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Investigating the Influence of Past Values of Some Macroeconomic Variables on Money Supply in Nigeria 1990-2011

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1. Abstract

The study investigated the influence of past values of some macroeconomic variables on money in Nigeria 1990-2011. This was done through the use of Vector Auto regression (VAR) technique. The estimation was based on two lags of the endogenous variables. The VAR model assumed that if even X happens before event Y, then X can cause changes in Y but not the other way round. The dependent variable was money supply (MS) while the independent variables were lending rate (LDR), inflation rate (INFR), Real Gross Domestic Product (RGDP) and Exchange Rate (EXCHR). The results indicated that the lags of some variables had positive impacts on money supply while the lags of other variables had negative impact on money supply. In fact second lag of RGDP had the highest positive impact on money supply. The F-Statistics of 51.78954 was high enough and the R^2 was 0.98 and it indicated that 98 percent of variations in the dependent variable were due to variations in the explanatory variables. The study concluded that the lag values of money supply, lending rate, inflation rate, real Gross Domestic Product and exchange rate influenced money supply in Nigeria. It was recommended that monetary policies with respect to money supply should consider the influence of the lagged values of the variable in question.

2. Introduction

The importance of money supply in an economy cannot be over stressed. Too much money supply can lead to inflation and all the evils that go with inflation while little money supply can lead to deflation and all the evils that go with it. It is therefore important to determine the proper amount of money supply in an economy. The Central Bank of Nigeria can decide to either increase or reduce the amount of money supply in circulation by using expansionary or contractionary monetary policy. Monetary authorities struggle to attain the optimum amount of money supply in an economy.

The optimum amount of money is usually the amount of money that is adequate to finance goods and service available and it is against this background that the study focused on the influence of past values of some macroeconomic variables on money supply in Nigeria. What happened in the past greatly influenced what happens now. Monetary authorities are to learn from history in order to determine proper amount of money supply in the economy.

3. Empirical Literature

Asogu (1991), did some work on the nature and causes of inflation in Nigeria. He used single equation approach and considered factors such as money supply its lagged value, domestic credit, net exports, real output and net government expenditure. The results indicated that money supply and its lag are not always significant. If annual data are used in the estimation change in real income was significant and was inversely related to inflation rate. Domestic credit and government expenditure were either not significant or significant with wrong signs. Akinnifesi (1984), noted that changes in money supply, lagged value in money supply, credits to government by banking system, government deficit expenditure, industrial production and food prices jointly explained inflationary tendencies in Nigeria.

In a study by Fakiyesi (1996), it was assumed that price changes depended on the growth in money supply, exchange rate, real income, rainfall and level of anticipated inflation which was based on the previous level of inflation. It was expected that changes in growth of money supply would affect price changes with a lag. The study included lagged value of money supply. The result showed that the lagged value of growth in money supply was significant.

Olowofeso (2004), worked on reductions of vector Autoregressive processes by automated method. He used some selected macroeconomic variables in Nigeria, 1980-2003. The variables were consumer price index, exchange rate, money supply and real Gross Domestic Product. The estimation was based on two types of lags of the variables. One of the automated results measured the effect of money supply on current and future real Gross Domestic Product and money supply.

Ogunleye (1995), noted in his study on monetary policy influences on the profitability of banks, that banks mobilize founds from surplus income units and directed some to deficit spending units. Banks played important role in the determination of prices and creation of money. The ability of banks to crate money was controlled by the Central Bank. Khan and Schimmelpfennig (2006) noted that monetary factors played a determinant role in recent inflation. It affected inflation with a lag of about a year.

Stock and Watson (1999), made use of Philips curve (unemployment rate) to investigate forecasts of U.S inflation for the period of 12 months. They indicated that inflation forecasts generally had been more accurate with Philips curve than forecasts based on other macroeconomic variables, including interest rates, money and commodity prices. They further indicated that forecasting relations based on other measures of aggregate activity may perform as well or better than the ones based on unemployment and that combining these forecasts would give optimal forecasts.

4. Conceptual and Theoretical Framework

Money supply is the supply of money that the society holds at a given period of time. The stock of money in an economy is M1 and M2. M1 comprises notes and coins issued by the central bank and current account deposit in the banks it is called the narrow money supply. M2 on the other hand is more compromising and it is M1 plus time and saving deposits with commercial and other financial institutions such as the Federal savings Bank, Federal Mortgage Bank and Development Banks. Inflation defined as persistent increase in the general price level. If the rise in price level is low, for example 0-3 percent, it is called creeping inflation. When prices rises moderately between 3-5 percent, it is called walking inflation. If the annual rise in price level is 6-9 percent it is running inflation. Hyperinflation occurs when the price rise is very fast at double or triple digit rate. A lag is the amount of time it takes for a variable to respond to changes in its independent variables.

Exchange rate is the rate at which one currency will exchange for another. Exchange rate is the price of one currency in terms of another. If the exchange rate depreciates then the prices of imports will rise and if it appreciates, then the prices of imports will fall. Real Gross Domestic Product is Gross Domestic Product expressed in current prices. Lending rate is the rate at which banks make loan available to their customers and corporate entities. The lending rate can rise or fall depending on what is happening to the bank or policy rate of the Central Bank. If the Central Bank increases the policy rate, the lending rate will increase and vice versa.

The theoretical framework is centered on the monetarist views. The monetarists are called the new or modern quantity theorist because their writings followed substantially the trend of the old quantity theory. They are also called monetarist economists because of their belief in the efficiency of monetary policies. The monetarists believe that money is the most important regulatory instrument in an economy. The monetarist believes that the increase in money supply will directly influence Gross Domestic Product. They also believe that inflation is solely a monetary phenomenon arising from the excess growth in money supply. The monetarists believe that interest rate is determined by real forces and that is productivity and thrift. The monetarists believe that all kinds of assets both financial and real are substitutes for money.

5. Methodology of the study

The annual time series data collected from the Central Bank of Nigeria statistical bulletin various issues and publications from the National Bureau of Statistics were used. The study covered the period 1990-2011. Being time series data, the study variables were subjected to unit root test. The Augmented Dickey-Fuller (ADF) unit root test was employed.

Study Variables:
MS= Money Supply
LDR= Lending Rate
INFR= Inflation Rate
RGDP= Real Gross Domestic Product
EXCHR= Exchange rate

Table 1: Unit Root Test for Variables in Second Difference

Variables	ADF Test Statistic	ADF Critical Value 1%	ADF Critical Value 5%	ADF Critical Value 10%	Remarks
MS	-4.3938	-3.7856	-3.0114	-2.6457	Stationary
LDR	-5.1976	-3.7667	-3.0038	-2.6417	Stationary
INFR	-4.6565	-3.7667	-3.0038	-2.6417	Stationary
RGDP	-6.1872	-3.7667	-3.0038	-2.6417	Stationary
EXCHR	-3.2711	-3.7667	-3.0038	-2.6417	Stationary

Source: Author's computation

The unit root tests were done for all the variable and the Augmented Dickey-Fuller test was used. It was found that some of the variables were stationary at first difference while others were stationary at second difference. Table 1 indicates that in absolute terms the computed ADF exceeded the critical value at 1%, 5%, and 10% level of significance for MS, LDR, INFR and RGDP. The EXCHR was stationary at 5% and 10% level of significance.

6. Vector Auto regression (VAR) Results and Discussions.

The term auto regression is as a result of the appearance of the lagged value of the dependent variable on the right hand side of the equation estimated. The term vector is because we are dealing with a vector of two or more variables. Table 2, shows the Vector Auto regression estimates. The VAR results were based on two lags of each endogenous variable. The standard errors and t-statistics were given in parenthesis.

MS=-58115+1.48101MS(-1)-0.43830 MS(-2)+28089LDR(-1)-8244LDR(-2)-13312INFR(-1)+6320INFR(-2)-95991RGDP(-1)+60002RGDP(-2)-15157EXCHR(-1)+20467EXCHR(-2)_____(i)

Since the equation arrived at is Ordinary Least Square regression, the interpretation is done in the usual fashion. With several lags of the same variables, each estimated coefficient may not be statistically significant due to multicollinearity, but collectively they may be significant on the basis of the F Test. The higher the F Test figures the better the model and vice versa. Individually MS at lag 1, LDR at lags 1and 2, INFR at lags 1 and 2, RGDP at lags 1 and 2, and EXCHR at lags 1 and 2 are statistically significant. RGDP at lag 2 had the highest positive impact on money supply because its coefficient was 60002. This was followed by LDR at its first lag. Its coefficient was 28089. Next to this was EXCHR at its second lag. Its coefficient was 20467. MS at its lag2, LDR at its lag 2 INFR at its lag 1 all related negativity to money supply. The results indicated the variables moved in opposite direction with money supply. The F Test of 51.78954 is high and we cannot reject the hypothesis that collectively all the lagged terms are significant.

The R^2= 0.982919

R^2= 0.98

98 percent of variations in the dependent variable (MS) were due to changes in the independent variables that is the first and second lags of MS, LDR, INFR EXCHR and RGDP. This was alright due to the fact that the highest value R^2 can attain is one.

7. Summary, Conclusion and Recommendations

This study has used Vector Auto regression (VAR) model to investigate the influence of the past values of some macroeconomic Variables on money supply in Nigeria, 1990-2011. The VAR estimation was based on two lags of the endogenous variables. The choice for this model was due to the fact that if even X happens before event Y, then X can cause change in Y but not the other way round. This is the basic reason for the VAR model. This result indicated that the lag 1 of MS, lag 1 of LDR, lag 2 of INFR and lag 2 of RGDP were positively related to MS. The impacted positively on MS. Lag 2 of MS, lag 2 of LDR, lag 1 of INFR, lag 1 of RGDP and lag 1 of EXCHR were inversely related to MS. The results further indicated that 98 percent of variations in the independent variable were due to changes in explanatory variables. In conclusion, the lagged values of MS, LDR, INFR rate, RGDP and EXCHR influenced money supply in Nigerian economy.

On the basis of the findings from this study monetary authorities should bear in mind the role of past values of MS, LDR, INFR, RGDP and EXCHR. For example the lag 2 of RGDP had the highest positive impact on money supply. To increase RGDP, monetary policies should be geared towards increasing money supply. Variables whose lagged values are negatively related to money supply indicate that money supply can either be reduced or increased depending on whether government want to increase or reduce the value of such variables. What is happening presently depends on what happened in the past.

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TABLE. 2. Ms =F(Idr,infr,exchr,rgdp)
Vector Autoregression Estimate
Date: 06/12/15 Time: 10:09
Sample (adjusted): 1992 2011
Included observations: 20 after adjustments
Standard error in () & t- Statistics in []

	MS	LDR	INFR	RGDP	EXCHR
MS(-1)	1.481007	-1.03E-06	1.40E-06	3.57E-07	1.48E-05
	(0.27243)	(1.2E-06)	(2.4E-06)	(4.3E07)	(2.28972)
	[5.43629]	[-0.88447]	[0.57207]	[0.83215]	[2.28972]
MS(-2)	-0.438302	1.01E-06	4.74E-07	-3.21E-07	-2.05E-05
	(0.31204)	(1.3E-06)	(2.8E-06)	(4.9E-07)	(7.4E-06)
	[-1.40465]	[0.75288]	[0.16895]	[-0.65474]	[-2.76886]
LDR(-1)	28089.01	0.110355	0.686842	0.121580	-0.316057
	(52233.7)	(0.22347)	(0.46926)	(0.08216)	(1.24191)
	[0.53776]	[0.49382]	[1.46367]	[1.47987]	[-0.25449]
LDR(2)	-8244.256	-0.054246	2.678710	-0.121398	-1.345533
	(53351.3)	(0.22825)	(0.47930)	(0.08391)	(1.26848)
	[-0.15453]	[-0.23766]	[5.58879]	[-1.44670]	[-1.06074]
INFR(-1)	-13312.43	0.169608	0.370293	0.006488	0.048329
	(19765.9)	(0.08456)	(0.17757)	(0.03109)	(0.46995)
	[-0.67350]	[2.00567]	[2.08529]	[0.20871]	[0.10284]
INFR(-2)	6320.086	-0.288988	0.440558	0.010439	-0.3559410
	(16175.5)	(0.06920)	(0.14532)	(0.02544)	(0.38459)
	[0.39072]	[-417592]	[-3.03168]	[0.41031]	[-0.93453]
RGDP(-1)	-95991.11	0.0.705081	-1.162974	0.476217	1.517945
	(179564)	(0.68025)	(1.42843)	(0.25008)	(3.78037)
	[-0.53458]	[0.91780]	[-0.72092]	[1.68616]	[0.35555]
RGDP(-2)	60002.44	-0.424907	0.652951	-0.255396	-2161873
	(159000)	(0.68025)	(1.42843)	(0.25008)	(3.78037)
	[0.37737]	[-0.62464]	[0.45711]	[-1.02125]	[-0.57187]
EXCHR(-1)	-15156.64	-0.074895	-0.198079	-0.004483	0.894534
	(12692.8)	(0.05430)	(0.11403)	(0.01996)	(0.30178)
	[-1.19411]	[-1.37919]	[-1.73708]	[-0.22455]	[2.96416]
EXCHR(-2)	20466.65	0.009460	0.058329	0.028862	-0.065683
	(12769.9)	(0.05463)	(0.11472)	(0.02009)	(0.30362)
	[1.60272]	[0.17315]	[0.50843]	[1.43701]	[-0.21633]
C	-58115.06	26.13567	-35.62292	1.287966	65.13673
	(1440431)	(6.16259)	(12.9406)	(2.26558)	(34.2477)
	[-0.04035]	[4.24102]	[-2.75280]	[0.56849]	[1.90193]
R-squared	0.982919	0.787823	0.935900	0.846053	0.936896
Adj .R-square	0.963940	0.552072	0.864679	0.675000	0.866780
Sum sq resids	5.85E+12	107.0607	472.0789	14.46981	3306.485
F-statistic	51.78954	3.341751	13.14064	4.946158	13.36211
Log likelihooh	-292.3945	-45.15541	-59.99291	-25.14209	-79.45786
Akaike AIC	30.33945	5.615541	7.099291	3.614209	9.045786
Schwarz SC	30.88711	6.163194	7.646944	4.161862	9.593439
Mean dependent	3379431	19.92250	2188500	4.780000	87.47550
S.D. dependent	4245303	5.153350	19.68805	2.224173	52.51424
Determinant resid covariance (dof adj)			3.46E+16		
Determinant resid covariance			6.38E+14		
Log likelihood			-482.7937		
Akaike information criterion			53.77937		
Schwarz criterion			56.51764		

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