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STABILISATION OF THE NIGERIAN ECONOMY: AN ASSESSMENT OF THE EFFECTIVENESS OF THE MONETARY POLICY

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Abstract
The study is basically an investigation of the influence of instruments of monetary policy (interest rate, reserve requirement and money supply) on stabilisation of the Nigeria economy. The study employed Augmented Dickey-Fuller test for stationarity, Johansen Co-integration test and Ordinary Least Square method (OLS) in the analysis of the time series quarterly data from 1980 to 2010. The result revealed that interest rate has significant impact on inflation control. Reserve requirement impacted significantly on inflation control although the relation was a positive one. Money supply has an inverse relationship with inflation rate. But the influence on inflation was not at a significant level. On the basis of the results, the researchers made the following recommendations, among others: it is imperative for monetary authorities to monitor and evaluate policies frequently; efforts should be increased to regulate money supply through aggressive promotion of banking habits with the intention to control total liquidity in the country, and. adequate supervision of banks is necessary to ensure compliance to policies and programmes.

Key words: stabilisation, economy, effectiveness, monetary policy,

Introduction

One of the goals of macroeconomic policy is to maintain economic stability. Price instability (inflation, deflation) and unemployment have adverse effect in the living standard of the populace. In this

respect, various programmes, policies and strategies are usually adopted. The government agency empowered to regulate and control monetary policy in Nigeria is the Central Bank of Nigeria (CBN) in collaboration with the Federal Ministry of Finance. CBN (1996) points out that the Nigerian financial system comprises the regulatory/supervisory authorities. The CBN is at the apex, principal regulator and supervisor in the money market, with the Nigerian Deposit Insurance Corporation (NDIC) playing complementary role. Actually, the promulgation of the CBN Decree 24 and Banks and Other Financial Institutions (BOFI) Decree 25, both of 1991, gave the Bank more flexibility in regulating and supervising the banking sector and licensing finance companies which was not so before. Monetary policy is usually the guideline adopted by the Central Bank to regulate and encourage monetary and sound financial system. The instruments of the monetary policy in Nigeria are direct control and the indirect or market approach. The tools of direct monetary control are qualitative ceilings on bank credit, selective credit controls and administered interest and exchange rates. Indirect control has to do with influencing the availability and the rate of return on financial assets which affect both the desire of the people to hold money balances and the willingness of financial agents to accept deposits and lend them to users. Such tools are reserve requirements, discount rate and open market operations. Evidently, the Central Bank applied only direct monetary policy instruments before the Structural Adjustment Programme (SAP) in 1986 and afterwards in late 1993, the authorities switched to indirect control mechanisms. The preference for indirect monetary control measures was motivated by the failure of the authorities to achieve credit control and satisfactory targeting of monetary aggregates (Anyanwu, 1993; CBN, 1996; Ayogu & Emenuga, 1998; Ojo, 1993). In actual fact, the actions of the CBN impact on the economy in different ways thereby affecting consumption and investment. In its liquidity transmission mechanism, variation in money supply does impact on interest rates both in the short and long-runs which is in turn transmitted to consumption, investment, among others. So, considering the mechanism of transmission of monetary policy over the years and its influence in Nigeria, it is our intention to assess the effectiveness of monetary policy in the stabilisation of the Nigeria economy. Over the years, the Central Bank of Nigeria (CBN) has exercised its legal powers in ensuring compliance to monetary policy. The outcome of this effort seemed not satisfactory considering the trend of inflation and happenings in the economy. Inflation rate in Nigeria as pointed by CBN 2003; Ukoha 2007, show that: between 1970-74, it stood at 10.28, 1975-79, 19.74, 1990-94, 23.84, 1995 – 99, 25.44. CBN reports also pointed that by 2001, inflation rate was 18.9 percent, fall slightly to 12.90 percent in 2002, rose to 14.00 and 15.4 percent in 2003 and 2004 respectively. By 2005, it was 17.9 and it fell to 8.5 and 6.6 percent in 2006 and 2007 respectively. By 2009 inflation rate stood at 12.0 percent. In March 2012, core inflation was 15.0 percent. This persistent rise in prices has really affected the living standard of the people as the real income of the

people is made to fall. This situation does discourage long term planning, investment, saving reduction and capital accumulation, thereby creating uncertainties and distortion in the economy.

Real interest rate is also affected by inflation in that there is an inverse relationship between inflation and interest rate. Besides, high and rising inflation rate do reduce domestic real rate of interest and currency value. Furthermore, banking habit has not been adequately encouraged thereby encouraging much money to exist outside the banking system with the associated problem of money supply regulation. As noted by Nwosu and Hamman (2008) a useful measure of banking sector is the extent to which it is able to promote banking habit usually captured by the currency ratio(ratio of currency outside the banks to broadly define money supply). Between 1970 and 1980, there was a steady decline in this ratio from 36.0 percent to 22.1 percent, showing increased patronage of the banks. The ratio rose to about 25 percent during early 1980s but started to fall again by 1984 until 1989. A remarkable change has been experienced in recent time. It has been observed that persistent and high inflation rate is harmful to economic stability and hence adversely affects economic growth and efficiency of resources. It is believed that maintaining a relatively low and stable inflation rate encourages macroeconomic stability. The continuous rise in inflation over the years, in spite of the application of monetary policy instruments such as direct and indirect monetary controls is a great concern. From the aforementioned, one may ask: to what extent have money supply, reserve requirement and interest rate impacted on inflation in Nigeria? This thought-provoking question has compelled us to focus this on the investigation of the effect of money supply, reserve requirement and interest rate on inflation control in Nigeria. The paper is organised in this order: section one is review of related literature; section two looks at model specification; section three is result presentation; section four is recommendations and conclusion.

Review Of Related Literature

Classical economists posit that changes in the general price level stem from variation in the stock of money. The stock of money is usually influenced by the monetary authority. In Fisher's famous equation, an increase in money supply creates an equal change in the price level. However, scholars have noted that money stock has effect on gross domestic product and that gross domestic product could equally affect money stock and so macroeconomic variables such as employment, consumption, inflation and so on can be controlled by money stock (Anyanwu, 1993; Okafor, 1988; Okpara, 1997). Actually, the quantity theory of money is employed by the classical economists to explain the long-run determinant of the price level and inflation rate. The rise in the overall price level brings a fall in the value of money. And so to them, the basic cause of inflation is the growth in aggregate money supply. The essence of monetary policy formulation in actual fact is focused on the determination of a maximum quantity of money that is in line with the desired target for gross

domestic growth, inflation and balance of payment stabilisation. This is the reason behind the setting of money supply growth rate and aggregate domestic credit by the monetary authority. Nevertheless, the Keynesians have the concept that a change in money supply will have influence or result to a change in interest rate and change in rate of interest leads to change in investment level, and that national income is positively affected by this change (Ojo, 2000; Okpara, 1997, 1998). Monetary policy is the key for regulation and stabilisation of an economy. In Nigeria, the tools of monetary policy have been the bedrock of influencing the direction of the economy, such as consumption, investment, export, import, among others. Mordi (2009) notes that monetary policy is a blend of measures and or set of instruments designed by the Central Bank to regulate the value, supply and cost of money consistent with the absorptive capacity of the economy or the expected level of economic activity without necessarily generating undue pressure on domestic prices and the exchange rate. Low and stable inflation has been pursued by the Central Bank. This is because of the unfavourable costs it has in the economy. So, the intention of monetary authority is aimed at counteracting undesirable distortions in macroeconomic variables. There have been controversies on the role of monetary policy based on different perspectives of economists. Mankiw (2010) commented on Martin's view that an economy is inherently unstable. This is on the ground that the economy frequently experiences shocks to aggregate demand and aggregate supply. And that unless there is application of monetary and fiscal policies to stabilise the economy, these shocks will lead to unnecessary and ineffective fluctuations in output, unemployment and inflation. Whereas Freidman sees the economy as naturally stable and opposed the intention of the policymakers to influencing the economy, so as not to harm the economy.

It is imperative to direct the economic variables if and only if a country such as Nigeria wishes to achieve economic development and growth, given that the activities of economic agents have a way of bringing about distortion and disequilibrium. The onus of regulating the economy rests on the resource managers through their specific agency. This is the reason behind the Keynesian contention that the policy makers should respond to the cyclical fluctuation in the economy so as to stabilize the economy, and that average economic well being would be increased if the governments aspire to reduce cyclical fluctuation associated with macroeconomic variables deviating from the path of positive impact. So the central problem for macroeconomic policy-makers is to take decision concerning how to manage the economy in such a way that inflation is kept under control while unemployment is also

kept to barest minimum (Abel and Bernanke, 1995; Lipsey and Chrystal, 2004).

Falawewo and Osinubi (2006) pointed that the Keynesian argue that fiscal policy is more potent than monetary policy. The monetarists led on the other hand, believe the other way round. However, monetary policy in Nigeria has been carried out through the portfolio behaviour of the CBN in terms of the control of its credit and management of reserves. Credit control is being used to check movement in domestic price level, while the exchange rate policy serves as a measure for determining the competitiveness and current account performance as well as foreign reserves. Bernanke, Gertler and Gilchrist (1996) note that the direct impacts of an alteration in the interest rate are transmitted not only through the resulting increase in the user cost of capital (the neoclassical channel of transmission), but also through the worsening of financial constraints: an increase in policy rates is reflected in larger interest payments, hence a worsening of the firm's cash flow, and in a decrease in the value of assets that could be used as collateral for new loans. This effect is experienced when the apex bank exercises its power of regulating the economy. Musgrave and Musgrave (2004) note that without stabilization, the economy tends to be subject to substantial fluctuations and may suffer from sustained periods of unemployment or inflation. However, both may exist at the same time if efforts are not put in place at the right time. The overall level of employment and prices in the economy depends upon the level of aggregate demand, relative to potential or capacity output valued at prevailing prices.

Macroeconomic instability has costs that are borne by the populace which specifically affect economic agents' income generation and living standard in different ways and broadly retard the development and growth of a developing economy. Fair (2001) studied the effectiveness of monetary policy using the multicountry econometric (MC) model of Fair (1994) to examine monetary policy effects. His findings were that the estimated rule explaining Federal Reserve behavior substantially reduces output and price variability. Similar results were obtained when the long run inflation coefficient was made greater than one, although a long run coefficient of 2.5 leads to a large interest rate variability. The optimal control results show that it is easier to lower output variability than price variability for the same size change in the interest rate. This is because the price level responds only moderately to interest rate changes. Edey (1994) notes that the cost ascribed to inflation is the price uncertainty it generates in the economy and the effects are shown on the aggregate price level and the changes associated in the relative prices. Empirical evidence tends to support the general concept that higher inflation is harmful to macroeconomic performance of countries. So the view that inflation is expensive presupposes that there exists optimal rate at which those costs are reduced and the reduction is a function of policy application. Ajisaf and Folorunso (2002) in their study of the relative effectiveness of fiscal and monetary policy in macroeconomic management employed co-integration and error correction model and found that monetary rather than fiscal

policy exerts a great impact on economic activity in Nigeria. Okwu, et al (2011) studied an empirical analysis of the effects of monetary policy innovations on stabilisation of commodity prices in Nigeria using ordinary least square method and found that positive relationship existed between the respective indicators of monetary policy innovations and indicator of commodity prices. Also, monetary policy rate had more immediate effect than broad money on consumer price index, and that commodity prices responded more to monetary policy rates than to broad money aggregates.

Model Specification

Some of the tools of stabilisation of the Nigerian economy in use by the monetary authority are reserve requirement, interest rate and money supply. In this work it is our intention to adopt the method of ordinary least square used by Okwu, et al (2011). This method is appropriate in evaluating the models formulated and it minimizes the error sum of squares and has a number of advantages such as unbiasedness, consistency, minimum variance and sufficiency; it is extensively used, straightforward and easy to understand. In our model, we are going to ascertain the effects of reserve requirement (rr), interest rate (intr) and money supply (ms) on inflation rate (inflr). The functional form of the relationship is stated thus: Inflr = f (rr, intr, ms)

That is $Inflr = a_0 + a_1 rr + a_2 intr + a_3 ms + e_t$ ---1

a_0 is the intercept; a_1 , a_2 and a_3 are the coefficients to be estimated and e_t is the stochastic error term. It is our intention to loglinearise the model. On apriori basis we expect interest rate, reserve requirement and money supply to have remarkable shock on inflation if and only if monetary policy is effectively impacting on inflation. This is because of the conception that a well regulated interest rate, reserve requirement and money supply will influence the commercial bank ability to function. This effect can result to contractionary or expansionary stimuli on the economy, depending on the direction of regulation of the instruments of stability.

Sources Of Data

The study is intended to use quarterly data from 1980 to 2010. It is the period in which various policies aimed at ensuring stabilization were made. The study focuses on instruments of monetary policy such as money supply, interest rate and reserve requirement in ascertaining the impact of stabilisation on inflation. The data for the study will be obtained from the Central Bank of Nigeria statistical bulletin of various issues.

Test For Stationarity

Unit root is a test for time series data to ascertain the stationarity of the variables Non stationary series that is has unit root suffers permanent or prolong effects from random shock that is, series follows a random walk. Non stationarity variables will produce spurious results if used in analysis: that is, result that is not valid for forecasting or prediction. If non stationary series are co integrated, the regression result is not

spurious. To fully investigate the data generating process, we first assess the time series properties of model variables using the Augmented Dickey- Fuller test (ADF).
The ADF test regression equations with constant are:

$$\Delta Y_T = \alpha_0 + Bt + \alpha_1 Y_{T-1} + \sum_{j=1}^{n} a_j \Delta Y_{T-1} + \varepsilon_T \ldots$$

where Δ is the first difference operator ε_T is random error term, n = number of lagged differences Y = the variable. In the equation, the null hypothesis holds as: Ho: $\alpha_i = 1$ (unit root), H1: $\alpha_i < 1$ (level stationary).

Table 1:UNIT ROOT TEST USING AUGUMENTED DICKEY FULLER TEST

Variables	ADF Statistics Level	Critical value	ADF Statistics Ist Difference	Critical value	Order of Integration
Inflr	-1.817152	1% -3.4861 5% -2.8857 10% -2.5795	-4.378775	1% -3.4861 5% -2.8857 10% -2.5795	I(1)
Intr	-2.100977		-5.489727		I(1)
RR	-1.216390		-3.191375		I(1)
MS	0.297697		-4.464576		I(0)

The results of table 1 above show that all the variables except MS are non-stationary in level form since their ADF statistic values are less than the critical values at 1%, 5% and 10%, the null hypothesis of no unit root is accepted for all the variables but was rejected in first difference. From our result, all the variables are stationary at first difference that is integrated of order one. E-view result is in the appendix A. The ADF test statistic absolute value for each variable is greater than the critical value at 5% . Given that the variables are integrated of the same order, this means that there is evidence of co-integration. In other words, the variables are suspected to have long-run relationships.

Johansen Test For Co-Integration

Specifically, a necessary but insufficient condition for co-integrating test is that each of the variables be integrated of the same order (Granger, 1986). It is our intention to assess the long-run relationship between inflation rate and instruments of stabilisation frequently employed by the Central Bank of Nigeria (CBN). Actually, this is a test for a linear combination of a series that is stationary or not. In other words, it is a test for joint individual co-linearity. We

want to examine the long-run co-movement of the variables. However, we need to confirm this using Johansen co-integration test. The Johansen (1988) co-integration procedure will be used to determine the number of co-integrating vectors. We chose this approach because it does not suffer from the problem of normalization and it is robust to departure from normality (Gujarati, 2003). The Johansen co-integration test is given as:

$Y_t = A_1Y_{t-1} + \ldots + A_p Y_{t-p} + BX_t + \varepsilon_T \ldots$

Where Y_t is a vector of non stationary I (1) variables; X_t is a vector of deterministic variables and ε_T is a vector of innovations.

Johansen Test Result

Sample: 1980:1 2010:4

Included observations: 119 Test assumption: Linear deterministic trend in the data

Series: INFLR INTR RR MS

Lags interval: 1 to 4

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.158536	39.11038	47.21	54.46	None
0.113681	18.56960	29.68	35.65	At most 1
0.034699	4.208922	15.41	20.04	At most 2
5.40E-05	0.006426	3.76	6.65	At most 3

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. rejects any cointegration at 5% significance level

From the result, we confirm that there is no co-integrating factor. The decision rule is that if the likelihood ratio is less than the 1% and 5% critical value, there is no co-integration, otherwise there is co-integration. Given that almost all the variables are integrated of order one, I(1), and not co-integrated, we manage the variables at the order of integration. However, in order to capture the peculiar relationship that may exist between the instruments of monetary policy and inflation, we loglinearise. The regression equation is shown thus: Log(D(INFLR(-1))) Log(D(INTR(-1))) Log(D(RR(-1))) Log(MS) C . The e-view result is in the appendix B.

Summary Of Regression Result

Variables	Coefficients	Std error	T-statistic	Probability
LOG(D(INTR(-1)))	-0.620371	0.233530	-2.656697	0.0326
LOG(D(RR(-1)))	1.074069	0.290183	3.701368	0.0076
LOG(D(MS(-1)))	-0.225456	0.187848	-1.200210	0.2691
R-squared	0.819536			
Adjusted R-squared	0.742195			
Prob(F-statistic)	0.005389			

The result shows that interest rate is inversely related to inflation rate (inflr). This implies that changes in interest rate over the years have help greatly in regulating inflation. Hence, it is obvious that impact of interest rate in controlling inflation at the period of study is statistically significant considering that the probability of 0.0326 is less than the 5 % (0.05) critical value. Reserve requirement affects the inflation rate positively as the co-efficient shows. This is contrary to expectation as we hoped that if reserve requirement is playing desirable role in combating inflation, it should significantly reduce the level of inflation rate. However, the effect of reserve requirement (rr) is statistically significant on inflation rate (inflr) at the period of study since the probability of 0.0076 is less than 5% significant level. Money supply has negative impact on inflation. The pattern of money supply regulation has contributed to reduction of inflation in Nigeria over the years. This meets the apriori expectation. The impact is not significant as the probability 0f 0.2691 is greater than the 5% level of significant. This situation can be attributed to the increase in aggregate money supply in the economy, especially during election and rising recurrent expenditure of the government on governance. This situation in Nigeria could also be attributed to the nature of the economy, the inconsistence policy, pattern of spending by the leaders over the years, poor banking habit of Nigerians and the corrupt practices of some authorities in the country. The regression line is well fitted given the value of the co-efficient and adjusted co-efficient of determination of 82% and 74% respectively. However, the overall joint effect of the variables on inflation is significant. The probability of the F-statistic of 0.005389 is less than the critical 5% value.

Other Tests To Confirm The Reliability Of The Model

Normality test using Jarque-Bera probability is 0.8051054. The probability is higher than 0.05 or 5% level of significant hence we conclude that the distribution is normally distributed. Breusch-Godfrey serial correlation LM test confirmed non serial autocorrelation in the model. This is because the probability of F-statistic which

is 0.902654 is higher than the 5% critical value. ARCH LM test for volatility in the residual indicates absence of volatility in that the probability of F-statistic is 0.915926 which is greater than the critical value at 5%. Hence, we say that there is no volatility in the model. Ramsey Reset test for model specification and stability confirmed that the model is well specified given that the probability of F-statistic of 0.189644 is higher than 5% critical value. Hence, we conclude that the model was well specified and stable. See results in appendix B.

Recommendations

In consideration of the result of our analysis, it is quite obvious that the assessed instruments of monetary policy are playing great role in stabilising the economy of Nigeria but yet to be enough to achieve and maintain the desired stability in dealing with inflation. So, to attain a desirable impact, it is imperative for the monetary authority to monitor and evaluate policies frequently. Efforts should be increased to regulate money supply through aggressive promotion of banking habits with the intention to control total liquidity in the country. Adequate supervision of banks is necessary to ensure compliance to policies and programmes. Moral suasion should be intensified to appeal to the commercial banks not to deviate from acceptable practices. Corruption in Nigeria should be practically addressed and there should not be a "sacred cow" if aggressive fight is be pursued. Financial discipline must be maintained by the three tiers of government in Nigeria. A good blend of fiscal and monetary policies should be vigorously pursued.

Conclusion

The study has shown the extent in which the selected instruments of monetary policy have gone in inflation control. Inflation rate, reserve requirement and money supply instruments are significant in controlling inflation. Efforts made by the Central Bank of Nigeria in stabilising the economy are yet to eradicate incessant inflation which retarded the living standard of the people with the associated adverse effects on the entire economy. A certain level of inflation is desirable in an economy to encourage investment, employment and resources use. But in Nigeria the economic hardship of the poor is intensified by incessant inflation. Poverty alleviation in Nigeria should include effective control of inflation and financial discipline on the part of the government. The finding of this study is in line with (Eddy 1994) that posits that uncontrolled inflation is harmful to macroeconomic variables. The degree of impact of instability is felt much by the poor who are in majority in Nigeria. So, any action that will help check instability sufficiently, such as inflation is on the right track to alleviating poverty in Nigeria.

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APPENDIX A

ADF Test Statistic	-1.817152	1% Critical Value*	-3.4861
		5% Critical Value	-2.8857
		10% Critical Value	-2.5795

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLR)
Method: Least Squares
Date: 02/13/13 Time: 10:49
Sample(adjusted): 1981:2 2010:4
Included observations: 119 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLR(-1)	-0.097377	0.053588	-1.817152	0.0718
D(INFLR(-1))	-0.539548	0.100638	-5.361252	0.0000
D(INFLR(-2))	-0.141482	0.112682	-1.255585	0.2119
D(INFLR(-3))	0.150574	0.111103	1.355274	0.1780
D(INFLR(-4))	0.089318	0.094006	0.950131	0.3441
C	2.064560	1.449393	1.424431	0.1571

R-squared	0.321351	Mean dependent var	-0.057563
Adjusted R-squared	0.291322	S.D. dependent var	10.73447
S.E. of regression	9.036598	Akaike info criterion	7.289547
Sum squared resid	9227.592	Schwarz criterion	7.429671
Log likelihood	-427.7281	F-statistic	10.70144
Durbin-Watson stat	2.026940	Prob(F-statistic)	0.000000

ADF Test Statistic	-4.378775	1% Critical Value*	-3.4865
		5% Critical Value	-2.8859
		10% Critical Value	-2.5796

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLR,2)
Method: Least Squares
Date: 02/13/13 Time: 10:51
Sample(adjusted): 1981:3 2010:4
Included observations: 118 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLR(-1))	-1.423749	0.325148	-4.378775	0.0000
D(INFLR(-1),2)	-0.195328	0.292917	-0.666837	0.5062
D(INFLR(-2),2)	-0.409629	0.245946	-1.665525	0.0986
D(INFLR(-3),2)	-0.277597	0.178308	-1.556842	0.1223
D(INFLR(-4),2)	-0.133998	0.093816	-1.428310	0.1560
C	-0.088059	0.840316	-0.104793	0.9167

R-squared	0.770452	Mean dependent var	0.069068
Adjusted R-squared	0.760204	S.D. dependent var	18.63558
S.E. of regression	9.125646	Akaike info criterion	7.309564

Sum squared resid	9327.071	Schwarz criterion	7.450446
Log likelihood	-425.2643	F-statistic	75.18302
Durbin-Watson stat	2.017091	Prob(F-statistic)	0.000000
ADF Test Statistic	-2.100977	1% Critical Value*	-3.4861
		5% Critical Value	-2.8857
		10% Critical Value	-2.5795

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTR)
Method: Least Squares
Date: 02/13/13 Time: 10:51
Sample(adjusted): 1981:2 2010:4
Included observations: 119 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTR(-1)	-0.113454	0.054001	-2.100977	0.0379
D(INTR(-1))	-0.525571	0.106096	-4.953739	0.0000
D(INTR(-2))	-0.215385	0.117028	-1.840460	0.0683
D(INTR(-3))	0.011325	0.122734	0.092271	0.9266
D(INTR(-4))	-0.077914	0.109786	-0.709689	0.4794
C	2.434204	1.143251	2.129195	0.0354

R-squared	0.291748	Mean dependent var	0.107584
Adjusted R-squared	0.260410	S.D. dependent var	3.665305
S.E. of regression	3.152142	Akaike info criterion	5.183146
Sum squared resid	1122.768	Schwarz criterion	5.323270
Log likelihood	-302.3972	F-statistic	9.309551
Durbin-Watson stat	1.893092	Prob(F-statistic)	0.000000
ADF Test Statistic	-5.489727	1% Critical Value*	-3.4865
		5% Critical Value	-2.8859
		10% Critical Value	-2.5796

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTR,2)
Method: Least Squares
Date: 02/13/13 Time: 10:52
Sample(adjusted): 1981:3 2010:4
Included observations: 118 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INTR(-1))	-2.009082	0.365971	-5.489727	0.0000
D(INTR(-1),2)	0.405413	0.337855	1.199962	0.2327
D(INTR(-2),2)	0.134930	0.293562	0.459631	0.6467
D(INTR(-3),2)	0.107196	0.215191	0.498144	0.6194
D(INTR(-4),2)	0.004141	0.112997	0.036647	0.9708
C	0.104504	0.298458	0.350146	0.7269

R-squared	0.723313	Mean dependent var	0.137648
Adjusted R-squared	0.710961	S.D. dependent var	6.001422
S.E. of regression	3.226503	Akaike info criterion	5.230184
Sum squared resid	1165.956	Schwarz criterion	5.371066
Log likelihood	-302.5809	F-statistic	58.55804
Durbin-Watson stat	1.886732	Prob(F-statistic)	0.000000

ADF Test Statistic	-1.216390	1% Critical Value*	-3.4861
		5% Critical Value	-2.8857
		10% Critical Value	-2.5795

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RR)
Method: Least Squares
Date: 02/13/13 Time: 10:53
Sample(adjusted): 1981:2 2010:4
Included observations: 119 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RR(-1)	-0.036714	0.030183	-1.216390	0.2264
D(RR(-1))	-0.540737	0.093280	-5.796914	0.0000
D(RR(-2))	-0.137312	0.105888	-1.296767	0.1974
D(RR(-3))	0.142469	0.105314	1.352810	0.1788
D(RR(-4))	0.259149	0.090822	2.853367	0.0051
C	0.113964	0.205004	0.555914	0.5794

R-squared	0.310914	Mean dependent var	-0.073950
Adjusted R-squared	0.280424	S.D. dependent var	1.271499
S.E. of regression	1.078585	Akaike info criterion	3.038282
Sum squared resid	131.4581	Schwarz criterion	3.178406
Log likelihood	-174.7778	F-statistic	10.19709
Durbin-Watson stat	2.173724	Prob(F-statistic)	0.000000

ADF Test Statistic	-3.191375	1% Critical Value*	-3.4865
		5% Critical Value	-2.8859
		10% Critical Value	-2.5796

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RR,2)
Method: Least Squares
Date: 02/13/13 Time: 10:53
Sample(adjusted): 1981:3 2010:4
Included observations: 118 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RR(-1))	-0.926083	0.290183	-3.191375	0.0018
D(RR(-1),2)	-0.720454	0.265416	-2.714435	0.0077
D(RR(-2),2)	-0.920535	0.223832	-4.112621	0.0001
D(RR(-3),2)	-0.745302	0.164951	-4.518327	0.0000
D(RR(-4),2)	-0.316759	0.089374	-3.544185	0.0006
C	-0.071113	0.097762	-0.727406	0.4685

R-squared	0.786818	Mean dependent var	-0.002542
Adjusted R-squared	0.777301	S.D. dependent var	2.190852
S.E. of regression	1.033884	Akaike info criterion	2.954031
Sum squared resid	119.7186	Schwarz criterion	3.094914
Log likelihood	-168.2879	F-statistic	82.67476
Durbin-Watson stat	2.171926	Prob(F-statistic)	0.000000

ADF Test Statistic	0.297697	1% Critical Value*	-3.4861
		5% Critical Value	-2.8857
		10% Critical Value	-2.5795

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MS)
Method: Least Squares
Date: 02/13/13 Time: 10:54
Sample(adjusted): 1981:2 2010:4
Included observations: 119 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MS(-1)	0.009421	0.031645	0.297697	0.7665
D(MS(-1))	-0.320655	0.128307	-2.499123	0.0139
D(MS(-2))	-0.400379	0.138998	-2.880474	0.0048
D(MS(-3))	-0.475197	0.169091	-2.810310	0.0058
D(MS(-4))	0.226789	0.171141	1.325161	0.1878
C	57992.01	50950.44	1.138204	0.2574
R-squared	0.213450	Mean dependent var		46733.28
Adjusted R-squared	0.178647	S.D. dependent var		514936.9
S.E. of regression	466679.8	Akaike info criterion		28.99378
Sum squared resid	2.46E+13	Schwarz criterion		29.13390
Log likelihood	-1719.130	F-statistic		6.133064
Durbin-Watson stat	1.677357	Prob(F-statistic)		0.000046
ADF Test Statistic	-4.464576	1% Critical Value*		-3.4865
		5% Critical Value		-2.8859
		10% Critical Value		-2.5796

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MS,2)
Method: Least Squares
Date: 02/13/13 Time: 10:55
Sample(adjusted): 1981:3 2010:4
Included observations: 118 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MS(-1))	-1.948352	0.436402	-4.464576	0.0000
D(MS(-1),2)	0.636534	0.483564	1.316341	0.1907
D(MS(-2),2)	0.240377	0.425809	0.564520	0.5735
D(MS(-3),2)	-0.222864	0.333114	-0.669031	0.5049
D(MS(-4),2)	0.012980	0.209537	0.061945	0.9507
C	67055.83	46869.44	1.430694	0.1553
R-squared	0.570154	Mean dependent var		35409.81
Adjusted R-squared	0.550965	S.D. dependent var		699735.3
S.E. of regression	468893.2	Akaike info criterion		29.00365
Sum squared resid	2.46E+13	Schwarz criterion		29.14453
Log likelihood	-1705.215	F-statistic		29.71173
Durbin-Watson stat	1.672316	Prob(F-statistic)		0.000000

APPENDIX B

Dependent Variable: LOG(D(INFLR(-1)))
Method: Least Squares
Date: 02/13/13 Time: 14:48
Sample(adjusted): 1985:1 2006:1

Included observations: 11
Excluded observations: 74 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(D(INTR(-1)))	-0.620371	0.233530	-2.656497	0.0326
LOG(D(RR(-1)))	1.074069	0.290182	3.701368	0.0076
LOG(MS)	-0.225456	0.187848	-1.200210	0.2691
C	4.428145	2.168035	2.042470	0.0804

R-squared	0.819536	Mean dependent var	1.289179
Adjusted R-squared	0.742195	S.D. dependent var	1.654927
S.E. of regression	0.840281	Akaike info criterion	2.765127
Sum squared resid	4.942505	Schwarz criterion	2.909816
Log likelihood	-11.20820	F-statistic	10.59633
Durbin-Watson stat	0.272661	Prob(F-statistic)	0.005389

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.104543	Probability	0.902654
Obs*R-squared	0.441524	Probability	0.801908

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 02/13/13 Time: 14:40
Presample and interior missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(D(INTR(-1)))	0.006965	0.272738	0.025537	0.9806
LOG(D(RR(-1)))	-0.003633	0.341467	-0.010641	0.9919
LOG(MS)	0.004363	0.219954	0.019836	0.9849
C	-0.077504	2.573578	-0.030115	0.9771
RESID(-1)	0.666232	1.556408	0.428057	0.6864
RESID(-2)	0.463586	6.072564	0.076341	0.9421

R-squared	0.040139	Mean dependent var	5.85E-16
Adjusted R-squared	-0.919723	S.D. dependent var	0.703030
S.E. of regression	0.974076	Akaike info criterion	3.087797
Sum squared resid	4.744120	Schwarz criterion	3.304831
Log likelihood	-10.98288	F-statistic	0.041817
Durbin-Watson stat	0.499339	Prob(F-statistic)	0.998321

ARCH Test:

F-statistic	0.014238	Probability	0.915925
Obs*R-squared	0.028274	Probability	0.866465

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 02/13/13 Time: 14:41
Sample(adjusted): 1988:3 1992:4
Included observations: 4
Excluded observations: 14 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.189026	0.105912	1.784748	0.2162
RESID^2(-1)	-0.082734	0.693365	-0.119322	0.9159

R-squared	0.007069	Mean dependent var	0.179668
Adjusted R-squared	-0.489397	S.D. dependent var	0.116651

S.E. of regression	0.142362	Akaike info criterion	-0.754032
Sum squared resid	0.040534	Schwarz criterion	-1.060885
Log likelihood	3.508064	F-statistic	0.014238
Durbin-Watson stat	0.788726	Prob(F-statistic)	0.915925

Ramsey RESET Test:

F-statistic	2.187221	Probability	0.189644
Log likelihood ratio	3.418966	Probability	0.064451

Test Equation:
Dependent Variable: LOG(D(INFLR(-1)))
Method: Least Squares
Date: 02/13/13 Time: 14:42
Sample: 1985:1 2006:1
Included observations: 11
Excluded observations: 74

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(D(INTR(-1)))	-0.881018	0.278727	-3.160864	0.0195
LOG(D(RR(-1)))	1.491452	0.389414	3.829992	0.0087
LOG(MS)	-0.287309	0.178659	-1.608146	0.1589
C	5.960008	2.256468	2.641300	0.0385
FITTED^2	-0.161064	0.108906	-1.478926	0.1896

R-squared	0.867747	Mean dependent var	1.289179
Adjusted R-squared	0.779579	S.D. dependent var	1.654927
S.E. of regression	0.776972	Akaike info criterion	2.636130
Sum squared resid	3.622112	Schwarz criterion	2.816991
Log likelihood	-9.498714	F-statistic	9.841929
Durbin-Watson stat	0.765130	Prob(F-statistic)	0.008335