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Do survey-based expectations mimic inflation in Nigeria?

Ibrahim Adamu

Survey-based expectations are mostly used by monetary authorities for inflation forecasts and evaluation of the credibility of their inflation fighting policies. It is also an important link in the monetary policy transmission mechanism. This study examined the predictive ability of business expectations survey (BES) inflation index on movements of inflation as well as the relationship between BES indicators and selected macroeconomic indicators in Nigeria. The study employed the modified Kaminsky-Reinhart (KLR) Signal Approach, correlation and trend analyses. The results of the modified KLR approach showed that BES inflation index predicts inflation rate only between 5 to 20 per cent threshold, which corresponds with Nigeria inflation series covered by the study. The paper found a weak and statistically insignificant relationship between the BES indicators and the selected macroeconomic indicators (inflation rate, exchange rate and lending rate). The study recommended that BES confidence indicators should be employed with some level of caution in making decision since the precision of its predictive ability is only moderate.

Keywords: Business Confidence, expectations survey, forecasting, inflation

JEL Classification: E31, D84

1.0 Introduction

Today, both in academic and policy discussions, inflation expectations have been highlighted as key for the inflation process. Economic agents like households, price setters, wage setters, amongst others, always have their expectations on what the general economic conditions should be or ought to be in the short run and/or long run. Since such expectations cannot be observed, central banks use some proxies, which include data from financial markets and survey-based expectations to understand the behaviour of inflation. The survey-based expectations according to Kershoff (2000) and Bernanke (2007) are used by monetary authorities for inflation forecast as well as for the evaluation of the credibility of their inflation fighting policies.

The Statistics Department of the Central Bank of Nigeria (CBN) had been conducting Business Expectations Survey (BES) since second quarter of 2008, in order to obtain vital information on the overall economic conditions of firms through the computation of confidence indicators. This is to aid the CBN Monetary Policy Committee (MPC) decision making processes.

Expectations, and in particular inflation expectations, play a key role in the conduct of modern monetary policy. Expectations refer to the forecasts or views of economic agents about the future trend of relevant variables based on available information or perceptions. This drive people's behaviour towards influencing their economic decisions. The varying decisions in turn affect real economic activity and actual inflation. Imperatively, inflation expectations represent an important link in the monetary policy transmission mechanism.

Forsells and Kenny (2002) highlighted two simple examples that underscore the crucial importance of access to reliable measures of inflation expectations. First, measures of expected inflation may represent an important information variable in a forward-looking analysis of inflation developments. Second, higher expectations of inflation may lead employees to demand higher wage, giving rise to cost-push effects on inflation. According to Muth (1961), the rational expectations hypothesis is widely accepted as the dominant model of expectations formation. It provides a framework where subjective expectations of individual economic agents are compared with their objective counterparts knowing the true underlying economic model. The hypothesis makes a good assertion that new information can directly affect the formation of expectations and may eventually be more important than the formation derived from the previous performance.

The European Central Bank (ECB) used inflation expectations as an indicator of gauging public confidence in the ability of the central banks to deliver its mandate on price stability. In other words, it uses the expectations to gain insight from the private sector's assessment on future inflation and to evaluate their perceptions about the credibility of the monetary policy.

Thus, the main objective of the study is to examine the predictive ability of the BES inflation index on the movements of inflation rate in Nigeria. Also, the paper examines the relationship between BES confidence indicators and some selected macroeconomic variables (Gross Domestic Product - GDP, exchange rate and borrowing rate).

The paper is structured into six sections. Following this introduction is an overview of the Business Expectations Survey (BES) in Nigeria. Section three discussed the literature review. Section four presents the methodology adopted as well as data sources. Section five discussed results while section six concludes the paper with policy recommendations.

2.0 Overview of Business Expectations Survey (Bes) In Nigeria

The CBN commenced the conduct of BES in the second Quarter of 2008, and has continued till date. The BES is a quarterly survey of business firms drawn from Business Establishment updated frames of the CBN and the National Bureau of Statistics (NBS). The survey is designed to generate qualitative measures of percentage changes in selected business variables, which can be used as indicators of general business conditions and tendencies. The Survey is conducted in the 36 states and the Federal Capital Territory, Abuja by field officers of the Statistics Department, and the sample size has ranged from 1,075 to 1,950 business establishments over the years, with response rates of between 80.6 per cent and 96.5 per cent. Respondents are often corporate executives, business owners and business leaders. For purposes of consistency, the same sets of businesses are covered in most cases, during each round of the survey.

The survey instrument is designed to capture 21 responses from the respondents, with respondents stratified into the 6 geo-political zones, and establishments classified by type and size. The questionnaire is designed such that there are questions that have three answer options, while others have five answer options. At the end of the analysis we obtain three global percentages: the proportion in percentage of positive responses (P), the proportion in percentage of negative responses (N), and the proportion in percentage of unchanged responses (E).

For questions with three answer options, the net balance method is use for the computation of the Diffusion Index (DI) where: $DI = P - N$.

However, for a five answer option questions, the DI is computed as:

$$DI = (SP + 0.5P) - (SN + 0.5N)$$

Where: SP = proportion (in percentage) of strongly positive responses; SN is the proportion (in percentage) of strongly negative responses; P is the proportion (in percentage) of positive responses; and N is the proportion (in percentage) of negative responses.

The index range from -100 to +100, where a positive index indicates a favourable view (except for inflation and borrowing rate indices, where a positive index indicates the opposite), and a negative index indicates an unfavourable view (except for inflation and borrowing rates indices, where

negative index implies favourable view). Summarily, overall business outlook diffusion index (DI) is computed as the percentage share of firms that have an “improving outlook” less percentage share of firms that have a “deteriorating outlook”.

The results of the survey over the years have provided the MPC with indicators on current and prospective outlook of the business sector, so as to guide decision making and economic management. It has also been observed that the series from the BES are by their nature particularly suitable for business cycle monitoring and forecasting. It has been demonstrated that the survey series are good proxies for corresponding quantitative series.

3.0 Literature Review

‘Expectations’ in Economics refers to the forecasts or views of agents about the future trend of relevant variables based on information or perceptions. In macroeconomic contexts, the importance of expectations was emphasised firstly by Keynes (1936), who stressed the central role of expectations in the determination of agents' behaviour. However, he did not have an explicit model of how expectations are formed, suggesting that agents often rely on the so-called “animal spirits”.

In 1961, Muth introduced a new theory: the theory of Rational Expectations (RE) based on the assumption that the agents, being rational, make an optimal use of all the available information to make choice. In his theory, he states thus: i) the expectations formulated by rationally informed agents have to be derived from the economic theory; ii) the economic agents make an optimal use of the scarce and costly information; iii) the expectations’ model is endogenous with respect to the economic system. In particular, the subjective forecast of any agent is the ‘mean’ of the expected value of the variable conditioned to the available information set.

Armantier *et al.* (2011) compared the inflation expectations reported by consumers in a survey with their behaviour in a financially incentivized investment experiment designed such that future inflation affects payoffs. The inflation expectations survey is found to be informative in the sense that the beliefs reported by the respondents are correlated with their choices in the experiment. Furthermore, most respondents appear to act on their inflation expectations showing patterns consistent (both in direction and magnitude) with expected utility theory.

There are three types of expectations hypothesis identified in literature. These are extrapolative, adaptive and rational expectations. An extrapolative expectation is where the economic agents assume that the actual potential inflation rate (TT_t) is equal to the inflation rate for the previous period (TT_{t-1}) although the extrapolative expectation Fisher (1930) said it can be formed as a weighted average of the past inflation rate. However, the hypothesis of the adaptive expectation as the name implies, presumes that the expected inflation rate depends on the past inflation expectations, with economic agents taking cognizance of the expectations errors that have occurred in the previous times. In the case of rational expectations, it is assumed that economic agents do not consider the past values of a given variable. Instead, they form their expectations with the help of an economic model using available information. The rational expectations hypothesis as highlighted by Muth (1961) was accepted widely as the dominant model of expectations formation. The reason was that it provides a framework where subjective expectations of individuals are compared with their objective counterparts knowing the true underlying economic model. The hypothesis therefore makes a good assertion that new information can directly affect the formation of expectations and may eventually be more important than the formation derived from the previous performances of the variable in question.

Ranchhod (2003) highlighted that expectation survey plays a vital role in understanding the pattern of economic activity, and thus, provide vital information to Central Banks who adopts inflation targeting in controlling inflation. It also underlies the economic decisions such as setting of prices and wages, and can influence consumption and investment decisions. The article reveals that while expectation survey may turn out to be inaccurate predictors of the level of inflation, they can still provide useful direction regarding near-term inflationary pressures. The research provided information regarding future inflation that is not given by other economic information and can potentially be more useful for forecasting.

Galati *et al.* (2011) examined how inflation expectations are formed with evidence from a high frequency survey. They found that inflation expectations depend on realized data and Greek Credit Default Swap Prices. They also identified that while 'median' long term expectations are at the target throughout the survey, long-term expectation 'means' have been sensitive to economic shocks. Lastly, they found that inflation expectations of central bank staff Granger-cause expectations of groups outside the central bank.

The European Central Bank reported in their monthly bulletin of February 2011 that they used inflation expectations as an indicator of assessing public confidence in the ability of the central bank to deliver its mandate on price stability. In other words, it uses the expectations to gain insight from the private sector's assessment on future inflation and to evaluate their perceptions about the credibility of the monetary policy as it involves anticipating future developments, monitoring and shaping private sector inflation expectations over the cycle, and providing a long-term nominal anchor for the economy.

Breitungz and Schmeling (2010) in their investigation on how well standard quantification methods can achieve a reliable proxy for actual quantitative expectations, found that quantified expectations exhibit a surprisingly low correlation with actual quantitative stock return forecasts. However, they also found that temporal and individual heterogeneity of the indifference thresholds is a major source of low correlation between qualitative and quantitative expectations. Another model of expectation formation was developed by William (2004) where agents form their forecasts on inflation by selecting a predictor function from a set of costly alternatives whereby they may rationally choose a method rather than the most accurate. Thus, they used the model to test whether survey data really exhibit rationally heterogeneous expectations. Using maximum likelihood criteria, they found that there is dynamic switching that depends on the relative 'mean squared errors' of the predictors.

Oral (2013) presents the result of different quantification methods (Carlson Parkin, balance and regression method) in estimating Turkish inflation predictions using the monthly consumer survey data of the Central Bank of the Republic of Turkey. The result showed that, of the expectations derived from the three different techniques, the regression method surpassed the other two methods. The paper, however, concluded that there is a large gap between consumer expectations and realization, which is caused by disparities in the basket respondents have in mind when compared with what CPI is tracking.

Trehan (2010) used data from survey of expected inflation of American households to learn how expectation processes have changed following recent changes in the behaviour of inflation. The result showed that though the inflation process has changed, households do not recognize the change in the process. Thus, they placed substantial weight than appears warranted on

recent inflation data, when forming expectations about inflation over the next year.

Pesaran and Weale (2005) assumed that expectation is an integral part of the decision making process by households, business firms and public and private institutions. They opined that expectations can be in the form of point expectations, or could concern the whole conditional probability or density expectations. Point expectations would be sufficient in the case of linear-quadratic decision problems where the utility (or cost) functions are quadratic and the constraints linear. The paper sought to know how expectation data could enhance the performance of conventional forecasting procedure like time-series model. It concluded that data collection on expectation about both macro-economic variables and individual experience provides a means of exploring mechanisms of expectations formations, linking theory to expectation and identifying the forecasting power of those expectations.

Bascos-Deveza (2011) found survey-based expectations indicators to be very useful in monitoring and predicting the movements in the economy such as inflation, exchange rate, and other economic variables, and stressed its importance in generating advance indicators for monetary policy. The paper explored the predictive ability of the BES diffusion indices for possible inflationary pressures and exchange rate appreciation using empirical conditional probabilities. It further found that analysis of BES results could be further enhanced with the use of statistical techniques for not only tracking and predicting the moves of key economic variables but also for forecasting the growth rate of these variables.

To this end, Klaauw *et al.* (2008) asserted that public expectation of inflation is a key variable in the propagation of the business cycle, and become an essential object of control by central banks. There is no known literature on the evaluation of predictive ability of BES indicators in Nigeria, which is obviously the concern of this study.

4.0 Research Methodology

The research work followed the principles of the Kaminsky-Reinhart (KLR) Signals Approach, which was applied to test leading indicators of currency crisis. This approach was modified and adopted by Bascos-Deveza (2011) in his study “Quantifying Qualitative Data from Expectations Survey How Well Do Expectations Survey Forecast Inflation” in the Philippines. Thus, this

study adopted the Bascos-Deveza (2011) modified KLR signals approach to evaluate the ability of the BES inflation index to provide advance warning signal on an impending increase in inflation rate. This approach was adopted because Philippines and Nigeria conduct BES in order to obtain information on the general business conditions in their economies for decision making by policy makers. The BES indicators are used by monetary authorities for inflation forecast as well as evaluation of the credibility of their inflation fighting policies. Thus, the succeeding discussion describes the application of the modified KLR signals approach.

Bascos-Deveza (2011) showed that when an indicator deviates from its “normal value” and assume an “extreme value” beyond a certain threshold, this is taken as a warning signal of an impending increase in inflation. The possible thresholds of an indicator were the values corresponding to some predetermined value of the index (BES inflation index) such as 10%, 20%, 30%, and so on. Bascos-Deveza (2011) used a threshold of 5 – 60 per cent for the Philippines. In view of the fact, that inflation rate has not gone beyond 20 per cent in Nigeria during the study period, this paper applied a threshold of 0 – 35 per cent with an interval of 5 per cent.

For each threshold value, the quarterly values of an indicator were transformed to a binary variable Y_t which is the inflation index. Let I_t be a binary variable such as $I_t = 1$ if $Y_t > T$ and 0 if $Y_t \leq T$, for $T = 0$ to 35% as predetermined threshold level for the inflation index value.

Setting the signalling horizon at the current quarter, the effectiveness of the index in signalling an impending increase in inflation for the current quarter was evaluated using the following matrix:

	No Increase in Inflation	Increase in Inflation
No Signal	A	B
Signal	C	D

In this matrix, **A** is the number of quarters when the inflation index did not issue a signal ($I_t = 0$) and there was no increase in inflation during the quarter.

B is the number of quarters in which the inflation index could not issue a signal ($I_t = 0$) and inflation actually increased during the quarter.

C is the number of quarters in which the inflation index issued a bad signal or noise. That is the indicator signal an increase in inflation ($I_t = 1$) and no increase occurred during the quarter.

D is the number of quarters in which the inflation index issues a good signal. That is the indicator signal an increase in inflation ($I_t = 1$) and inflation actually increased during the quarter.

From this matrix, the performance of the inflation index in predicting an increase in inflation was examined in the following ways:

- (i) Signal = $D/(B+D)$ measures the percentage of correct signals issued by the inflation index;
- (ii) Noise = $C/(A+C)$ measures the percentage of wrong signals issued by the inflation index;
- (iii) Noise to Signal = $\{C/(A+C)\}/\{D/(B+D)\}$ measures the ratio of the percentage of wrong signals (Noise) to the percentage of correct signals (Signal) issued by the index;
- (iv) Conditional Probability of Higher Inflation (CPHI) = $D/(C+D)$ measures the probability of an increase in inflation occurring during the current quarter given that the index emitted a signal;
- (v) Unconditional Probability of higher inflation (UPHI) = $(B+D)/(A+B+C+D)$ measures the probability of higher inflation in the current quarter.

If, as the Threshold increases, the conditional probability of higher inflation increases, then the predictive power of the BES inflation index in projecting a possible increase in inflation will be confirmed. Moreover, the significance of this approach lies in its capability of providing estimates of the probability of an increase in inflation given the value of the inflation index in any given quarter.

The study used quarterly data sourced from the CBN Statistical Bulletin from the period Q2:2008 to Q2:2013. The variables used for analysis includes year-on-year headline inflation rate, growth rate of real gross domestic product (GDP), nominal exchange rate, maximum lending rate, overall business

confidence index (BCI), BES inflation index, BES naira exchange rate index, and BES borrowing rate index.

5.0 Discussion of Results

5.1 The Predictive Ability of the BES Inflation Index

Results from table 1 indicated that as the BES inflation index increase, the probability of an increase in inflation rate during the quarter exhibited mixed reactions. From the threshold between 5 and 20 per cent, the CPHI consistently increased from 0.47 to 0.60. However, the CPHI declined to 0.50 at the 25 per cent threshold level, but went up to 0.67 at the 30 per cent threshold. This analysis indicated that the BES inflation index could be used in evaluating the probability of an increase in the inflation rate only to some extent. Empirically, the BES inflation index predicts the inflation rate only between 5 to 20 per cent threshold, which corresponds to the range of our Nigeria inflationary trend (8.4% in Q2:2013 been the least and 15.1% in Q4:2008 been the maximum recorded during the period covered by the study). For example, if BES inflation index in any given quarter lies between 5 and 20 per cent threshold, then the CPHI is between 0.47 to 0.60, while beyond it there is no certainty that BES inflation index would predict inflation in Nigeria. More so the 'Noise' continue to decline as the threshold increase. The unconditional probability of higher inflation (UPHI) during the current quarter, without considering the value of the BES inflation index, remain constant at approximately 0.5.

Table 2: Signals Approach Probability Table on higher inflation based on the BES inflation expectations index (Q2 2008 – Q2 2013)

Threshold	Signal $D/(B+D)$	Noise $C/(A+C)$	Noise to signal ratio $[C/(A+C)]/[D/(B+D)]$	Conditional probability of higher inflation (CPHI) $D/(C+D)$	Unconditional probability of higher inflation (UPHI) $(B+D)/(A+B+C+D)$
0%	1.00	1.00	1.00	0.48	0.48
5%	0.90	0.91	1.01	0.47	0.48
10%	0.80	0.64	0.80	0.53	0.48
15%	0.80	0.55	0.68	0.57	0.48
20%	0.60	0.36	0.61	0.60	0.48
25%	0.30	0.27	0.91	0.50	0.48
30%	0.20	0.09	0.45	0.67	0.48
35%	0.00	0.00	0.00	0.00	0.48

Source: Authors' calculations

5.2 Result of the Relationship between BES Indices and Selected Macroeconomic Indicators

The results of the correlation analysis and the trend analysis using graphs as shown in figures 1 and 2, indicated that the BES indices could not significantly and consistently confirm the expected relationship with the counterpart macroeconomic indicators. The statistical details are presented in table 2.

Table 2: Correlations between BES Indices and Selected Economic Indicators

Economic Indicators	Correlation Coefficient
Overall Business Confidence Index and GDP	0.24
BES Inflation Rate Index and Inflation Rate	-0.30
BES Exchange Rate Index and Average Naira/Dollar Exchange Rate	-0.36
BES Borrowing Rate Index and Maximum Lending Rate	0.44

Source: Authors' calculations

As shown in table 2, the BCI was found to be positively correlated (correlation coefficient of 0.24) with the growth rate of the GDP. Although, the relationship between BCI and GDP growth rate was weak and statistically insignificant over the study period. Similarly, we found that the relationship between the BES borrowing rate index and the maximum lending rate was positive, weak and insignificant with a coefficient of 0.44. However, the BES inflation index was found to be negatively related to the year-on-year inflation rate with a correlation coefficient of -0.30 while the BES exchange rate index was negatively correlated (-0.36 coefficient) with the average exchange rate of the Naira. The two negative relationships were found to be statistically insignificant and weak. Besides the apriori expectations were positive relationships.

From figure 1, it was observed that the BCI oscillates in the same direction with the GDP growth rate. From second quarter of 2008 to fourth quarter of 2010 both BCI and GDP growth rate move in same direction. Similarly, both variables exhibited similar trend between the third quarter of 2011 to second quarter of 2012.

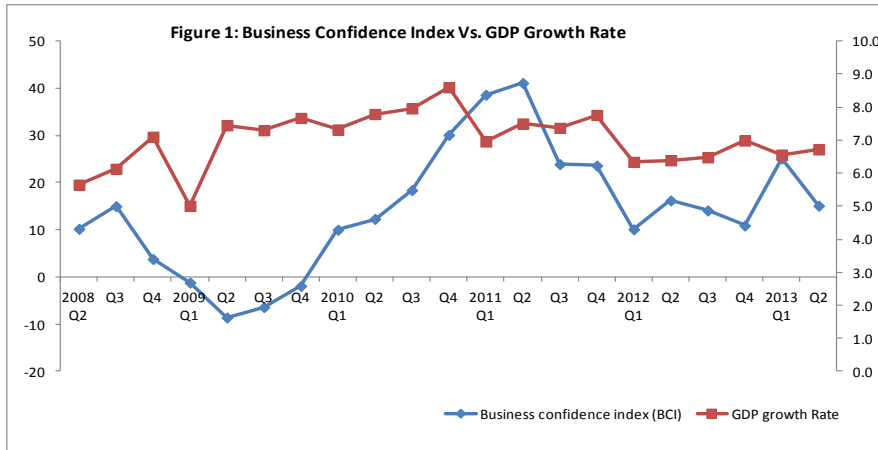
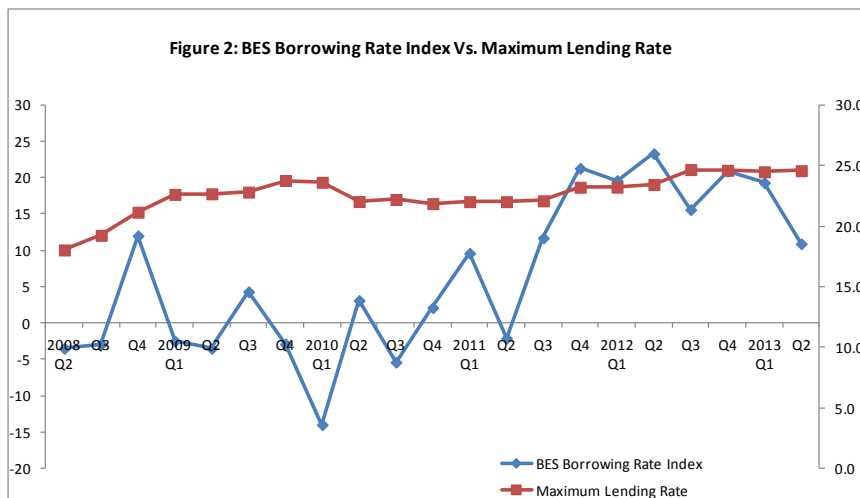


Figure 2 showed that the BES borrowing rate index oscillates while the maximum lending rate was relatively stable. However, they tend towards same direction in few instances within the study period but the magnitude of change was always pronounced for the borrowing rate index.



6.0 Conclusion and Policy Recommendations

Empirically, the study found that the predictive ability of the BES inflation index for possible inflationary pressures was significant only to some extent, partly due to heterogeneity of respondents' inflation expectation and probably because inflation determinants were argued to be multidimensional in Nigeria. However, the BES inflation index provides important information that is relevant for predicting CPHI increases, though with a moderate level of certainty. Meanwhile, the relationship between the BES Indicators and the selected macroeconomic indicators were found to be weak and statistically

insignificant as confirmed by the correlation analysis. Furthermore, the correlation analysis showed that apriori expectation of the nature of relationships inflation index and inflation rate as well as between exchange rate index and average exchange rate were not met.

The limitations emanating from the study are that: first, it is possible that the dataset was not sufficient for a robust empirical analysis; second, probably because inflation determinants were thought to be multidimensional in Nigeria; third, the respondents might have limited understanding of some of the macroeconomic variables because they are either not adequately informed or do not have anything to do with their movements for decision making in their businesses; fourth the economic fundamentals of the economy such as large informal sector operators, low level financial literacy, financial exclusion, poverty, etc. could have been contributing factors to the mixed results; and fifth, the composition of sampled respondents is skewed to small and marginal players who do not received common information set like the lead players, and thus, their actions and inactions have little or no impact on the movements of the selected macroeconomic variables.

Our policy recommendations are, therefore:

- (i) BES confidence indicators should be employed with some level of caution in making decision since the level of precision of its predictive ability is moderate;
- (ii) strategies of deepening financial literacy should be enhanced;
- (iii) sample frame of respondents should be revised to ensure that leading firms are adequately captured in the survey to improve the quality of the indicators computed from the survey;
- (iv) further investigations could be conducted to find more evidence on the predictive ability of the BES indicators in Nigeria; and
- (v) there should be consistent public awareness campaign on the importance of expectation surveys.

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