POLAC INTERNATIONAL JOURNAL OF ECONOMIC AND MANAGEMENT SCIENCE (PIJEMS)
DEPARTMENT OF ECONOMICS AND MANAGEMENT SCIENCE
NIGERIA POLICE ACADEMY, WUDIL-KANO

IMPACT OF MONETARY POLICY SHOCKS ON AGGREGATE DEMAND IN NIGERIA:

(1986-2017)

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Abstract

The Study examined the impact of monetary policy shocks on aggregate demand in Nigeria spanning the period of 1986-2017.Data were extracted from the Central Bank Statistical Bulletin and National Bureau of Statistics. The study employed macro econometric model using the two stage least square regression analysis and simulation experiment was carried out. The results revealed that monetary policy have impact on aggregate demand as monetary policy variables money supply and interest rate are statistically significant. The simulation result also revealed that lowering interest rate by 0.5% will increase aggregate demand by 0.42% and increasing money supply by 0.5% will increase aggregate demand by 0.53%. The study recommends for effective expansionary monetary policy in order to stimulate aggregate demand by reduce interest rate and increase money supply to sectors such as agriculture and manufacturing which deposit money banks often time find difficult to extend credit to.

Keywords: Monetary Policy, Aggregate demand, Interest rate, Money Supply, Simulation

1. Introduction

One of the ways taken by all economy to make the banking sector effective is the use of the monetary policy introduced by the federal government and carried out by the apex bank of the country. Apparently, the existence of an effective banking industry is vital to every economy and it encourages economic growth and development via its role in financial interdiction of funds supplies to deficit economic units. This stimulates international trade, investment, economic growth as well employment growth (Abdulazeez, 2016). Monetary policy is referred to as either being expansionary or contractionary. Expansionary policy seeks to accelerate economic growth, while contractionary policy seeks to restrict it. Expansionary policy is traditionally used to try to combat unemployment in a recession by lowering interest rates in the hope that easy credit will entice businesses into expanding. This is done by increasing the money supply available in the economy (Das & Pradhan, 2009).

Expansionary monetary policy attempts to promote aggregate demand growth. Aggregate demand is the sum of private consumption, investment, government spending and imports. Monetary policy focuses on the first two elements. By increasing the amount of money in the economy, the central bank encourages private

consumption. Increasing the money supply also decreases the interest rate, which encourages lending and investment. The increase in consumption and investment leads to a higher aggregate demand. When interest rates are cut (which is our expansionary monetary policy), aggregate demand (AD) shifts up due to the rise in investment and consumption. The shift up of AD causes us to move along the aggregate supply (AS) curve, causing a rise in both real GDP and the price level. We need to determine the effects of this rise in AD, the price level, and real GDP (output) in each of our two countries

The Minimum Rediscount Rate (MRR) is being used as the price-based nominal anchor to influence the direction of the cost of funds in the economy. Changes in this rate give indication about the monetary disposition of the Bank, whether it is pursuing a concessionary or expansionary monetary policy. This rate has generally been kept within the range of 8 and 26 percent since 1986. As a companion to the use of the MRR, the CBN later introduced the Monetary Policy Rate (MPR) in 2006 which establishes an interest rate corridor of plus or minus two percentage points of the prevailing MPR. Since 2007, this rate has been held within the band of 6 and 10.25 percent, until last quarter of 2010 when it was increased to 10.30 percent, and since July 2016, monetary policy remained at 14 percent (CBN, 2017).

The scope of this study focuses mainly on the impact of monetary policy on aggregate demand in Nigeria. The objective of this study is to analyse the impact of monetary policy shocks on aggregate demand in Nigeria. The research hypothesis for the study was formulated in null form as follows: Monetary policy has no significant impact on aggregate demand in Nigeria. The paper is structured in five sections: The general introduction is in section one while the second section reviewed related literature. Section three is the research methodology and section four is the presentation and analysis of results. The last section deals with the conclusion and recommendations of the study.

2. Literature Review

Monetary Policy is the deliberate use of monetary instruments (direct and indirect) at the disposal of monetary authorities such as central bank in order to achieve macroeconomic stability (Dwivedi, 2005). While Aggregate demand is the sum of the demand for all final goods and services in the economy. It can also be seen as the quantity of real GDP demanded at different price levels (Sexton, Fortura & Peter, 2005). According to Farlex Financial Dictionary (2012) defined aggregate demand as the total demand of goods and services in an economy at a given overall price and time.

Keynesian's monetary theory explains the effect of variation in money supply on the level of economic activity through its effect on the rate of interest which determines investment in the economy (Ahuja, 2011). Keynes does not agree with the older quantity theorists that there is a direct and proportional relationship between quantity of money and prices, rather according to him, the effect of a change in the quantity of money on prices is indirect and non-proportional (Jhingan, 2009).

Sesay and Abdulai (2017) examine the rate at which changes in monetary policy in Sierra Leone has affected the behavior of private sector investments for the period spanning 1980 – 2014 using vector autoregressive model and the results suggest that money supply and gross domestic saving exert positive and statistically significant effect on private sector investments whereas Treasury bill rate, inflation and gross domestic debt exert a negative effect.

Joab and Daney (2017) examine the impulse on the aggregate demand in Bolivia through the coordination of the monetary and fiscal policy in crisis time. They used the Dynamic Stochastic General Equilibrium Model (DSGE) in analyzing the data and the results show that fiscal - monetary policy is evidenced in the impulse response functions of cost push inflation.

Khaysy and Gang (2017) examine the impact of

monetary policy on the economic development in Kenya by using annual time series data for the period 1989-2016. The unit root testing result suggests that all variables are stationary at first difference and Johansen Co integration and Error Correction Model were employed to analyze the association between variables. The finding of the study shows that money supply; interest rate and inflation rate negatively affect the real GDP per capita in the long run while only the real exchange rate has a positive sign. The error correction model result indicates the existence of short run causality between money supply, real exchange rate and real GDP per capita.

Abdulazeez (2016) examines the impact of monetary policy on economic growth in Nigeria. The study uses time-series data covering the range of 1990 to 2010. Multiple regressions were employed to analyze data on the variables such as money supply, interest rate, financial deepening and gross domestic product. The variables of the study were all found to have marginal impact on economic growth in Nigeria.

Adigwe, Echekoba and Justus (2015) examine the impact of monetary policy on the Nigerian economy using the ordinary least square method (OLS) for analyse the data that cover the period 1980 - 2010. The result of the analysis shows that monetary policy represented by money supply exerts a positive impact on GDP growth but has negative impact on the rate of inflation.

Osasohan (2014) investigates the impact of monetary policy on economic growth in the United Kingdom. The study uses time-series data over a period spanning 1940-2012. The impacts of each of the endogenous variables were investigated using the vector error correction model (VECM). The study shows that a long run relationship exists among the monetary policy variables. Specifically, it finds that the inflationary rate and money supply are significant monetary policy instruments that drive growth in the United Kingdom.

Michael and Ebibai (2014) examine the impact of monetary policy on selected macroeconomics variables such as gross domestic product, inflation, and balance of payments in Nigeria from 1980-2014using the ordinary least square (OLS) regression analysis. The error correction method was used to ascertain if there is a static long run equilibrium relationship among the explanatory variables and to subsequently derive an adequate dynamic model of the short run relationship. The study shows that the provision of investment friendly environment in Nigerian will increase the growth rate of GDP.

3. Methodology

The study uses time series data that cover the period 1986 - 2017. Data were obtained from Central Bank of Nigeria Statistical Bulletin and National Bureau of Statistics for the period under review. Two stage least squares was employed in estimating the behavioural equations and simulation experiment was also performed**.** The study constructs macro-econometric model with two blocks; monetary block and aggregate demand block.

3.1 Monetary Sector Block Model

The monetary sector block shows the relationship between money supply and net foreign asset and domestic credit. The monetary sector block was adopted from the work of Anfofum (2011). The model is expressed below:

BMS= NFA + DMC + ……1

$DMC = \pi_0 + \pi_1 INT + \pi_2 RGDP + \pi_3 BD + \pi_4 GFCF + U_t$.2

Where: BMS = Broad money supply, NFA = Net foreign asset, DMC= Domestic credit, INT= Interest Rate, RGDP= Real gross domestic product, BD = Bank deposit, GFCF = Gross fixed capital formation, and Ut = error term.

3.2 Aggregate Sector Block Model

Aggregate demand is expressed as a function of private consumption, private investment and government spending. Aggregate demand is the endogenous variable while private consumption, private investment and government spending are the exogenous variables. The macro econometric model specification for the aggregate demand sector block is:

$AD = P^C + P^I + G^s$……3

$AD = BMS + INT$ ……4

$P^C = \beta_o + \beta_1 Y^d + \beta_2 INT + \beta_3 MS + \mu$ …….5

$P^I = \alpha_0 + \alpha_1 Y^d + \alpha_2 INT + \alpha_3 RPSC + \alpha_4 G^I + \mu$ …6

$G^s_t = \beta_0 + \beta_1 RPSC_t + \beta_2 G^R_t + \beta_3 INF_t + \mu_t$ ……7

$AD_t = \beta_0 + \beta_1 BMS_t + \beta_2 INT_t + \mu_t$.....8

Where; AD = Aggregate Demand, P^C = Private Consumption, P^I= Private Investment, G^C = Government spending, Y^d = Disposable Income, INT= Interest Rate, BMS= Broad Money Supply, RPSC = Ratio of private sector credit to GDP, G^I = Government Investment

4. Presentation and Discussion of Results

The behavioural equations (equ. 2, 5, 6, 7, & 8) were estimated using two stage least square techniques. All the estimates were done with intercept and with log of first difference and the results are presented in blocks forms:

4.1 Monetary Sector Block Results

Table1: Estimated Result for Domestic credit (DMC) equation in the Monetary Sector Block

INT=C(1)*BD+C(2)*GFCF+C(3)*RGDP+C(4)^				
Stacked instruments: (INT,*) (BD,*) (GFCF,*)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.2164.4	0.454671	-2.841410	0.0052
C(2)	0.730108	0.034013	3.273578	0.0017
C(3)	0.484220	0.012723	1.394326	0.1574
C(4)	0.264655	0.114601	2.482400	0.0084
R-squared	0.684289	Mean dependent var		0.271525
Adjusted R-squared	0.628754	S.D. dependent var		0.307011
S.E. of regression	0.043267	Sum squared resid		2.733424
Durbin-Watson stat	2.057326			

Source: E-views 7 output

The result in table 1 shows that domestic credit (DMC)is a function of interest rate (INT), bank deposit (BD), gross fixed capital formation (GFCF) and real gross domestic product (RGDP). The result reveals that interest rate (INT) have negative relationship with domestic credit (DMC). A unit increase in interest rate will lead to 0.22 unit decrease in domestic credit. The variable (interest rate) is statistically significant as its t-value is greater than 2 in absolute term and p-value is less than 0.05. The coefficient of bank deposit (BD), Gross fixed capital formation (GFCF), and real gross domestic product (RGDP) shows a positive signs which means that, a percentage increase in BD, GFCF and RGDP would lead to 0.73, 0.48 and 0.27 per cent increase in DMC respectively. These variables are statistically significant except for GFCF which is statistically insignificant. The

adjusted R^{-2} for goodness of fit measure indicated that the explanatory variables explain the variation in the dependent variable to about 63 percent.

4.2 Aggregate Demand Sector Block Results

Table 2: Summary of Result for Private Consumption (P^C) Equation

PC=C(1)*YD+C(2)*INT+C(3)*MS				
Instrument list: (YD,*) (MS,*)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.886073	0.521857	2.305410	0.0097
C(2)	-0.214647	0.695309	0.626325	1.8691
C(3)	0.647074	0.326036	-2.148772	0.0036
R-squared	0.975402	Mean dependent var		508005.2
Adjusted R-squared	0.960499	S.D. dependent var		726671.7
S.E. of regression	124812.4	Sum squared resid		4.52E+11
Durbin-Watson stat	2.60095			

Source: E-views 7 output

Table 2 shows the estimated coefficient of INT is -0.21 which implies that a percentage increase in INT will decrease P^C by about 0.21%. The estimated coefficient of Y^d and MS are 0.89 and 0.65 respectively. They all have a positive relationship with PC which means that a percentage increase in Y^d and MS would lead to an increase in P^C by 0.89% and 0.65% respectively. The t-values for Y^d and MS are statistically significant, while that of INT is statistically significant. The R^2 of the result is 0.98 and $R^{-2}$is 0.96. This indicates that about 98% change in P^C is caused by the explanatory variables. The Durbin Watson statistic of 2.17 shows that there no autocorrelation among the variables.

Table 3: Summary of Result for Private Investment (P^I) Equation

PI=C(1)*YD+C(2)*INT+C(3)*RPSC+C(4)*GI				
Instrument list: (YD,*) (RPSC,*) (GI,*)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.920316	0.731566	2.969945	0.0013
C(2)	0.813573	0.661839	-2.643715	0.0024
C(3)	0.266030	0.125474	-5.137490	0.0000
C(4)	0.181864	57.01198	-0.196382	1.6876
R-squared	0.901805	Mean dependent var		309647.5
Adjusted R-squared	0.865749	S.D. dependent var		347739.2
S.E. of regression	117539.6	Sum squared resid		3.87E+11
Durbin-Watson stat	1.983416			

Source: E-views 7 output

In table 3, Private investment equation indicates that the model is a good fit as 90% of the variation in P^I is explained by the explanatory variables. All the explanatory variables are statistically significant except for G^I as it t-value is not up to 2 in absolute terms. All the variables have positive relationship with the dependent variable. A percentage increase in Y^d, INT, RPSC and G^I would result to an increase in P^I by 0.92%, 0.81%, 0.27% and 0.18% respectively. The DW statistics of 1.98 fall

within the rejection region. Therefore, there is absence of autocorrelation among the variables.

Table 4: Summary of Result for Government Spending (Gs) Equation

G^S=C(1)*RPSC+C(2)*GR+C(3)*INF				
Instrument list: (RDEGDP,*) (GR,*)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.284765	0.492832	3.327275	0.0054
C(2)	0.572739	0.973635	-2.537375	0.0021
C(3)	-0.281736	1.239375	-1.383657	0.4827
R-squared	0.743639	Mean dependent var		4637388
Adjusted R-squared	0.713753	S.D. dependent var		393837.9
S.E. of regression	845.3542	Sum squared resid		572E+11
Durbin-Watson stat	1.936357			

Source: E-views 7 output

The result in table 4 shows that RPSC and GR have positive and significant relationship with GS. The coefficient of RPSC is 0.28 while that of GR is 0.57. This means that a percentage increase in RPSC and GR would lead to 0.28% and 0.57% increase in GR respectively. Their respective p-values are less than 0.05 as indicated in the table. The coefficient of INF is -0.28 which means a percentage increase in INF will result to 0.28% decrease in GS. INF is statistically insignificant as its p-value is (0.48) is greater than 0.05. The coefficient of determination R^2 of 0.74 means that, the model is a good fit model and that 74% of the behaviour of GS is explained by the explanatory variables (RPSC, GR and INF).

Table 5:Summary of Result for Aggregate demand (AD) Equation

AD=C(1)*BMS+C(2)*INT				
Instrument list: (BMS,*)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.291723	0.852625	3.626256	0.0032
C(2)	-0.103757	0.956254	-4.627378	0.0008
R-squared	0.493157	Mean dependent var		583873.8
Adjusted R-squared	0.439189	S.D. dependent var		3283465
S.E. of regression	8272635	Sum squared resid		3.53E+11
Durbin-Watson stat	1.683735			

Source: E-views 7 output

Table 5 shows the estimated coefficient of BMS and INT as 0.29 and- 0.10 respectively. BMS is positively related with AD while INT is negatively related with AD. A percentage increase in BMS will lead to 0.29% increase in AD while a percentage increase in INT will lead to 0.10% decrease in AD. BMS is statistically significant (p-value = 0.0032< 0.05) and INT is statistically significant (p-value = 0.0008 < 0.05). The R^2 of the result is 0.49 indicates that about 49% change in AD is caused by the behaviour of BMS and INT.

4.3 Simulation Experiment Result

Table 6: Simulation Experiments and Results

A	**INTEREST RATE**	
S/N	**Experiments**	**Results**
1.	0.5% Decrease in interest rate (INT)	0.42% Increase in Aggregate demand (AD) 0.34% Increase in Private Consumption (P^C) 0.86% Increase in Private Investment (P^I)
2.	0.5% Increase in interest rate (INT)	0.97% Decrease in Aggregate demand (AD) 0.37% Decrease in Private Consumption (P^C) 0.12% Decrease in Private Investment (P^I)
B	**MONEY SUPPLY (BMS)**	
1.	0.5% Decrease in money supply (MS)	0.71% Decrease in aggregate demand (AD)
2.	0.5% Increase in money supply (MS)	0.53% Increase in aggregate demand (AD)

Source: Computed as Baseline Simulation Experiments from E-views 7 (2018)

In order to examine the impact of monetary policy variables on aggregate demand, the study performed a simulation experiment of 0.5% increase and decrease in interest rate and money supply.

The baseline simulation for the gross domestic product (appendix B) demonstrated a good tracking power of the actual from the baseline simulation. The nature of the oscillation suggests a good tracking power of the model. On the whole, the graphs show that the models have good tracking powers, that is, the actual values are close to their baseline simulation which is an indication of the ability of the model to forecast and replicate most of the critical turning points of the historical data.

From the result in table 6, the respective values of the dynamic baseline simulation and scenario solution are presented. With the decrease in interest rate by 0.5%, aggregate demand, private consumption and private investment increased with 0.4%, 0.34% and 0.86% respectively and when interest rate was increased by 0.5%, all the variables decreased with 0.97%, 0.37% and 0.12% respectively. This implies that financial shocks from the interest rate have impact on aggregate demand.

The value of money supply increase shows that the impact of money supply on aggregate demand is positive and significant.

4.4 Discussion of Results

The results from the estimated equations on the impact of monetary policy on aggregate demand indicated that, broad money supply (BMS) and interest rate (INT) as monetary policy variables are statistically significant in influencing aggregated demand. Money supply is positively related with aggregate demand while interest rate (INT) is inversely related with aggregate demand in Nigeria during the period under review. The findings are in line with the works of Michael and Ebibai (2014). Similarly, the Simulation results performed on interest rate and money supply shows that 0.5% decrease in interest rate increased aggregate demand by 0.42% and 0.5% increase in interest rate decrease aggregate demand

by 0.97%.Money supply decrease by 0.5% decreased aggregate demand by 0.71% and increase in money supply by 0.5% increased aggregate demand by 0.53%.The baseline simulation demonstrates good tracking power of the actual from the baseline simulation as the nature of the oscillation suggested.

4.5 Test of Hypothesis

From the regression analysis, the study reject null hypothesis that monetary policy has no significant impact on aggregate demand in Nigeria and accept the alternative that monetary policy has significant impact on aggregate demand in Nigeria. This is because; the monetary policy variables (broad money supply and interest rate) are statistically significant as their p-values are 0.0032 and 0.0008 which are less than 0.05.

5. Conclusion and Recommendations

The study examines the impact of monetary policy on aggregate demand in Nigeria. Specifically, the study investigates the impact of monetary policy on aggregate demand components (Consumption spending and investment spending)using time series data spanning the period 1986 - 2017.In other words, how does aggregate demand respond to unanticipated monetary policy shocks? The study employs the macro econometric model framework and uses a set of policy macroeconomic variables constructed in blocks (monetary policy sector block and aggregate demand sector block). The study estimated the equations using the two stage lease squared techniques and performed simulation experiment. The result shows that growth rate in aggregate demand fuelled by large money supply and low interest rate. Based on these findings, the study recommends that, there is need for effective expansionary monetary policy in order to stimulate aggregate demand (reduce interest rate and increase money supply)to sectors such as agriculture and manufacturing which deposit money banks often time find difficult to extend credit to.

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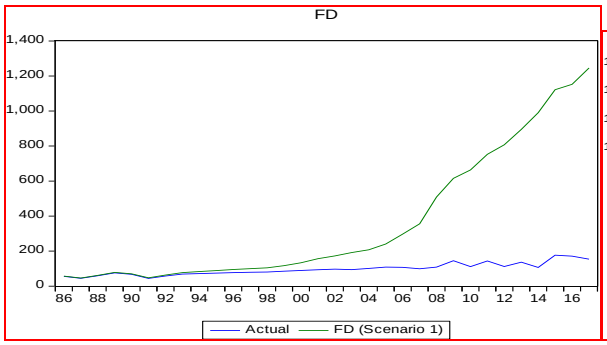
Appendix

TRACKING OF ACTUAL AND SIMULATED VALUES


FD
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800
600
400
200
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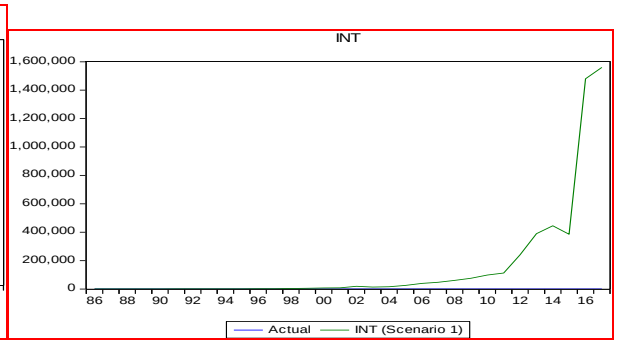
Actual
FD (Scenario 1)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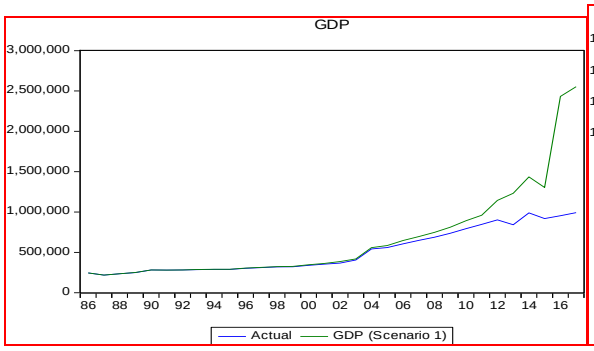
Actual
INT (Scenario 1)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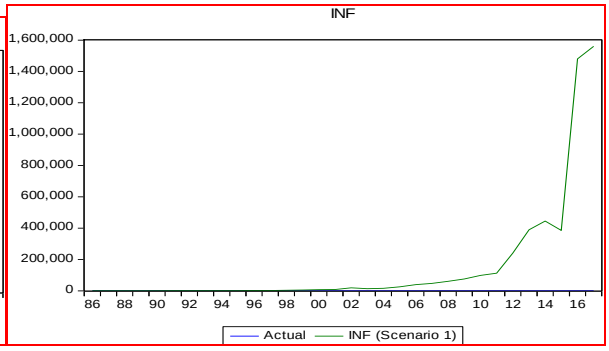
Actual
GDP (Scenario 1)


INF
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1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
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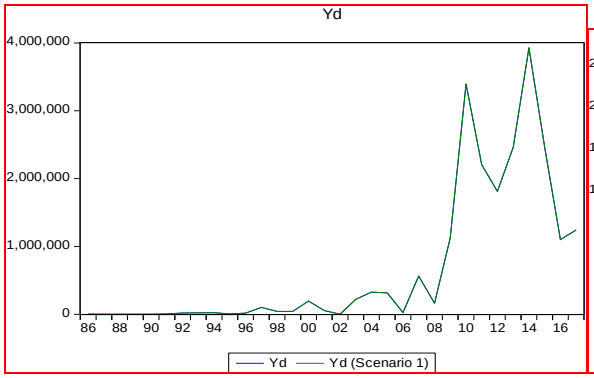
Actual
INF (Scenario 1)


Yd
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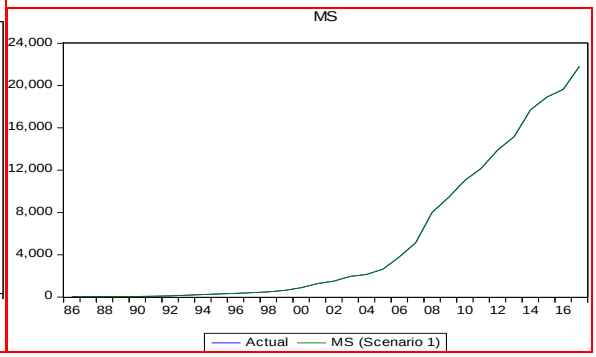
Yd
Yd (Scenario 1)


MS
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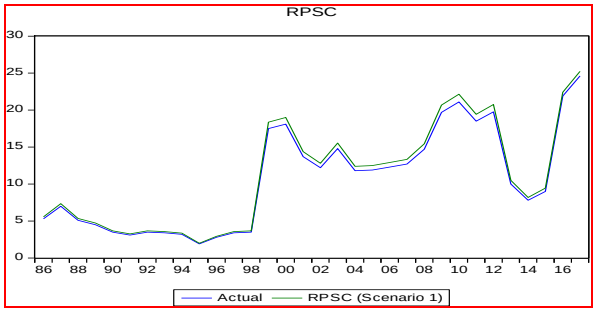
0
86 88 90 92 94 96 98 00 02 04 06 08 10 12 14 16
Actual
MS (Scenario 1)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20
15
10
5
0
86 88 90 92 94 96 98 00 02 04 06 08 10 12 14 16
Actual
RPSC (Scenario 1)