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Full Length Research Paper

Introduction of higher currency notes in Nigeria and the dynamics of inflation (1980-2014)

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ABSTRACT

The dynamics of inflationary trends, which has been a macroeconomic concern in Nigeria over the last decade, is considered to be very hazardous to the aggregate economic activity of any country. In order to determine the practical effect of higher currency note introduction on the Nigerian economy, an empirical investigation on the casualty between inflation, currency denomination, fiscal deficit and broad money supply was carried out using the Vector Error Correction Model (VECM) and the Vector Autoregressive (VAR) Model (Forecast Variance and Impulse Response) model. Time series data of 1980 to 2014 were employed and the results confirm that in the long run there is a relationship between inflation, currency denomination, fiscal deficit and broad money supply. The Cholesky ordering (currency denomination, inflation, fiscal deficit and broad money supply) is used in the VAR estimates, which indicates that the shocks in currency denomination affect the other variables and result to inflation. It is therefore recommended that the Nigerian government should implement inflation management policies and also ensure that lower currency notes in circulation are more than higher currency notes in circulation.

Keywords: Inflation, Currency Denomination, Fiscal Deficit, Broad Money Supply

Background of the Study

Introducing a new currency or a higher currency note in a country is a form of currency redenomination, which can also be in the form of changing the number of zero's attached to a given currency. Currency redenomination over the years has been observed to be a tool in the hands of the government in developing countries and is mostly used to reassert monetary sovereignty. The introduction of a higher note may be relevant to the economy, but it has its own trouble of loss, forgery and inflation (Chukwu, 2010). The Monetarist school of thought believes instability in the economy is as a result of monetary and fiscal policies adopted by the government of a country. Their main argument is that money has a direct impact on the economy; hence the most important regulatory instrument (Afolabi, 1999). The Monetarist emphasizes the fact that inflation can be controlled by controlling money supply.

There is no economy in the world that has been spared by the effects of inflation, thus it remains one of the pervasive and persistent world problem (Ojonye, 2015); with developing countries now generally suffering from rapid inflation than industrialized ones (Killick, 2008). High inflation disrupts steady growth and results into social unrest in developing countries (Leubddorf, 2014).

Specifically, over the past few years, inflation in Nigeria has been fluctuating and all measures taken by the government in combating it has proved to be ineffective (Olusoji et al., 2011). The trends of higher currency denominations in Nigeria, according to Chukwu (2010) has only testified to the fact that the Naira has continuously depreciated against the values of the Dollars, Pounds and that of other advanced capitalist economies. Olusoji et al (2011) further noted that this might be due to the fact that the government has failed to understand the dynamics of inflation and its correlates in Nigeria. Nigeria has introduced higher currency denominations six times till date, yet the relationship between inflation and higher currency introduction has received little attention.

According to Odior and Shodeinde (2013), Nigeria has experienced the introduction and circulation of different units of currency in response to two factors – the prevailing political as well as economic conditions. However the former appears to have always weighed heavier. However, Egbuna and Obikili (2013) argued that the introduction of a higher denomination, such as the proposed N5,000 note, will accentuate inflationary trends and be counter-productive to the Central Bank's drive to reduce inflation. The continuous fluctuations in inflation despite the fiscal and monetary policies put in place call for this study, in order to provoke some thoughts and solutions to the trends of inflation in Nigeria by examining the possible effects of the introduction of higher currency notes. Higher currency note introduction in Nigeria has led to the removal of smaller units, resulting in goods having to be rounded off to the nearest naira note since the 50 kobo, N1 and other lower denominations have been done away with. The objective of this study is therefore to empirically study and critically analyze if the introduction of higher currency notes is highly inflationary to the Nigerian economy. Is there any significant relationship between higher currency note introduction and inflation?.

Literature Review

The relationship between inflation and money supply has been found in Bamidele and Joseph (2014) to be strongly correlated in the Nigerian context. Likewise but employing the quasi-experimental research design approach, Bakare (2011) examined the determinants of money supply growth on inflation in Nigeria and the result indicates the existence of a positive relationship between both variables (Anfofum et al., 2015). From another perspective, the introduction of higher denomination banknotes was found not to lead to higher inflation in Nigeria in Egbuna and Obikili (2013); Franses (2006); Pollan (2002); Mosley (2003). However, Folorunso and Abiola (2000), using the Cointegration and Error Correction Mechanism in examining the long-run causative factors of inflation in Nigeria from 1970 to 1998, established that in the long run, inflation trends in Nigeria have been determined by exchange rate, money supply, income and fiscal deficit. In addition, Olusoji et al. (2011) studying currency denomination and inflation dynamics in Nigeria from the period of 1970 – 2006, using Vector Autoregressive model (VAR), establish that the relationship between inflation, currency denomination and fiscal deficit are largely positive.

According to Jhingan (2008) money was considered as the cause of demand - pull inflation, which is price rise resulting from too much money chasing few goods or the supply of goods being less than the demand for such goods. Therefore an increase in money supply will directly influence GDP because the excess will be spent and GNP will increase given steady or predictable money velocity. Phillip David Cagan was one of the contributors to the monetarist theory and according to Thomas (2013), Cagan's study provided important evidence that, during periods of hyperinflation, changes in real balances are mainly due to changes in the expected rate of inflation. Therefore, as Thomas further puts it, government allows hyperinflation to happen when they print more money to serves as a major source of raising revenue. However, Adenuga et al. (2012), employing the Ordinary Least Square method on their study on inflation, money growth and money supply, saw that inflation is not purely a monetary phenomenon.

The Nigerian currency

The monetary system criterion classifies money into: i) Metallic money, ii) Paper money and iii) Credit money; however this study focused on the paper money. The evolution of paper money can be traced back to the goldsmiths who issued receipts to the gold depositors with an assurance of returning the gold on demand. The receipts issued were substituted for money and backed up by the gold deposited. This led to the developments of bank notes in the world economy. During and after the First World War the convertibility of bank notes into gold became unnecessary because of the continuous increase in the prices of the gold.

The history of the Nigerian currency can be dated back to the activities of the West African Currency Board. The Board was responsible for the issuing of currency notes in Nigeria from 1912 to 1959. In 1959, the Central Bank of Nigeria was established as the apex regulatory authority in the money market and it took over this responsibility. The Central Bank of Nigeria (CBN) introduced the Naira note on the 1st of January 1973 to replace the Pound. Since then, various denominations of the naira note have been introduced. The twenty naira note was introduced in 1997 due to income growth,

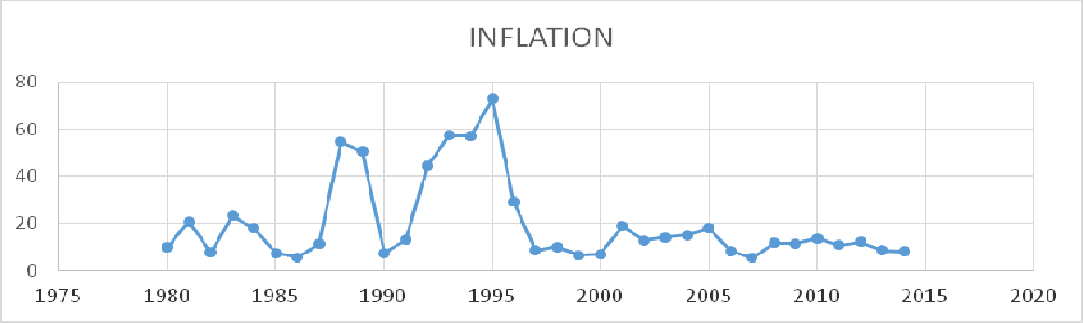

Figure 1. Trends of Inflation in Nigeria (1980-2014)
Source: CBN Statistical Bulletin and World Indicators

hence was necessary to ensure that transactions between persons are effective and convenient. In order to facilitate an efficient payment system as a result of the expansion in the Nigerian economy experienced over time, the N50 note was introduced in 1991, followed by the N100 in 1999, N200 note in 2000, N500 in 2002 and the N1000 note in 2005.

The introduction of the higher currency denomination, according to Chukwu (2010), can be defended based on the fact that it serves as one of the indices for measuring the level of growth in a developing economy. It is anticipated that the introduction of a higher currency into the economy will facilitate efficiency in the payments of goods and services (Abdulrasheed, 2001), though the public interprets the introduction as an over- issuance of currencies. Nevertheless, according to Abdulrasheed (2001), over the years experience has shown that where a few currency notes are introduced the result is inflation. This was experienced at the introduction of the N50 and the N100 notes, as wealthy people spent more which led to an increase in the monetary base.

Inflation

Inflation is a macroeconomic variable that is consistent in the world with optimal level being from 3-4%. It is a familiar word in economics that has plunged countries into long periods of instability. According to Oner (2012) inflation measures how much more expensive a set of goods and services has become over a certain period, usually a year, however, inflation should not necessary been seen as an increase in price because at times, fluctuation in prices could be as a result of sellers wanting to make extra margin or of shortfalls in supply resulting from changes in seasonal factors. Inflation can be said to be the overall increase in the cost of living in a country. Generally, inflation is said to occur when the general prices of goods and services are continuous and persistent overtime. In Nigeria, the rate of inflation is measured using the Consumer Price Index.

Nature and trend of inflation in Nigeria

According to Shuaib et al. (2015) inflation would have been ignored if not for the fact that it has some cost associated with it, which is a great concern to the government of both the developed and developing countries. Inflation has consistently been rising in Nigeria and as discussed in Shuaib, et al (2015), the inflationary pressure has futher been aggrevated by high demand for import of both intermediate inputs and consumer goods. Figure 1.

From the figure above and within the study period of 1980-2014, Nigeria experienced the lowest rate of inflation in 2007 and it was 5.4%, followed by 6.6% in year 1999. Year 2000 and 2001 saw a high rate of 6.9% and 18.9% respectively and with a respective growth rate of 4.5% and 173.9%. However the rate reduced to 12.9% in 2002 but rose again in 2003 and 2004 to 14% and 15% inflation rate respectively. At the introduction of the 1000 naira note in 2005, the rate added a growth of 19.3% and rose to 17.9%, but in 2006 a dratic redution of 54.2% was observed, as a result fell to 8.2%. As a result of the global finacial crises, a more than double turnaround of 114.8% was seen in year 2008 and the rate rose to 11.6%. In subsequent years, a rise was also seen in 2010 and 2012, but in 2009, 2011, 2013 and 2014, there was a fall.

Nigeria recorded the highest inflation rate in 2014 and according to Odittah (2015), from the analysis of the figures released by the National Bureau of Statistics (NBS) all through 2014 for ten consecutive months, the rate of inflation emained high at 7.7% which was the lowest to an all time 8.5% just before the year ended.

Causes of inflation in Nigeria

As cited in Nwachukwu, Dibie and Ogudo (2014), Emina (2006) associated inflation with the economic retardation, social and political unrest in less developed countries such as Nigeria (p. 74). Inflation has been a problem in Nigeria since the 1970s and this has resulted in all sorts

of disequlibria in the economy (Odiba et al., 2013). Causes of inflation in nigeria includes:

Government expenditure

As shown in Nwachukwu et al. (2014) government expenditure is positively associated with price inflation. One of the facors that contribute to the large Nigerian government expenditure is her external and domestic debt. Nigeria's external debt as at December 2014 is valued at $10 billion and domestic debt at $50 million.

Sharp depreciation of the naira

Currency depreciation is evident in countries with a floating exchange rate regime. It is the reduction in value of a currency against a foreign one. For example if the naira is quoted at $1: N154.00 and thereis a 10% depreciation of the naira, the new exchange rate will be quoted at $1: N171.6. Nigeria is highly depended on imported goods, hence exposed to high inflate rate whenever the naira depreciates. This is because imported goods become more expensive resulting in cost push inflation.

Global economic crises

As a result of its over dependence on crude oil for foreign exchange, Nigeria is exposed to economic crises through which other sectors are affected. For instance (as seen in figure 1), the effect of the global financial meltdown rose the Nigerian inflation rate from 5.4% in 2007 to 11.5% in 2008 and remained at double digits till 2013 before it returend back to a single digit.

Fiscal deficit

When the government increases its spending and reduces its taxes or borrowings, a fiscal deficit could occur. Fiscal deficit is the gap between the revenue and expenditure of any government. Fiscal defects can be financed either by printing more money, borrowing form the public, borrowing from the banking system, taxation and loans and grants. However the repercussions of deficits usually depend on how they are financed and if they are invested into productive activities (Ojong et al., 2012). The economic consequences of financing large deficit include inflation, deteriotaion in the economic growth, devaluation of the currency and so much more. For example financing of deficit through public borrowing will lead to an increase in interest rates, financing through printing of more money will affect the supply of money, resulting in inflation. According to Tahir and Muhammad (2010) there is a conventional believe that continuous high deficits contribute to rise in inflation. This was established in Vieira (2000) with a study on six major European countries for a period of 45 years. Deficits in Nigeria are largely financed by the CBN which is very inimical to the performance of macroeconomic variables of the economy (Wosowei, 2013).

Money supply

The definition of money supply is based on the level of financial development of the economy (Odiba et al, 2013), hence referred to the stock of money in an economy (Ashamu, 2007). Owolabi and Adegbite (2014) defined it as the amount of specified money within an economy available for the purchase of products and services. It could be narrow or broad. The broad money supply definition used in this study, can be describe as the currency in circulation, demand deposits, quasi money and foreign currency deposits. Money supply is considered an important instrument for monitoring inflation (Owolabi and Adegbite, 2014) and monetary policy is one of the macroeconomic instruments used in the management of money supply in an economy (Ayanwu and Kalu, 2014).

In Nigeria, the CBN controls money supply through the base money (currency and coins outside the banking system and deposits of banks with the Central Bank). When there is too much money in circulation with rising prices, the base money is reduced by pursuing a Contractionary Monetary Policy through the sale of financial securities to deposit money banks and non-banking institutions in order to level out their ability to create money or an increase in their cash reserve deposits. On the other hand, the Expansionary Monetary Policy is employed to increase the supply of money in the economy through an increase in money credit making the government increase its expenditure (CBN, 2006).

METHODOLOGY AND METHODS

Model specification

In order to account for the behavior of inflation and the demand of money, this study employed the Phillip Cagan model. Assuming the velocity of money is increasing in the nominal interest rate, Cagan's model consists of two equations with one explaining individuals' demand for money and the other, the evolution of inflation expectations over time. According to Edmund (2007), Cagan was interested in finding out if the momentum effects in the dynamics of inflation could increase inflation that originally gets started because of a government

decision to monetize a fiscal deficit (that is financing of deficit by printing money). This model was thus modified to explain the effects of currency denomination, money supply and fiscal deficit on the dynamics of inflation in Nigeria.

According to the money demand function:

$(M_t - Pt)^d = y_{0+} y_t - ά\ E_t\ \pi_{t+1} + U_t$ ……..…… (1)

Where:

M and P denotes the natural logarithm of nominal money balances and price level respectively;

y 0, y and ά are structural parameters (with ά > 0);

$E_t\ \pi_{t+1}$ is the mathematical expectation of the rate of inflation based on the information available at time t.

On differencing equation (1) and equating the desired cash balances:

$\mu_t - \pi_t = y - ά\ E_t\ \pi_{t+1} + ά\ E_{t-1}\ \pi_t + \Pi_t$ ..... (2)

Where:

$\mu_t = M_t - M_{t-1,}$ which is the growth of the rate of money supply

$\pi_t = P_t - P_{t-1,}$ which is the current rate of inflation

However, in Nigeria, there is a certain degree of the causative factors of inflation as evidenced by the studies of Iya and Aminu (2014); Fatukasi (2005). Majority of the studies concluded that inflation is caused by excess domestic demand and income growth which were factored by expansionary and fiscal monetary policies. Therefore modifying equation 2 to incorporate the influence of higher currency note on the dynamics of inflation, the final estimated model for this study as solved in Olusoji et al. (2011) is

$\pi_t = ά\ \pi_{t-1} + \beta\ \mu_t + \delta\ CD_t + \psi\ FD_t + U_t$ ..... (3)

Where

π = Inflation

μ = Measure of money represented by broad money supply

CD = Currency denomination denoted by a dummy variable

FD = Fiscal deficit

ά, β, δ, and ψ = the coefficients

U = the disturbance term

t = the time (1, 2, 3……n)

In equation (3) above

- Inflation (π) is a function of higher currency denomination (CD), fiscal deficit (FD) and broad money supply (μ).
- Inflation is theorised to depend positively on money supply and fiscal deficit.
- Changes in currency denomination is represented by a dummy variable; taking the value of 1 when there is an introduction of new currency and 0 when there is no introduction. The introduction of a new currency is being used to measure the price level changes because there is an argument that when actual prices increase, one has to pay more for any given quantity of goods so the customer issues larger checks and switches from a lower denomination to higher currency denomination. Therefore changes in the average denomination of currency can be used to measure changes in price level, although as will be indicated this simple argument can be deceptive.

Data collection

The specified model above was estimated using time series annually data on the Nigerian economy covering 1980 – 2014. Specifically, data relating to inflation, money supply, fiscal deficit, currency denomination were obtained from the CBN's Statistical Bulletin and World Indicators. The use of quarterly data would have been more resourceful but they were not available for fiscal deficit. Secondary data from the Central Bank of Nigeria CBN) statistical bulletin and National Bureau of Statistic's 'Annual Abstract of Statistics' was also used.

Data analysis

Most times, time series data are non- stationary and using non- stationary variables in a model could lead to retrogression (Olusoji et al., 2011). Economic inferences have been carried out based on the use of the Augmented Dickey Fuller test (ADF) to check for the stationarity of the variables, the Vector Error Correction Model (VECM) to check for the rate at which the short run variables will correct itself in relation to an unexpected shock and the Vector Autoregressive (VAR) model to analyze the effect of variables' shocks on the system.

The VAR model is known to be one of the most successful, flexible and simple to use model for the analysis of multivariate time series (Anfofum et al., 2015) and the existence of a high interdependence between policy variables and economic indicators such as inflation and money supply suggest the use of the VAR model (Olusoji et al., 2011). The Forecast Error Variance Decomposition (FEVD) and the Impulse Responses Analysis from the estimated VAR models were used to examine the effects of currency denomination shocks on inflation rate. The FEVD accesses the contribution of each shock of variable to the current case while the Impulse Response shows the dynamics of the variables looking at the reaction of each variable to a specific shock at time t.

The Error Correction Mechanism is measured using the residual from the long run model and it indicates the measure of the rapid adjustment of the short run relation to unexpected shocks. The Vector Error Correction Mechanism, which incorporates both the long run and short run effect, was used to examine the long run effect of currency denomination, fiscal deficit and money supply on inflation. According to Akinbobola (2012) the VECM model brings about efficient results most especially when

Table 1. Descriptive Statistics of the Variables (using E-views 7)

Statistics	Broad money supply *(billion naira)*	Fiscal deficit *(billion naira)*	Inflation rate *(%)*
Mean	12.95085	-265609.0	19.74257
Median	12.93188	-65157.70	12.22
Maximum	16.68797	32049.4	72.84
Minimum	9.380927	-1158519	5.38
Std. Dev	2.437241	406284.7	17.92022
Observations	35	35	35

Source: Researcher's Computation (2016)

Table 2. Unit Root Test for Stationarity at Level (using E-views 7)

Variable			ADF Test Statistics	Critical Values	
				1%	5%
INFL	I(0)	LEVELS	-3.418545	-4.262735	-3.552973
	I (1)	1ST DIFFERENCE	-5.747240	-4.273277	-3.557759
LM2	I(0)	LEVELS	-3.177424	-4.262735	-3.552973
	I (1)	1ST DIFFERENCE	-3.184916	-4.262735	-3.552973
	I (2)	2ND DIFFERENCE	-7.196608	-4.273277	-3.557759
Fiscal Deficit	I(0)	LEVELS	-1.919813	-4.262735	-3.552973
	I (1)	1ST DIFFERENCE	-7.307280	-4.273277	-3.557759
Currency Denomination	I(0)	LEVELS	-4.103078	-4.252879	-3.548490
	I (1)	1^{ST} DIFFERENCE	-5.533289	-4.284580	-3.562882

Source: Researcher's Computation (2016)

the variables are non-stationary and cointegrated compared to the use of the Ordinary Least Square estimates. This study employs the use of Johansen (1980) reducing rank procedures to allow for easier correction of serial correlation. This procedure is also very useful because it can detect Cointegration vectors in non- stationary time series.

Presentation of Result

Descriptive analysis

From table 1, inflation rate from 1980 to 2014 was found to average at 19.74% and ranges from 5.38% to 72.84% with a standard deviation of 17.92%. Broad money supply averages at 12.95085 billion naira, ranges from 16.68797 billion naira to 9.380927 billion naira and has a standard deviation of 473.68 billion naira. Lastly, fiscal deficit averages at a deficit of 273.36 billion naira, ranges from a deficit of 115.85 billion naira to a surplus of 320.49 billion naira and a standard deviation of 473.69 billion naira.

Unit root test

To prevent spurious regressions the unit root test for the stationarity of the variables was carried out and the Augmented Dickey- Fuller (ADF) was employed.

It is clearly shown in table 2 above that the only variable stationary at 5% significance level, before the first difference is the currency denomination. The stationarity of inflation and fiscal deficit were established at the first difference, while that of broad money supply was at second difference; implying the possibility of determining the presence of relevant co-integrating relationships among the time series data.

Cointegration test

Result in table 3 shows that both the Trace test and Max-Eigen test are statistically significant to reject the null hypothesis of r = 0 at 5% significance level. The Trace test and Max – Eigen test statistics indicates 1 cointegrating equation both at the 0.05 level. This implies that there is a cointegration among the variables, thus suggesting the existence of a long run equilibrium relationship.

The normalized cointegrating coefficients can thus be expressed explicitly as follows:

INFL = -876.6610 CURRDENO + 0.003937 LFD - 0.000308 LM2

[5.401697] [8.034694] [7.162791]

The result shows a positive relationship between fiscal deficit and inflation, meaning, a unit increase in fiscal

Table 3. Test for Cointegration among Series (using E-views 7)

Hypothesized No. of CE (s)	Eigenvalue	Trace statistics	0.05 Critical value	Prob. **	Max- Eigen Statistics	0.05 Critical Value	Prob. **
None*	0.751305	70.75214	47.85613	0.0001	45.92043	27.58434	0.0001
At most 1	0.313156	25.83171	29.79707	0.1338	12.39637	21.13162	0.5090
At most 2	0.242582	13.43535	15.49471	0.0998	9.168721	14.26460	0.2724
At most 3	0.121282	4.266626	3.841466	0.0389	4.266626	3.841466	0.00389

*denotes statistical significance at 5% ** MacKinnon–Haug–Michelis (1999) p values
Source: Researcher's Computation (2016)

Table 4. Normalized Cointegration Coefficients (using E-views 7)

1 Co-integrating Equation(s) : Log Likelihood -1045.868			
Normalized cointegrating coefficients (standard error in parentheses)			
INFL	**CURRDENO**	**FD**	**LM2**
1.000000	-876.6610 (162.849) [5.401697]	0.003937 (0.00049) [8.034694]	-0.000308 (4.3E-05) [7.162791]

At 5% significance
Source: Researcher's Computation (2016)

Table 5. Vector Error Correction Model (using E-views 7)

VARIABLE	INFL	CURRDENO	LFD	LM2
ECM (-1)	-0.768519	0.003003	-0.019055	0.0005551
Standard Error	0.32514	0.00894	0.02979	0.00267
t – statistics	-2.36369	0.33602	-0.63961	0.20603

Source: Researcher's Computation (2016)

deficit will lead to a rise of 0.003937 in inflation. However a negative significant relationship between currency denomination (CURRDENO) and inflation (INFL) was found, same with broad money supply (LM2) and inflation; suggesting that any increase in currency denomination and broad money supply will lead to 876.6610 and 0.000308 drop in inflation respectively.

Vector error correction model (VECM)

Since the model contains cointegration relationship among variables, we can proceed to test the VECM. To consider the result of the VECM as significant, the ECM value for inflation must have a negative value and must be between zero and one. A positive value implies that the VECM is not reasonable.

Table 5 reveal that the Error Correction Model of the dependent variable (INFL), estimated as approximately -0.77, is statistically significant with a negative sign and lying between zero and one. This indicates that the current run errors of the system will be corrected at the rate of 77% in the long run.

Vector autoregressive (VAR) framework

The cholesky decomposition technique was used in the ordering of the variables and the following ordering was established: currency denomination, fiscal deficit, broad money supply and inflation. This implies that currency denomination is not affected by the shocks to fiscal deficit, broad money supply and inflation but the shocks of currency denomination affects the other three variables. In addition, currency denomination is transmitted to inflation through fiscal deficit and broad money supply.

Impulse response functions

The impulse response graph, in Figure 2 below shows the response of inflation to a one standard deviation shock in currency denomination, fiscal deficit and money supply. A positive shock to currency denomination was found but having a negative to positive and negative influence (increasing and fading) on inflation throughout the ten periods. Similarly, a positive shock in fiscal deficit

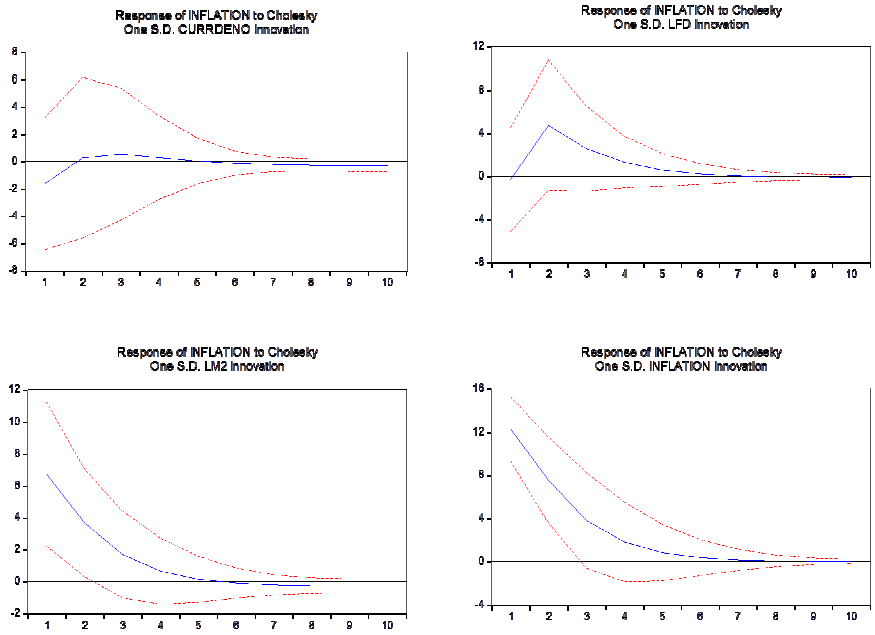

Figure 2. Response Impulse of Inflation
Source: Researcher's Computation (2016)

Table 6. Variance Decomposition of Inflation Rate (using E-views 7)

Period	S.E.	INFLATION	CURRDENO	LFD	LM2
1	14.13193	75.81345	1.332518	0.043170	22.81086
2	17.12121	71.22384	0.934078	7.655453	20.18663
3	17.82576	70.33992	0.960560	9.161811	19.53771
4	17.98427	70.15742	0.972382	9.542336	19.32786
5	18.01496	70.14179	0.969947	9.620160	19.26810
6	18.02111	70.13956	0.972905	9.629495	19.25804
7	18.02430	70.12426	0.984527	9.626831	19.26438
8	18.02793	70.09834	1.002124	9.623268	19.27627
9	18.03209	70.06675	1.022942	9.620223	19.29008
10	18.03654	70.03256	1.045308	9.617560	19.30457

Cholesky Ordering: CURRDENO LFD LM2 INFL
Source: Researcher's Computation (2016)

has a positive impact on inflation rate (both increasing and decreasing), a positive shock in broad money supply has a positive then a negative influence on inflation rate (both increasing and fading) and response of inflation to itself has a positive influence (both increasing and declining).

Forecast error variance decomposition

In table 6 below, the variance decomposition of INFL-inflation rate ranged from 70.3% to 75.8% over the ten period horizons, while the innovation of CURRDENO-currency denomination, accounting for the forecast error variance of inflation ranges from 0.93% to 1.33%. This indicates that the continuous fluctuations of past inflation rate shocks, after 10 periods of the shocks, explains over 70% of the variation in the current inflation rate while currency denomination accounts for over 1%. Similarly, the variance decomposition of LM2- Broad Money Supply and LFD- Fiscal Deficit ranges from 19.27% to 22.8% and 0.043% to 9.63% respectively. Both can be concluded to have contributed to inflation by 19.3% and 9.62% at the end of the ten period horizons. In conclusion, currency denomination shocks after 10 periods affect both broad money and fiscal deficit by 19.3% and 9.62% respectively, and resulting into a 70.03% impact on inflation. This signifies the introduction

of a higher currency note having a significant impact on inflation.

DISCUSSION OF RESULTS

The specified model for the study considered inflation as a function of higher currency denomination, fiscal deficit and broad money supply. Applying the Cointegration test and Vector Autoregressive Model on an annual data series for fiscal deficit and broad money supply for the period of 1980-2014, the normalised Cointegration result shows the existence of a significant relationship between the introduction of higher currency notes and inflation. Whereas the Cointegration test result indicates the existence of one cointegration equation, the Johansen Cointegration technique shows the existence of a negative and significant relationship between currency denomination and broad money supply in the long run while that of fiscal deficit with inflation was positive. The VECM was introduced to reconcile the short run disequilibrium and a value of 77 % was found, which implies that 77% of errors in the short run were corrected in the long run.

The Cholesky ordering (curredeno, fiscal deficit, broad money supply and inflation) indicates that currency denomination is not affected by the shocks from fiscal deficit, broad money supply and inflation. Rather the shock from currency denomination leads to inflation through fiscal deficit and broad money supply. Findings from the impulse response show that a positive shock to currency denomination has a positive and negative influence on inflation (both rising and declining) within the ten periods, whereas for fiscal deficit, the positive shock has a positive impact on inflation rate (both increasing and decreasing). Similarly, a positive shock in broad money supply has a positive then a negative influence on inflation rate (both increasing and fading) all through the ten periods but, response of inflation to itself has a positive influence (both increasing and declining). Over the ten period horizons, inflation shocks variation ranges from 70.3% to 75.8%, while that of higher currency introduction (which accounts for the forecast error variance of inflation) ranges from 0.93% to 1.33%. Specifically, the continuous fluctuations of past inflation rate shocks after 10 periods of the shocks explain 70.03% of the variation in the current inflation rate, while currency denomination accounts for 1.05%. Similarly, shock variation of broad money supply ranges from 19.27% to 22.8% and that of fiscal deficit ranges from 0.043% to 9.63% with both contributing, respectively, 19.3% and 9.62% to the current inflation rate.

In summary the most significant determinant of the dynamics of inflation in Nigeria is the shock variation of broad money supply, followed by that of fiscal deficit. Both contribute, in prices, 19.3% and 9.627% respectively to the current fluctuations in inflation while inflation shock and that of currency denomination explains 70.03% and 1.05% respectively.

CONCLUSION AND RECOMMENDATION

CONCLUSION

The introduction of a higher currency notes into the Nigeria economy was found to bring about an increase in inflation in Nigeria. Specifically, currency denomination and broad money supply each negatively and significantly affects inflation while that of fiscal deficit is positive. However both the fiscal deficit and broad money supply were found to be the most significant determinant of the dynamics of inflation in Nigeria. This indicates that a high fiscal deficit as well as a decrease in money supply will lead to a very responsive increase in the rate of inflation in Nigeria. Therefore careful selection and combination of inflation management policies could be used to reduce inflation rate in Nigeria.

RECOMMENDATION

Recommendations based on the results include the following:

1. The results clearly indicated that monetary and fiscal policies affect inflation rate, therefore rapt attention should be paid to monetary and fiscal policies. The policies introduced during inflation can be tracked by changes in past shocks in, broad money supply, fiscal deficit and currency denomination. There is a need to take note of lag effects in the design of monetary and fiscal policies so that the policy targets can be monitored easily.
2. It can deduced from the findings that when the 100 naira note was introduced inflation was lower compared to the time of the 500 naira note introduction, which was more than double the rate in 2001, therefore in order to control or reduce inflation it is advisable that lower currency denominations in circulation should be more than the higher currency denomination in circulation which is operated by some advanced countries like U.S.A , where the 100 dollar bill is the highest currency note in circulation.

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Appendixes

Appendix I. Time Series Data for all Variables

YEAR	INFLATION	M2	FD	CURRDENO
1980	9.97	11,860.00	-1,975.20	0
1981	20.81	14,471.17	-3,902.10	0
1982	7.7	15,786.74	-6,104.10	0
1983	23.21	17,687.93	-3,364.50	0
1984	17.82	20,105.94	-2,660.40	0
1985	7.44	22,299.24	-3,039.70	0
1986	5.72	23,806.40	-8,254.30	0
1987	11.29	27,573.58	-5,889.70	0
1988	54.51	38,356.80	-12,160.90	0
1989	50.47	45,902.88	-15,134.70	0
1990	7.36	52,857.03	-22,116.10	0
1991	13.01	75,401.18	-35,755.20	1
1992	44.59	111,112.31	-39,532.50	0
1993	57.17	165,338.75	-65,157.70	0
1994	57.03	230,292.60	-70,270.60	0
1995	72.84	289,091.07	1,000.00	0
1996	29.27	345,853.96	32,049.40	0
1997	8.53	413,280.13	-5,000.00	0
1998	10	488,145.79	-133,389.30	0
1999	6.62	628,952.16	-285,104.70	1
2000	6.93	878,457.27	-103,777.30	1
2001	18.87	1,269,321.61	-221,048.90	1
2002	12.88	1,505,963.50	-301,401.60	0
2003	14.03	1,952,921.19	-202,724.70	0
2004	15	2,131,818.98	-172,601.30	0
2005	17.86	2,637,912.73	-161,406.30	1
2006	8.24	3,797,908.98	-101,397.50	0
2007	5.38	5,127,400.70	-1,117,237.10	0
2008	11.58	8,008,203.95	-47,379.60	0
2009	11.54	9,411,112.25	-810,008.40	0
2010	13.72	11,034,940.93	-1,105,401.40	0
2011	10.84	12,172,490.28	-1,158,518.50	0
2012	12.22	13,895,389.13	-975,724.00	0
2013	8.48	15,160,289.86	-1,153,490.20	0
2014	8.06	17,680,520.00	-978,434.70	0

Source: CBN Statistical Bulletin and World Indicators

INFL - Inflation

Null Hypothesis: INFLATION has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 1 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.418545	0.0661
Test critical values:	1% level		-4.262735	
	5% level		-3.552973	
	10% level		-3.209642	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(INFLATION)				
Method: Least Squares				
Date: 04/01/16 Time: 13:06				
Sample (adjusted): 1982 2014				
Included observations: 33 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION(-1)	-0.553865	0.162018	-3.418545	0.0019
D(INFLATION(-1))	0.297110	0.174387	1.703742	0.0991
C	16.51387	7.090568	2.328992	0.0270
@TREND(1980)	-0.310667	0.273985	-1.133884	0.2661
R-squared	0.288894	Mean dependent var		-0.386364
Adjusted R-squared	0.215331	S.D. dependent var		16.25754
S.E. of regression	14.40117	Akaike info criterion		8.285709
Sum squared resid	6014.421	Schwarz criterion		8.467104
Log likelihood	-132.7142	Hannan-Quinn criter.		8.346743
F-statistic	3.927182	Durbin-Watson stat		1.818093
Prob(F-statistic)	0.018143			
ENO				

LM2 - Money Supply

Null Hypothesis: LM2 has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 1 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.177424	0.1063
Test critical values:	1% level		-4.262735	
	5% level		-3.552973	
	10% level		-3.209642	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LM2)				
Method: Least Squares				
Date: 04/01/16 Time: 13:11				
Sample (adjusted): 1982 2014				
Included observations: 33 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LM2(-1)	-0.247373	0.077853	-3.177424	0.0035
D(LM2(-1))	0.547754	0.142662	3.839533	0.0006
C	2.222421	0.667529	3.329326	0.0024
@TREND(1980)	0.059815	0.018816	3.178938	0.0035
R-squared	0.434042	Mean dependent var		0.215396
Adjusted R-squared	0.375495	S.D. dependent var		0.109515
S.E. of regression	0.086545	Akaike info criterion		-1.943097
Sum squared resid	0.217210	Schwarz criterion		-1.761702
Log likelihood	36.06110	Hannan-Quinn criter.		-1.882063
F-statistic	7.413519	Durbin-Watson stat		2.202493
Prob(F-statistic)	0.000786			

FD- Fiscal Deficit

Null Hypothesis: FD has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 2 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.165774	0.9007
Test critical values:	1% level		-4.273277	
	5% level		-3.557759	
	10% level		-3.212361	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(FD)				
Method: Least Squares				
Date: 04/01/16 Time: 13:15				
Sample (adjusted): 1983 2014				
Included observations: 32 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FD(-1)	-0.251914	0.216091	-1.165774	0.2539
D(FD(-1))	-0.721049	0.235698	-3.059209	0.0050
D(FD(-2))	-0.333228	0.188607	-1.766787	0.0886
C	-135941.7	111037.4	-1.224288	0.2314
@TREND(1980)	14504.08	7547.876	1.921610	0.0653
R-squared	0.531883	Mean dependent var		30385.33
Adjusted R-squared	0.462532	S.D. dependent var		312575.0
S.E. of regression	229155.6	Akaike info criterion		27.66479
Sum squared resid	1.42E+12	Schwarz criterion		27.89381
Log likelihood	-437.6367	Hannan-Quinn criter.		27.74071
F-statistic	7.669464	Durbin-Watson stat		2.097294
Prob(F-statistic)	0.000290			

AT FIRST DIFFERENCE

INF - Inflation

Null Hypothesis: D(INFLATION) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 1 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-5.747240	0.0002
Test critical values:	1% level		-4.273277	
	5% level		-3.557759	
	10% level		-3.212361	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(INFLATION,2)				
Method: Least Squares				
Date: 04/01/16 Time: 13:19				
Sample (adjusted): 1983 2014				
Included observations: 32 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION(-1))	-1.351897	0.235225	-5.747240	0.0000
D(INFLATION(-1),2)	0.411020	0.168476	2.439631	0.0213
C	3.560024	6.169632	0.577024	0.5685
@TREND(1980)	-0.189032	0.298614	-0.633031	0.5318
R-squared	0.574122	Mean dependent var		0.396562
Adjusted R-squared	0.528493	S.D. dependent var		22.65153

CURRDENO – Currency Denomination

Null Hypothesis: D(CURRDENO) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 2 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-5.533289	0.0005
Test critical values:	1% level		-4.284580	
	5% level		-3.562882	
	10% level		-3.215267	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(CURRDENO,2)				
Method: Least Squares				
Date: 04/01/16 Time: 13:20				
Sample (adjusted): 1984 2014				
Included observations: 31 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CURRDENO(-1))	-2.163105	0.390926	-5.533289	0.0000
D(CURRDENO(-1),2)	0.728304	0.299947	2.428105	0.0224
D(CURRDENO(-2),2)	0.434802	0.176608	2.461962	0.0208
C	0.082861	0.170927	0.484773	0.6319
@TREND(1980)	-0.004361	0.008146	-0.535347	0.5970
R-squared	0.735063	Mean dependent var		0.000000
Adjusted R-squared	0.694304	S.D. dependent var		0.730297
S.E. of regression	0.403780	Akaike info criterion		1.170795
Sum squared resid	4.238988	Schwarz criterion		1.402083
Log likelihood	-13.14732	Hannan-Quinn criter.		1.246189
F-statistic	18.03416	Durbin-Watson stat		2.156252
Prob(F-statistic)	0.000000			

LM2 - Money Supply

Null Hypothesis: D(LM2) has a unit root				
Exogenous: Constant, Linear Tren				
Lag Length: 0 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.184916	0.1048
Test critical values:	1% level		-4.262735	
	5% level		-3.552973	
	10% level		-3.209642	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LM2,2)				
Method: Least Squares				
Date: 04/01/16 Time: 13:21				
Sample (adjusted): 1982 2014				
Included observations: 33 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LM2(-1))	-0.513877	0.161347	-3.184916	0.0034
C	0.105643	0.048183	2.192548	0.0362
@TREND(1980)	0.000243	0.001819	0.133713	0.8945
R-squared	0.253777	Mean dependent var		-0.001370
Adjusted R-squared	0.204029	S.D. dependent var		0.110738
S.E. of regression	0.098798	Akaike info criterion		-1.704978
Sum squared resid	0.292829	Schwarz criterion		-1.568932
Log likelihood	31.13214	Hannan-Quinn criter.		-1.659203
F-statistic	5.101223	Durbin-Watson stat		1.947417
Prob(F-statistic)	0.012389			

FD – Fiscal Deficit

Null Hypothesis: D(FD) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 1 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-7.406549	0.0000
Test critical values:	1% level		-4.273277	
	5% level		-3.557759	
	10% level		-3.212361	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(FD,2)				
Method: Least Squares				
Date: 04/01/16 Time: 13:23				
Sample (adjusted): 1983 2014				
Included observations: 32 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FD(-1))	-2.328994	0.314451	-7.406549	0.0000
D(FD(-1),2)	0.420990	0.174036	2.418980	0.0223
C	-62290.50	91895.39	-0.677841	0.5034
@TREND(1980)	7465.195	4558.145	1.637770	0.1127
R-squared	0.847068	Mean dependent var		-5539.297
Adjusted R-squared	0.830682	S.D. dependent var		560461.2
S.E. of regression	230620.1	Akaike info criterion		27.65140
Sum squared resid	1.49E+12	Schwarz criterion		27.83462
Log likelihood	-438.4224	Hannan-Quinn criter.		27.71213
F-statistic	51.69578	Durbin-Watson stat		2.152995
Prob(F-statistic)	0.000000			

AT 2ND DIFFERENCE

LM2 - Money Supply

Null Hypothesis: D(LM2,2) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 0 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-7.196608	0.0000
Test critical values:	1% level		-4.273277	
	5% level		-3.557759	
	10% level		-3.212361	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LM2,3)				
Method: Least Squares				
Date: 04/01/16 Time: 13:23				
Sample (adjusted): 1983 2014				
Included observations: 32 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LM2(-1),2)	-1.269952	0.176465	-7.196608	0.0000
C	0.026856	0.043432	0.618337	0.5412
@TREND(1980)	-0.001390	0.002104	-0.660727	0.5140
R-squared	0.641117	Mean dependent var		0.005582
Adjusted R-squared	0.616366	S.D. dependent var		0.176888
S.E. of regression	0.109561	Akaike info criterion		-1.495608
Sum squared resid	0.348106	Schwarz criterion		-1.358195
Log likelihood	26.92973	Hannan-Quinn criter.		-1.450059
F-statistic	25.90311	Durbin-Watson stat		2.046585
Prob(F-statistic)	0.000000			

Appendix III: Johansen Cointegration Test and Vector Error Correction Results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.751305	71.75214	47.85613	0.0001
At most 1	0.313156	25.83171	29.79707	0.1338
At most 2	0.242582	13.43535	15.49471	0.0998
At most 3 *	0.121282	4.266626	3.841466	0.0389
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.751305	45.92043	27.58434	0.0001
At most 1	0.313156	12.39637	21.13162	0.5090
At most 2	0.242582	9.168721	14.26460	0.2724
At most 3 *	0.121282	4.266626	3.841466	0.0389
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
INFLATION	CURRDENO	FD	M2	
-0.002467	2.162373	-9.71E-06	7.60E-07	
-0.071278	-1.103599	2.40E-08	1.88E-09	
0.003584	2.921512	5.06E-06	-2.62E-07	
-0.004658	0.253954	1.07E-06	-5.04E-07	
Unrestricted Adjustment Coefficients (alpha):				
D(INFLATION)	0.674022	8.261865	2.138363	1.445543
D(CURRDENO)	-0.140507	0.068641	-0.145069	-0.045558
D(FD)	165888.9	1095.949	-47923.28	12821.69
D(M2)	-3295.639	21725.26	78950.99	-98456.23
1 Cointegrating Equation(s):		Log likelihood	-1045.868	
Normalized cointegrating coefficients (standard error in parentheses)				
INFLATION	CURRDENO	FD	M2	
1.000000	-876.6610	0.003937	-0.000308	
	(162.849)	(0.00049)	(4.3E-05)	
Adjustment coefficients (standard error in parentheses)				
D(INFLATION)	-0.001663			
	(0.00757)			
D(CURRDENO)	0.000347			
	(0.00017)			
D(FD)	-409.1817			
	(67.0250)			
D(M2)	8.129024			
	(155.374)			
2 Cointegrating Equation(s):		Log likelihood	-1039.670	
Normalized cointegrating coefficients (standard error in parentheses)				
INFLATION	CURRDENO	FD	M2	
1.000000	0.000000	6.80E-05	-5.38E-06	
		(4.3E-05)	(3.7E-06)	
0.000000	1.000000	-4.41E-06	3.45E-07	
		(5.5E-07)	(4.7E-08)	
Adjustment coefficients (standard error in parentheses)				
D(INFLATION)	-0.590551	-7.660296		
	(0.18716)	(6.37092)		
D(CURRDENO)	-0.004546	-0.379580		
	(0.00477)	(0.16234)		

Appendix III: Continue

D(FD)	-487.2987	357504.2	
	(1937.94)	(65966.3)	
D(M2)	-1540.403	-31102.37	
	(4482.65)	(152587.)	
3 Cointegrating Equation(s):		Log likelihood	-1035.086
Normalized cointegrating coefficients (standard error in parentheses)			
INFLATION	CURRDENO	FD	M2
1.000000	0.000000	0.000000	-5.69E-07
			(1.8E-06)
0.000000	1.000000	0.000000	3.35E-08
			(3.7E-08)
0.000000	0.000000	1.000000	-0.070678
			(0.00908)
Adjustment coefficients (standard error in parentheses)			
D(INFLATION)	-0.582888	-1.413042	4.47E-06
	(0.18508)	(9.84502)	(2.8E-05)
D(CURRDENO)	-0.005066	-0.803399	6.32E-07
	(0.00434)	(0.23081)	(6.7E-07)
D(FD)	-659.0350	217495.8	-1.853411
	(1825.19)	(97087.7)	(0.27988)
D(M2)	-1257.477	199553.9	0.431975
	(4355.18)	(231666.)	(0.66782)

Cointegrating Eq:	CointEq1			
INFLATION(-1)	1.000000			
CURRDENO(-1)	56.79537			
	(13.3596)			
	[4.25127]			
LFD(-1)	-9.773176			
	(5.76046)			
	[-1.69660]			
LM2(-1)	11.91502			
	(4.42071)			
	[2.69527]			
C	-79.41044			
Error Correction:	D(INFLATION)	D(CURRDENO)	D(LFD)	D(LM2)
CointEq1	-0.768519	0.003003	0.019055	0.000551
	(0.32514)	(0.00894)	(0.02979)	(0.00267)
	[-2.36369]	[0.33602]	[0.63961]	[0.20603]
D(INFLATION(-1))	0.546761	-0.015741	-0.012035	-0.002524
	(0.32381)	(0.00890)	(0.02967)	(0.00266)
	[1.68854]	[-1.76871]	[-0.40563]	[-0.94791]
D(INFLATION(-2))	-0.387119	-0.004388	-0.019983	-0.000561
	(0.25726)	(0.00707)	(0.02357)	(0.00212)
	[-1.50478]	[-0.62063]	[-0.84771]	[-0.26527]
D(CURRDENO(-1))	30.93180	-0.954087	-0.062727	-0.008234
	(19.7332)	(0.54236)	(1.80813)	(0.16229)
	[1.56750]	[-1.75914]	[-0.03469]	[-0.05074]
D(CURRDENO(-2))	24.08603	-0.678006	0.820168	0.007631
	(15.3504)	(0.42190)	(1.40654)	(0.12624)
	[1.56908]	[-1.60703]	[0.58311]	[0.06045]
D(LFD(-1))	-4.431071	0.137563	-1.047187	0.034367
	(5.05935)	(0.13905)	(0.46358)	(0.04161)
	[-0.87582]	[0.98927]	[-2.25890]	[0.82596]
D(LFD(-2))	-4.422267	0.227793	-0.337904	0.042729
	(5.42794)	(0.14918)	(0.49736)	(0.04464)
	[-0.81472]	[1.52692]	[-0.67940]	[0.95721]
D(LM2(-1))	45.87751	-0.410210	1.080338	0.562414
	(44.1639)	(1.21383)	(4.04670)	(0.36321)
	[1.03880]	[-0.33795]	[0.26697]	[1.54847]
D(LM2(-2))	13.83972	0.100708	0.080390	0.229571
	(43.3937)	(1.19266)	(3.97612)	(0.35687)
	[0.31893]	[0.08444]	[0.02022]	[0.64329]
C	-29.77321	0.278192	-0.024961	0.123504
	(16.0477)	(0.44106)	(1.47044)	(0.13198)
	[-1.85529]	[0.63073]	[-0.01698]	[0.93580]
R-squared	0.689114	0.686166	0.710044	0.512728
Adj. R-squared	0.248693	0.241567	0.299274	-0.177574
Sum sq. resids	2492.715	1.883005	20.92853	0.168595
S.E. equation	14.41271	0.396128	1.320623	0.118531
F-statistic	1.564670	1.543338	1.728566	0.742759
Log likelihood	-108.8671	-1.043231	-37.16690	35.15362
Akaike AIC	8.457807	1.269549	3.677793	-1.143575
Schwarz SC	9.298526	2.110267	4.518511	-0.302856
Mean dependent	-0.325333	0.000000	0.196916	0.225973
S.D. dependent	16.62788	0.454859	1.577628	0.109229
Determinant resid covariance (dof adj.)		0.137437		
Determinant resid covariance		0.003518		
Log likelihood		-85.52630		
Akaike information criterion		10.76842		
Schwarz criterion		14.31812		