Analysis of Structural Tools on the Effect of GDP and Inflation Rate on Nigeria Economy

AGBOLUAJE, A.A.
IBRAHIM BADAMASI BABANGIDA UNIVERSITY, MATHEMATICS AND COMPUTER SCIENCE DEPARTMENT, P.M.B. 11, LAPAI, NIGER STATE, NIGERIA.

Email: ayo_dele1960@yahoo.com

ABSTRACT

This paper is on analysis of Structural tools on the effect of GDP and Inflation Rate on Nigeria economy, using the tools to show relationship between the variables. Results of the analyses show that Granger Causality test shows that per capita GDP do not granger-cause inflation rate and nominal GDP is significant and can be rejected at the 5% level of significant by implication this means that a rise in per capita GDP is a signal of economic growth but the rise is very slow not growing. In impulse response: Third column indicates that a rise in per capita GDP signals growth in the economy but only in the first four periods but from periods four to twenty which is stagnant affect the economic growth over the period under study. In addition, forecast error variances; innovations in per capita GDP contributed little to explain the variation of nominal GDP and inflation rate this means that the economic growth rate is very slow. Hence, in conclusion the tools of investigating the effect of economic growth rate agree.

KEYWORDS:
Granger Causality, Impulse Response and Forecast Error Variance Decomposition, Per Capita GDP, Nominal GDP and Inflation Rate

INTRODUCTION

Inflation is one of the most frequently used terms in economic discussions, yet the concept is variously misconstrued. There are various schools of thought on inflation, but there is a consensus among economists that inflation is a continuous rise in the prices.

Inflation is an important concept in the history of economic thought and can be defined as a sustained rise in the general level of prices i.e. a persistent rise in the price levels of commodities and services, leading to a fall in the currency’s purchasing power. High inflation is bad for the economy and it adversely affects economic performance. Even moderate levels of inflation can distort investment and consumption decisions. Reducing inflation also has costs associated with the including lost output and higher rates of unemployment. The problem of inflation used to be confined to national boundaries, and was caused by domestic money supply and price rises. In this era of globalization, the effect of economic inflation crosses borders and percolates to both developing and developed nations.

Nigeria has experienced all manner of inflationary episodes – from creeping to moderate and from high to galloping. Average inflation during the period 1960–1972 was relatively low, the historical average rate being 5.01%. When assessed on an annual basis, however, rising prices became a cause for concern for the then military government when in 1969 the inflation rate hit double digits at 10.36%. Government’s concern seems to have been justified by the fact that Nigeria was experiencing double-digit inflation for the first time, in the face of a raging civil war whose end was not then in sight. In reaction, government imposed a general wage freeze for a period of one year. Apparently aware of possible opposition by labor unions, price control measures were introduced with the official
promulgation of the Price Control Decree, early in 1970. Inflationary pressures continued unabated, however, even with price controls.

As inflationary pressure continued to mount in 1974, government put several measures in place, including reduction in import duties on a relatively wide range of goods and raw materials. Monetary policy measures that encouraged banks to lend more to the productive sectors of the economy were put in place.

On a comparative scale, the period 1986–1995 represents a time of greater inflationary pressures than the preceding periods, as indicated by a historical average rate of 31.50%. When the inflation experience is taken on a year-by-year basis, however, it is found that 1986 and 1987 recorded relatively low rates of 5.4 and 10.2%, respectively. The change is attributed largely to the improved food supply situation, particularly during the year 1986. In 1988, domestic prices went up sharply to 38.3%, reaching an all-time high of 40.9% in 1989. Inflationary pressures eased relatively in 1990, with an inflation rate of 7.5% – again because of rising output growth in the staple food subsection. From 1991, the trajectory of domestic prices was upward trending, with inflation rates of 44.6%, 57.2%, 57.0% and 72.8% recorded in 1992, 1993, 1994 and 1995, respectively. The inflation rate declined significantly from 72.8% in 1995 to 29.3% in 1996. This reflected the salutary effect of sustained implementation of stabilization measures during the period, including disciplined fiscal and restrained monetary policies. The fight against inflation was highly successful in 1997, when for the first time since 1990 the rate dropped to a single digit of 8.5%, against the 53% average rate in the previous three years. The major factors that influenced the moderation in the inflation rate were the relatively good harvest of staples (brought about by favorable rainfall conditions) and the associated fall in food prices, exchange rate stability, sustained fiscal discipline, and non-accommodating monetary policy.

Historically, from 2005 until 2012, Nigeria GDP Growth Rate averaged 6.8 Percent reaching an all time high of 8.6 Percent in December of 2010 and a record low of 4.5 Percent in March of 2009. The Gross Domestic Product (GDP) growth rate provides an aggregated measure of changes in value of the goods and services produced by an economy. Nigeria is one of the most developed economies in Africa. The petroleum industry provides 95% of foreign trade earnings and about 80% of budget revenues. Yet, agriculture is the main source of revenue for two-thirds of the population. Still, more than 50% of Nigerians live in poverty with corruption and poor infrastructure as the main obstacles for future sustainable development.-accommodating monetary policy. It is significant to note that the low inflation rate was achieved in spite of the adverse effect of the rise in the costs of production and marketing stemming from frequent shortages of petroleum products and disruptions in power supply among other structural bottlenecks. The inflation rate increased from 8.5% in 1997 to 10% in 1998, thus slipping back to the double-digit level, but remained subdued until the last quarter of the year when domestic and external imbalances mounted. The major factor that influenced the resurgence was the rising cost of production (goods and services) induced by continued scarcity of petroleum products, frequent power outages, deteriorating infrastructure and equipment, and the announcement effect of the upward review of the salary structure of the public sector. However, the economy recorded a mixed performance in 2002.

The real gross domestic product (GDP) increased by 3.3% relative to the preceding year’s 4.2%. Inflation declined from 18.9% in 2001 to 12.9% at the end of the year. The food index, a dominant component, rose by 13.1% compared with 28.0% in the preceding year. Core inflation, which excludes the impact of food, was 12.5%. The Gross Domestic Product (GDP) in Nigeria expanded 6.5 percent in the third quarter of 2012.

The Gross Domestic Product growth rate measures the increase in value of the goods and services produced by an economy. Economic growth is usually calculated in real terms or inflation-adjusted.
terms, in order to net out the effect of changes on the price of the goods and services produced. The Gross Domestic Product can be determined using three different approaches, which should give the same result. These different methods are the product technique, the income technique, and the expenditure technique. In sum, the product technique sums the outputs of every class of enterprise to arrive at the total. The expenditure technique works on the principle that every product must be bought by somebody, therefore the value of the total product must be equal to people's total expenditures in buying products and services. The income technique works on the principle that the incomes of the productive factors must be equal to the value of their product, and determines GDP by finding the sum of all producers' incomes. The real GDP per capita of an economy is often used as an indicator of the average standard of living of individuals in that country, and economic growth is therefore often seen as indicating an increase in the average standard of living. However, there are some problems in using growth in GDP per capita to measure the general well-being of a country’s population. In fact, GDP was first developed by Simon Kuznets for a US Congress report in 1934, who immediately said not to use it as a measure for welfare. First, GDP per capita does not provide much information relevant to the distribution of income in a country. Second, GDP per capita does not take into account negative externalities such as pollution consequent to economic growth. Third, GDP per capita does not take into account positive externalities that may result from services such as education and health. Finally, GDP per capita excludes the value of all the activities that take place outside of the market place such as free leisure activities or less positive activities like organized crime.

LITERATURE REVIEW

Understanding the relationship between inflation and real growth has all along been a key concern in macro-economic research. According to Rangarajan (1998), the question, in essence, presupposes a possible trade-off between price stability and growth either in the long or short run. The new endogenous growth theories, for instance, surmised that inflation has an adverse impact on growth because of its harmful effects on productivity and efficiency. Others such as Choi, Smith and Boyd (1996) echoed a similar view and argued that inflation, in the presence of information asymmetry can harm growth by accentuating financial markets frictions and thereby adversely affecting the provision and allocation of investment. The rational expectations revolution inter alia, criticised the non-neutrality proposition of Keynesians by arguing that, under flexible markets, inflation in the long run [Rangarajan 1998].

Bruno and Easterly (1998) conclude that there was no evidence of a growth-inflation trade-off in a sample which excluded discrete high inflationary crisis. On the other hand, there was ample evidence to show that growth turned sharply negative when inflation crossed past a high threshold rate of 40 % per annum. They also argue that the failure of investigators in detecting a meaningful relationship between inflation and growth can be attributed to a stylized rapid recovery of output after inflation which, on an average, renders the overall statistical relationship insignificant. On the other hand, Sarel (1996) attempts an alternative empirical investigation of the problem and also concludes that inflation affects growth only if it breaches a specific 'threshold' rate of inflation but not otherwise. He concludes that an inflation threshold of about 8 % for a pooled sample of a large number of countries, including India, serves as a good common benchmark for the sample as a whole. Since the common threshold is an estimate from a pooled sample, it may not be exactly suitable for particular country if taken in isolation. There is, therefore, a need to have yet another empirical assessment of the problem of finding the level at which inflation actually begins to erode economic growth in given economy.

A more recent work involving 70 countries (of which 48 are developing economies) for the period 1960-1989 found no causal relationship between inflation and economic growth in 40 % of the countries; they reported bidirectional causality in about 20 % of countries and a unidirectional (either inflation to growth or vice versa) relationship in the rest. More interestingly, the relationship was found to be positive in some cases, but negative in others. Recent cross-country studies, found that

Bruno and Easterly’s (1998) work is interesting. They note that the ratio of people who believe inflation is harmful to economic growth to tangible evidence is unusually high. Thus, Bruno and Easterly (1998) examined only cases of discrete high-inflation (40 % and above) crises and found a robust empirical result that growth falls sharply during high-inflation crises, then recovers rapidly and strongly after inflation falls.

METHODOLOGY

GRANGER CASUALTY

Granger (1969) came out with a model for testing for causality in econometrics. According to Granger, a variable \( y_{it} \) is said to be Granger-causal for another time series variable \( y_{2t} \), if the \( y_{it} \) helps predicting \( y_{2t} \). Formally, denoting by \( \frac{y_{2t}}{\alpha} \) the optimal \( h \)-step predictor of \( y_{2t} \), at origin \( t \) based on the set of all the relevant information in the universe \( \Omega \), \( y_{it} \) may be defined to be Granger-noncasual for \( y_{2t} \) if and only if \( \frac{y_{2t}}{\alpha} = \frac{y_{2t}}{\alpha_{i\eta(j),[2t]}}, h = 1,2,\ldots \)

In turn, \( y_{it} \) is Granger-causal of \( y_{2t} \), if the equality in Lagrange Multiplier F-Test for Autocorrelation is violated for at least one \( h \) and, thus, a better forecast of \( y_{2t} \) is obtained for some forecast horizon by including the past of \( y_{it} \) in the information set. If \( \Omega = \{ (y_{1s},y_{2s}) | s \leq t \} \) and \( (y_{1t},y_{2t}) \) is generated by a bivariate \( VAR(p) \) process:

\[
\begin{bmatrix}
y_{1t} \\
y_{2t}
\end{bmatrix}
= 
\begin{bmatrix}
c_1 \\
c_2
\end{bmatrix}
+ \sum_{i=1}^{p} \begin{bmatrix}
\alpha_{11,t} & \alpha_{12,t} \\
\alpha_{21,t} & \alpha_{22,t}
\end{bmatrix}
\begin{bmatrix}
y_{1,t-1} \\
y_{2,t-1}
\end{bmatrix}
+ e_t
\]

The equation autocorrelation coefficients test statistic is easily seen to be equivalent to \( \alpha_{12,t} = 0, \quad i = 1,2,\ldots, p \)

It is perhaps worth mentioning that Granger-casualty can also be investigated in the framework of the VECM. Writing that model for the presently considered bivariate case as

\[
\begin{bmatrix}
\Delta y_{1t} \\
\Delta y_{2t}
\end{bmatrix}
= \alpha \beta^T \begin{bmatrix}
y_{1,t-1} \\
ys-t
\end{bmatrix}
+ \sum_{i=1}^{p-1} \begin{bmatrix}
\alpha_{11,i} & \alpha_{12,i} \\
\alpha_{21,i} & \alpha_{22,i}
\end{bmatrix}
+ \ell
\]

In that case, \( \alpha \) and \( \beta \) are \( (2 \times 1) \) vectors and

\[
\alpha \beta^T = 
\begin{bmatrix}
\alpha_1 \\
\alpha_2
\end{bmatrix}
\begin{bmatrix}
\beta_1 & \beta_2
\end{bmatrix}
= 
\begin{bmatrix}
\alpha_1 \beta_2 & \alpha_1 \beta_2 \\
\alpha_2 \beta_1 & \alpha_2 \beta_2
\end{bmatrix}
\]

Thus in this case \( \alpha_2 \beta_1 = 0 \) needs to be checked in addition to \( \alpha_{12,i} = 0 \quad (i = 1,\ldots, p-1) \). Economic systems usually consist of more than two relevant variables. Hence, it is desirable to extend the concept of Granger-casualty to higher dimensional systems. Different possible extensions have been considered. For details see, Lutkepohl (1993) and Dufour and Renault (1998). This approach is not satisfactory if interest centers on a causal relation between two variables within a higher dimensional system become asset of variables being causal for another set of variables does not necessarily imply that each member of the former set is causal for each member of the latter set. Therefore it is of interest
to consider causality of $y_{1t}$ to $y_{2t}$ if there are further variables in the system. In this context, different causality concepts have been proposed which are most easily explained in terms of the three-dimensional VAR process

$$y_t = \begin{bmatrix} y_{1t} \\ y_{2t} \\ y_{3t} \end{bmatrix} = \sum_{i=1}^{p} \begin{bmatrix} \alpha_{11,i} & \alpha_{12,i} & \alpha_{13,i} \\ \alpha_{21,i} & \alpha_{22,i} & \alpha_{23,i} \\ \alpha_{31,i} & \alpha_{32,i} & \alpha_{33,i} \end{bmatrix} \begin{bmatrix} y_{1,t-i} \\ y_{2,t-i} \\ y_{3,t-i} \end{bmatrix} + \epsilon_t$$

Within this system, causality of $y_{1t}$ for $y_{2t}$ is sometimes checked by testing.

$H_0 : \alpha_{21,i} = 0, i = 1, ..., p$

Thus, the definition of no causality corresponding to the restrictions in a hypothesis above is in line with an intuitive notion of the term. For higher dimensional processes the definition based on Lagrange Multiplier results is more complicated nonlinear restrictions for the VAR coefficients (Dufour and Renault (1998)).

**Decision Rule:** Accept $H_0$ (No causal relationship between variables) if $p$-value is greater than significance level $\alpha$, otherwise we reject the null hypothesis and accept the alternative hypothesis, $H_1$ (there exist causal relationship between variables) if $p$-value is less than significant level $\alpha$ (obtain from table)

**IMPULSE RESPONSE ANALYSIS**

Impulse response traces out responses of current and future values of each variable to a unit increase in the current value of one of the VAR errors, assuming that this error returns to zero in the subsequent period and that all errors are equal to zero.

For an $1(0)$ process $y_t$, the effects of shocks in the variables are easily seen in its Wold moving average (MA) representation,

$$y_t = \epsilon_t + \phi_1 \epsilon_{t-1} + \phi_2 \epsilon_{t-2}$$

The coefficient matrices where $\phi_0 = I_k$ and, $\phi_k$ are computed recursively. That is this representation may be obtained by recursive formulas from the coefficient matrices $A_j$ of the levels VAR representation,

$$y_t = A_1 y_{t-1} + ... + A_p y_{t-p} + V_t + \epsilon_t,$$

where $v_t$ contains all deterministic terms (Lutkepohl (1991)). These impulse responses have been criticized on the grounds that the underlying shocks may not occur in isolation if the components of $\epsilon_t$ are instantaneously correlated. Therefore, orthogonal innovations are preferred in an impulse response analysis.

**FORECAST ERROR VARIANCE DECOMPOSITION**

Forecast error variance decomposition of the variables gives information about shocks that can forecast variables better. In practice, forecast error variance decompositions are popular tools for interpreting VAR models. Forecast error variance decompositions are related to impulse responses. The $h$-step forecast error for the $y_t$ variables in terms of structural innovations $\epsilon_t = \left(\epsilon_{1t}, ..., \epsilon_{kt}\right)' = B^{-1} \epsilon_t$ can be shown to be

$$\psi_0 \epsilon_{T+h} + \psi_1 \epsilon_{T+h-1} + ... + \psi_{h-1} \epsilon_{T+1}$$

so that the $k$th element of the forecast error vector is

$$\sum_{n=0}^{h-1} \left( \psi_{k,1} \epsilon_{1,t+h-n} + ... + \psi_{k,k} \epsilon_{k,t+h-n} \right)$$
Where \( \psi_{ij,n} \) denotes the \( j \)th element of \( \psi_n \). Because, by construction, \( \varepsilon_t \) are contemporaneously and serially uncorrelated and have unit variances, the corresponding forecast error variance is

\[
\sigma^2_k(h) = \sum_{n=0}^{h-1} \left( \psi^2_{k1,n} + \ldots + \psi^2_{kn,n} \right) = \sum_{j=1}^{k} \left( \psi^2_{j1,n} + \ldots + \psi^2_{j,h-1,n} \right)
\]

The quantity \( \left( \psi^2_{k1,0} + \ldots + \psi^2_{j,h-1} \right) \) is interpreted as the contribution of variable \( j \) to the \( h \)-step forecast error variance of variable \( k \). This interpretation is justified if the \( \varepsilon_n \) can be viewed as shocks in variable \( i \). The percentage contribution of variable \( j \) to the \( h \)-step forecast error variance of variable \( k \) is obtained by dividing the above terms by \( \sigma^2_k(h) \).

\[
\omega_j(h) = \left( \psi^2_{j1,0} + \ldots + \psi^2_{j,h-1} \right) / \sigma^2_k(h)
\]

The corresponding estimated quantities are often reported for various forecast horizons.

**STRUCTURAL ANALYSIS**

When the adequate model for a data generating process (DGP) of a system of variables has been found, then the tools; Granger-Causality Impulse Response Analysis and Forecast Error Variance can be used for forecasting and economic analysis.

**GRANGER CAUSALITY**

In order to examine whether one variable is causally related to another; we examine the Granger causality test on the variables.

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Obs</th>
<th>F-statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCGDP do not Granger-cause INF RATE, NGDP</td>
<td>32</td>
<td>3.1465</td>
<td>0.0495</td>
</tr>
<tr>
<td>NGDP do not Granger-cause INF RATE,PCGDP</td>
<td>32</td>
<td>2.3517</td>
<td>0.1031</td>
</tr>
<tr>
<td>INF RATE do not Granger-cause NGDP,PCGDP</td>
<td>32</td>
<td>0.0996</td>
<td>0.9053</td>
</tr>
<tr>
<td>NGDP,PCGDP do not Granger-cause INF RATE</td>
<td>32</td>
<td>1.1144</td>
<td>0.3342</td>
</tr>
<tr>
<td>INF RATE, NGDP do not Granger-cause PCGDP</td>
<td>32</td>
<td>0.6146</td>
<td>0.5439</td>
</tr>
<tr>
<td>INF RATE, PCGDP do not Granger-cause NGDP</td>
<td>32</td>
<td>1.1877</td>
<td>0.3114</td>
</tr>
</tbody>
</table>

Table 1: Result of Granger-Causality Test

From the table, it shows that per capita GDP do not granger-cause inflation rate and nominal GDP is significant and can be rejected at the 5% level of significant. This shows long-run impact since p-value is less than significant value.

The null hypothesis that: Nominal GDP do not granger-cause inflation rate and per capital GDP, inflation rate do not granger-cause nominal GDP and per capital GDP, nominal GDP and per capita GDP do not granger-cause inflation rate, inflation rate and nominal GDP do not granger-cause per capita GDP, inflation rate and per capital GDP do not granger-cause nominal GDP, cannot be rejected because the p-values for the F-test of the individual cause variables are greater than the significant values 0.05 and 0.01. They are independent variables and have short-run effect.

**IMPULSE RESPONSE GRAPHICAL ANALYSIS REPRESENTATION**

The impulse response analysis is all about tracing out the effects of shocks in the variables response to a one-standard error shock in variables. Result of impulse response is below. The graph lines traces out the impulse response functions.
The impulse functions in the first column indicate that the response variables Inflation rate, Nominal GDP and Per capita GDP strongly affected impulse variable Inflation rate with persistence negative offset. Observations show that the innovations to response variables are not statistically significant for the twenty periods.

The impulse functions in the second column indicate that the response variables Inflation rate, Nominal GDP and Per capita GDP strongly affected impulse variable Nominal GDP with persistence
negative offset. Observations show that the innovations to response variables are not statistically significant for the twenty periods.

The impulse functions in the third column indicate that the response variables Inflation rate, Nominal GDP and Per capita GDP resulted in impulse variable Per capita GDP with persistence positive offset. OBSERVATIONS show that the innovations to response variables are statistically significant for the twenty periods.

Third column indicates that a rise in per capita GDP signals growth in the economy but only in the first four periods.

FORECAST ERROR VARIANCE DECOMPOSITION

Using VECM model for the forecast error variance decompositions of the variables, the forecast error variances of the variables gives information about shocks that can forecast variables better. Below is the table

VECM FORECAST ERROR VARIANCE DECOMPOSITION

Proportions of forecast error in "INF_RATE"
accounted for by:

<table>
<thead>
<tr>
<th>forecast horizon</th>
<th>INF_RATE</th>
<th>NGDP</th>
<th>PCGDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>0.96</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td>3</td>
<td>0.88</td>
<td>0.01</td>
<td>0.11</td>
</tr>
<tr>
<td>4</td>
<td>0.88</td>
<td>0.01</td>
<td>0.10</td>
</tr>
<tr>
<td>5</td>
<td>0.90</td>
<td>0.02</td>
<td>0.09</td>
</tr>
<tr>
<td>6</td>
<td>0.90</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td>7</td>
<td>0.90</td>
<td>0.02</td>
<td>0.09</td>
</tr>
<tr>
<td>8</td>
<td>0.90</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td>9</td>
<td>0.90</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td>10</td>
<td>0.90</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td>11</td>
<td>0.90</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td>12</td>
<td>0.90</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td>13</td>
<td>0.90</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>14</td>
<td>0.91</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>15</td>
<td>0.91</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>16</td>
<td>0.91</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>17</td>
<td>0.91</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>18</td>
<td>0.91</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>19</td>
<td>0.91</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>20</td>
<td>0.91</td>
<td>0.02</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Proportions of forecast error in "NGDP"
accounted for by:

<table>
<thead>
<tr>
<th>forecast horizon</th>
<th>INF_RATE</th>
<th>NGDP</th>
<th>PCGDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.12</td>
<td>0.88</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>0.08</td>
<td>0.92</td>
<td>0.01</td>
</tr>
<tr>
<td>3</td>
<td>0.07</td>
<td>0.92</td>
<td>0.01</td>
</tr>
<tr>
<td>4</td>
<td>0.07</td>
<td>0.93</td>
<td>0.01</td>
</tr>
<tr>
<td>5</td>
<td>0.06</td>
<td>0.93</td>
<td>0.01</td>
</tr>
<tr>
<td>6</td>
<td>0.06</td>
<td>0.93</td>
<td>0.01</td>
</tr>
<tr>
<td>7</td>
<td>0.06</td>
<td>0.94</td>
<td>0.01</td>
</tr>
<tr>
<td>8</td>
<td>0.05</td>
<td>0.94</td>
<td>0.00</td>
</tr>
<tr>
<td>9</td>
<td>0.05</td>
<td>0.94</td>
<td>0.00</td>
</tr>
<tr>
<td>10</td>
<td>0.05</td>
<td>0.95</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Proportions of forecast error in "PCGDP"
accounted for by:

<table>
<thead>
<tr>
<th>forecast horizon</th>
<th>INF_RATE</th>
<th>NGDP</th>
<th>PCGDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.16</td>
<td>0.82</td>
<td>0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.11</td>
<td>0.88</td>
<td>0.01</td>
</tr>
<tr>
<td>3</td>
<td>0.10</td>
<td>0.89</td>
<td>0.01</td>
</tr>
<tr>
<td>4</td>
<td>0.10</td>
<td>0.89</td>
<td>0.00</td>
</tr>
<tr>
<td>5</td>
<td>0.10</td>
<td>0.90</td>
<td>0.00</td>
</tr>
<tr>
<td>6</td>
<td>0.09</td>
<td>0.90</td>
<td>0.00</td>
</tr>
<tr>
<td>7</td>
<td>0.09</td>
<td>0.91</td>
<td>0.00</td>
</tr>
<tr>
<td>8</td>
<td>0.09</td>
<td>0.91</td>
<td>0.00</td>
</tr>
<tr>
<td>9</td>
<td>0.09</td>
<td>0.91</td>
<td>0.00</td>
</tr>
<tr>
<td>10</td>
<td>0.09</td>
<td>0.91</td>
<td>0.00</td>
</tr>
<tr>
<td>11</td>
<td>0.09</td>
<td>0.91</td>
<td>0.00</td>
</tr>
<tr>
<td>12</td>
<td>0.09</td>
<td>0.91</td>
<td>0.00</td>
</tr>
<tr>
<td>13</td>
<td>0.09</td>
<td>0.91</td>
<td>0.00</td>
</tr>
<tr>
<td>14</td>
<td>0.09</td>
<td>0.91</td>
<td>0.00</td>
</tr>
<tr>
<td>15</td>
<td>0.08</td>
<td>0.91</td>
<td>0.00</td>
</tr>
<tr>
<td>16</td>
<td>0.08</td>
<td>0.91</td>
<td>0.00</td>
</tr>
<tr>
<td>17</td>
<td>0.08</td>
<td>0.91</td>
<td>0.00</td>
</tr>
<tr>
<td>18</td>
<td>0.08</td>
<td>0.92</td>
<td>0.00</td>
</tr>
<tr>
<td>19</td>
<td>0.08</td>
<td>0.92</td>
<td>0.00</td>
</tr>
<tr>
<td>20</td>
<td>0.08</td>
<td>0.92</td>
<td>0.00</td>
</tr>
</tbody>
</table>

The most important source of variations in each forecast error is its own innovations. Innovations in nominal GDP are also important factor in explaining variance of per capita GDP.

The overall most important source of variations is in inflation rate forecast error of its own innovations.

REPORT ON THE ANALYSES

Granger causality analysis has one long-run relationship. Impulse Response analysis traces out the effects of shocks in the variables of a given system which can also be regarded as a type of causality analysis and granger causality has one long-run impact. The most important source of variations in each forecast error is its own innovations. In practice, Forecast Error Variance Decompositions is the popular tools for interpreting VAR models and expressing the h-step ahead forecast error in terms of the orthogonalized impulse responses.

CONCLUSION

In this study based on the result of the analysis carried out to determine the effect of GDP and inflation rate in Nigeria economy, the results from granger causality, impulse response and forecast error variance decomposition analyses revealed the following:
In granger causality: the P-value 0.0495 for per capita GDP do not granger-cause inflation rate and nominal GDP is significant and can be rejected at the 5% level of significant by implication this means that a rise in per capita GDP is a signal of economic growth but the rise is very slow (stagnant) because the graph shows this and the p-value is close to 0.05 over the period under study. Similarly, impulse response: Third column indicates that a rise in per capita GDP signals growth in the economy but only in the first four periods but from periods four to twenty which affect the economic growth over the period under study. In addition, forecast error variances; innovations in per capita GDP contributed little to explain the variation of nominal GDP and inflation rate this means that the economic growth rate very slow. Hence, in conclusion the methods of investigating the effect of economic growth rate yielded the same result.

RECOMMENDATION

Any of the three methods used above in this study is recommended for the study of cause and effect on two or more economy variables as they yield the same result. The government should plan to raise the per capita GDP to improve the economic growth and high standard of living for good health of the nation.

REFERENCES


