		-3.52289		-3.52289		-3.52289	
5% level			-2.90178		-2.90178		-2.90178		-2.90178		-2.90178	
10% level			-2.58828		-2.58828		-2.58828		-2.58828		-2.58828	

*MacKinnon (1996) one-sided p-values.

Source: Data Analysis.

Autoregressive roots graph reports the inverse roots of the characteristic AR polynomial. In this paper the estimated VAR is stable (stationary), we can see that all roots have modulus less than one and lie inside the unit circle as shown in Table 3 (see Lütkepohl (2006)).

Table 3: Roots of Characteristic Polynomial

Root	Modulus
0.978053	0.978053
0.877133	0.877133
0.797092	0.797092
0.695993 - 0.215611i	0.728625
0.695993 + 0.215611i	0.728625
0.489578 - 0.407243i	0.636815
0.489578 + 0.407243i	0.636815
0.190406	0.190406
-0.032709 - 0.091654i	0.097316
-0.032709 + 0.091654i	0.097316

No root lies outside the unit circle.
VAR satisfies the stability condition.

Source: Data Analysis.

4.1 Correlation Analysis

Before we report the other empirical results of the models specified couple with the other results, it would be useful to first examine the statistical relationship between consumer confidence index and some of the variables considered in the work. Table 4 shows the correlations between real consumption, real personal disposable income, Consumer confidence, retail trade confidence, growth rate of consumption and financial deepening. All of the correlations are in the expected direction: except for RTI and GRC that gave negative value of -0.0265 . The confidence indices correlate well with GRC, RPDI and RTI. In addition, there are moderate and statistically significant correlations in the expected directions between the indices and the other economic variables: the RPDI and FD as well as between CCI and RPDI. As can be seen from this Table 4, these series reveal a close association for the period under consideration.

	FD	GRC	RPDI	CCI	RTI	DGRC
FD	1					
GRC	0.573**	1				
RPDI	-0.017	0.380**	1			
CCI	-0.526**	-0.187	0.331**	1		
RTI	-0.178	-0.265*	0.578**	0.634**	1	
DGRC	0.103	0.079	-0.158	0.088	0.275*	1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Explanatory variable consumption model	Adj. R ² without consumer confidence	Adj. R ² with consumer confidence
RTI	0.043302	0.055939
RTI, RPDI	0.099774	0.111203
RPDI, FD	0.533908	0.451402
RTI, RPDI, FD	0.543329	0.487833

Source: Authors Calculation.

Table 5 shows the goodness of fit of each model, as measured by the adjusted R-squared. In each case the model fit improves, as we include more relevant variables and consumer confidence index as explanatory variables. It should be noted that the overall adjusted R-squared remains relatively low even under the best model and many individual coefficients (not reported) were insignificant. The best model is actually the one which includes RTI, RPDI and FD. The results at least suggest that any model of consumer behaviour, however sophisticated, may benefit from the inclusion of confidence indicators in the model.

The various growth rate of consumption model estimated

Table 6

Independent Variables	Model I	Model II	Model III	Model IV	Model V	Model VI
D(GRC(-1))	-0.610824*	-0.694157*	-0.736168*	-0.747372*	-0.615880*	-0.626549*
D(GRC(-2))	-0.286900*	-0.436602*	-0.488238*	-0.502289*	-0.423680*	-0.428309*
D(GRC(-3))	-	-0.218182**	-0.267731**	-0.280494*	-0.240881**	-0.240015**
CCI(-1)	-	0.046082	-	0.027286	-0.011480	-0.010149
CCI(-2)	-	-0.044154	-	-0.028853	-0.027290	-0.026663
RTI(-1)	-	-	0.019831	0.018187	0.019508	0.017927
RTI(-2)	-	-	-0.019259	-0.016812	-0.008395	-0.008962
FD(-2)	-	-	-	-	1.788725	1.672514
FD(-1)	-	-	-	-	-2.204969**	-2.102247
RPDI(-2)	-	-	-	-	-	0.002638
RPDI(-1)	-	-	-	-	-	-0.002162
Prob(F-statistic)	0.000009	0.000118	0.000075	0.000462	0.000161	0.000722
Akaike info criterion	0.362495	0.417008	0.401674	0.454867	0.405175	0.459575
Durbin-Watson stat	2.106615	2.051741	2.068133	2.072363	2.097431	2.097126

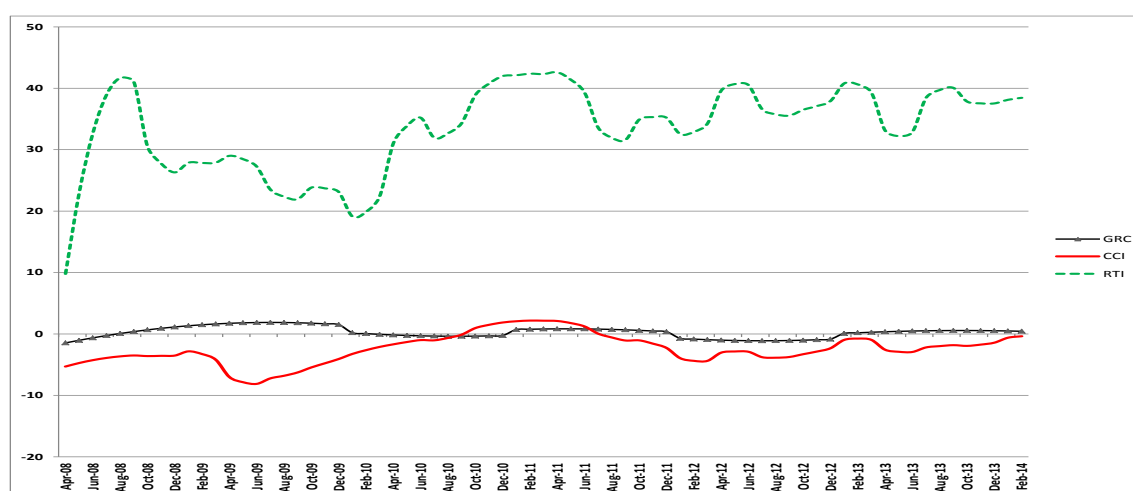
(*)Significant at 5%; (**) Correlation is significant at the 0.05 level (2-tailed).

Source: Data Analysis.

Table 6 presents the results of the model specified. Models 1 to IV clearly show that the coefficients are significant by using the F-statistic. The behavioural equation was used in Winsolve to conduct the in-sample and out-of-sample forecast. The estimated parameters that are significant are clearly highlighted in Table 6.

Trends of Consumer Confidence index, retail trade index and GRC

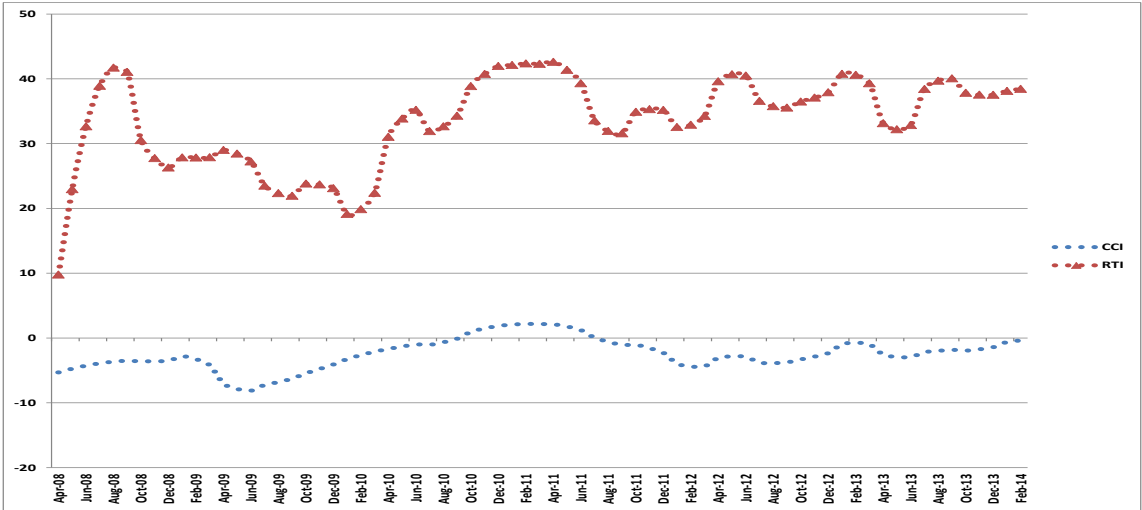
Figure 1



From the quarterly data we observed that the consumers' overall outlook in Q2, 2014 remained downbeat. At -2.4 points, it inched up by 6.0 points above the level achieved in the corresponding quarter of 2013. The bleak outlook of consumers in the quarter under review, could be attributable to the pessimistic outlook of consumers in their family financial situation which stood at -14.5 points. The indices for next quarter and the next twelve months rose by 1.5 and 4.8 points, respectively, from the level attained in the corresponding quarter 2013. The positive outlook of consumers in these quarters could be attributable largely to the optimistic outlook of consumers in their family income. The retail trade index fell slightly above CCI from August, 2011 as shown in Figures 1and 2.

Nigeria Consumer Confidence versus retail trade index

Figure 2



Consumers have more confidence in the economy when there is increase in the output of goods and services. Historically, the overall conference outlook index is a barometer of the health of the economy from the perspective of the consumer. The CCI and its related series are among the earliest sets of economic indicators available each quarter and are closely watched as indicators by the monetary policy committee members and other stakeholders for the Nigeria economy.

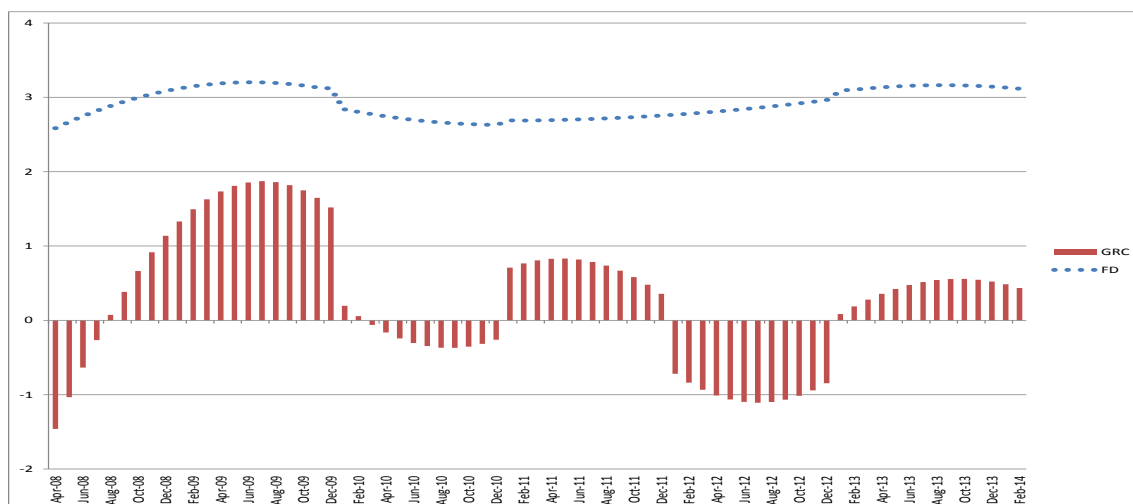
Time	Actual growth rate of consumption	In-sample Forecast	Error	Out-of-sample Forecast
201401	-0.037	-0.035	-0.002	-0.037
201402	-0.050	-0.054	0.005	-0.050
201403	-0.063	-0.074	0.011	-0.063
201404	-0.075	-0.087	0.011	-0.075
201405	-0.088	-0.091	0.003	-0.088
201406	-0.101	-0.088	-0.012	-0.101
201407				-0.103
201408				-0.070
201409				-0.061
201410				-0.060
201411				-0.061
201412				-0.061

Source: Authors Computation.

The negative values displayed by the consumption data used in the model could be as a result of consumers spending less on consumption items at the expense of other pressing needs like payment of school fees, accommodation, housing and transportation costs which are autonomous.

Trend of financial deepening verses real consumption

Figure 3



4.2 Forecast Evaluation

We present the in-sample forecast from 2014:M1 to 2014:M6 and out of sample forecast from 2014:M7 to 2014:M12. The error margin of the in-sample forecast from -0.002 to 0.011 confirm the robustness of the model used for the forecast. This result broadly accords with Al-Eyd (2009), who finds the information content of confidence indicators for future consumption in the U.S. to be rather small. We do not reject the null hypothesis of identical forecasting performance. In other words, the models containing the confidence indicator improve the DGRC forecasts. Similarly, the confidence indicator improves the forecasts generated by the autoregressive process for GRC growth. Finally, we perform some in-sample and out-of-sample analysis to check to what extent and in which circumstances the consumption models outperform. These forecasts are obtained using models, whose parameters are estimated using data up to $t-1$. Root mean square errors are computed and used as comparison between models and the best model was selected for the forecast. The results of the out-of-sample forecast are displayed in column 5 of Table 7.

5. Concluding Remarks

This paper examined the predictive capacity of consumer confidence index that contained information on people's expectation of their future well-being for consumption in Nigeria. It presented the in-sample forecast from 2014:M1 to 2014:M6 and out-of-sample forecast from 2014:M7 to 2014:M12. The error margin of the in-sample forecast lies between -0.002 to 0.011 which confirm the robustness of the model used for the forecast. Broadly speaking, the results are in tandem with Al-Eyd (2009), who finds the information content of confidence indicators for future consumption in the U.S. to be rather small. However, in sharp contrast with the situation in the US or Britain, the results indicate that the confidence index have explanatory power in forecasting consumption growth in Nigeria. The empirical analyses also showed that including confidence in a model of consumption can help improve the statistical fit. Thus, the paper concludes that consumer confidence index has predictive power for consumption growth in Nigeria. This is an important implication for policy-makers and business owners, who have to plan ahead and anticipate market trends; but care must be taking particularly during period of economic uncertainty and fluctuations. For future investigation, this preliminary analysis could however be extended on various reasons. First, it is unclear how robust the results will be by including other relevant macroeconomic variables. Secondly, there is need for a comparative study of expectations data in modeling consumption in the West African zone.

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