Dynamic causal chain of money, output, interest rate, exchange rate and prices: Nigeria as a case study

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Abstract

The primary aim of this study is to investigate the causal chain among output, money, prices, exchange rate and inflation in the context of Nigerian economy following the global economic crisis that hit many countries. The data used are from 1970 to 2012. The methodology employed uses several econometric techniques such as unit root tests, cointegration, vector error-correction model(VECM), variance decompositions and persistent profile in order to capture both the within-sample and out- of- sample causality. The result obtained is quite in line with our expectation given the nature of the Nigerian economy that relies heavily on the crude oil revenue and also imports from abroad. The result of cointegration analysis reveals that there exist long run relationships among the variables under study. From the VECM analysis, it suggests that output, interest rate and prices are the leading variables while exchange rate and money appear to have borne the brunt of the short run adjustments. This finding is in line with the real business cycle theory. In order to capture the impact of economic crisis on the selected variables, a dummy variable was created in the VECM analysis. It indicates an absence of the impact of the global economic crisis on the Nigerian economy as evidenced by the insignificance of the coefficient of the dummy variable. The findings of these results have economic policy implications in that output contains information about the sources of shock that affects the economy and hence output would be useful in predicting the future growth of the economy.

Keywords: Nigeria, Macroeconomics, cointegration, Granger-causality

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Introduction

The relationship among macroeconomic variables such as money supply, prices, and income has been a long debated topic among the mainstream macroeconomist. This disagreement has led to different schools such as the Keynesian, Monetarist, Classical and Real Business Cycle theory to come up with theories on the relationship among the variables, Masih, R. et al. (1996). Monetarists School holds the view that money plays a vital role and is the main determinant of changes in prices. On the contrary, Keynesian postulated that money changes both income and prices. The Classical and the Real Business Cycle theories postulate that an increase in Money would increase mainly prices and exchange rates rather than income and employment. In view of this conflicting theoretical debate, studies on these relationships were conducted by numerous researchers for both the developed and developing countries which cover different period of time and provides conflicting evidence on this matter. Examples include B. Friedman and Kuttene (1992), Ramachandran and Kamaiah (1992), R. Masih et al. (1996), Hossain (2011), Tan and Baharumshah (1999), Ghazali et al. (2008), and Palamalai et al. (2014).

Policy makers and economists are always working towards achieving price stability and sustained economic growth in a country. In order for these objectives to be achieved, there is an utmost need for understanding how these variables interact with each other and these exact patterns of interactions remain unclear. This necessitates a study to be conducted in order to discern their relationships which would provide direction to the policy makers as to the right monetary policy to adopt. The recent financial crisis which started in the late 2007 started to show effect in 2008 which heightened significant challenge to policy makers as to how to go about employing the right tool to manage monetary policies. The consequence of this crisis is the loss of trade and investment which was seen by the massive pull out of capital by foreign investors. The effect was felt in almost every sector of the Nigerian economy directly ranging having a direct effect from increased volatility in the financial market to the loss in output, accelerating inflation, increase in price level and significant loss in value of currency as evidenced by the continues depreciation of Nigerian Currency (Naira) against foreign currencies like U.S dollar (Aliyu 2009) and indirectly through falling commodity prices, crude oil in particular as the country economy is heavily dependent on the proceeds from the sale of oil to finance it budget, Adamu (2009).

In general, the increased macroeconomics instability in Nigeria in the recent years as evidenced by prolonged high inflation rate, exorbitant increase in interest rate, weak foreign exchange position and slow growth in the economy necessitates the need to understand the causal link between macroeconomic variables in the Nigerian Economy. To the best of author's knowledge, this paper is the first of its kind to look in to what happen to the Nigerian economy especially after the global financial crisis. The empirical issue between money, interest rate, inflation, exchange rate and output relationship is of significant importance to the Nigerian policy makers as this will provide clear direction as the appropriate strategy to adopt in the current position of the economy.

Despite the importance of monetary aggregate to the Nigerian economy, there is however no study that attempts investigates relationship among the macroeconomics variables such as money, output, interest rates, and inflations on Nigerian Economy which considers the effect of global economic crisis on the relationships of these variables. This gap is aimed to be filled by the present study. Secondly, most of the researches conducted on the relationship between money supply and output provides evidence of money being the main influence of output and prices in Nigeria. There is need to employ these compressive econometrics technique to re-examine these relationship. Thirdly, this study is the first of its kind in the Nigerian context to employ detailed macroeconomic variables as other studies like Bolaji A. A (2012) and Mbutor O. M (2014) limited their use of variables to only inflation, output, money supply and ignore variables like exchange rate which can assist in determining the exact transmission channel. Therefore, the objective of this article is to investigate the causal nexus between money, price, income, interest rate and the exchange rate in Nigeria and examine the effect of global economic crisis on the selected variables. And to also revisit the causal link between money and output in order to corroborate this relationship.

The focus on Nigeria being the largest economy in Africa following the recent rebasement of the country's GDP should provide valuable insight in to the relationship between money, output and prices. An understanding of these relationships will help the policymakers to devise an appropriate strategy that aims towards the development of the country's economy.

The empirical analysis is carried out within the cointegration and vector error correction model framework using yearly data covering the period from 1970 to 2013. The result from cointegration analysis shows that, in the long-run, there exist equilibrium relationship among the variables namely: GDP, money supply, interest rates, exchange rate, and consumer price index.

The empirical result shows that, output is the leading variable as opposed to money supply. This findings is in line with the real business cycle theory and also consistent with the findings of Masih et al. (1996). The short run estimate of the VECM suggest that, the persistent increase in inflation and exchange rate depreciation in the country is not as result of excess money supply in the economy but is rather imported. This is due to fact that Nigeria being an import dependent economy relies heavily on the goods produced from the foreign market and any change in the supply of these goods will significantly affect the prices and the demand of exchange rate in the country. Furthermore, a dummy variable is created in the VECM to capture the effect of economic crisis on Nigerian economy where the dummy takes the value of "0" in the pre-crisis period and the value of "1" during crisis. The result indicates insignificant effect of financial crisis on the selected variable under study. The variance decomposition result suggests that Price is the most exogenous variable as the values are consistent even after the 40th horizon (Years).

Following this introduction, the reminder of our article is organized as follows. The literature review section is provided in the next section then followed by methodology and empirical result section and conclusion section presents concluding remark.

Literature Review

Literature on macroeconomics causality has emphasized on the role of money and macroeconomic variables which provides conflicting result and as such it is hardly surprising that the causal link between money and macroeconomic variables has received considerable attention recently. Several researches have been conducted in order to investigate the empirical evidence behind the relationship between money, output, interest rates, exchange rate and prices. While most of the empirical studies concentrated on finding the causality among the variables, little studies in the context of Nigeria employed inflation and exchange rate in their analysis. This section is aimed at reviewing literature on causal links between money and macroeconomic variables.

Much of the earlier work emphasized on one period analysis of the causality among the variables. H.B Tan and A.Z Baharumshah (1999) investigate the causal link of money, output, interest rate and prices in Malaysian context using monthly data spanning from 1975 to 1995. Their finding reveals that, money stock (M3) appears to have the strongest causal effect on the real output with (21% of the variance) and a moderate effect is found on prices (7% of forecast variance). However, the authors could not ascertain the exact granger causality in the environment of VECM as they found mixed evidence. M1 and M3 shows significant effect on output and prices in the short run, but they were unable to establish the causal relationship

running from M2 to output in the short run and concluded that M2 does not lead prices in the short run but rather responds to changes in prices. Therefore, their conclusion is that, money is non-neutral in the short run and is consistent with Keynesian and Monetarists macroeconomic paradigms. In another study by R. Masih et al (1996) which investigates the causal chain among real output, money, interest rate, inflation and exchange rate using Indonesia as a case study covering the period of 1955 to 1991. The methodology employed various econometrics tests to capture these relationships. Their result reveals that, real output leads money supply and the other three endogenous variables. Their result is in support of real business cycle theory (RBC).

In contrast to the R.Masih et al (1996), Palamalai et al. (2014) in their study investigated the causal link between money and macroeconomic variables using India as a case study. They found out that during pre-economic crisis period, there exist a stable long run cointegration relationship between the variables selected under study. Interest rate, exchange rate and price level are found to be neutral in the long run. However, the result of the post-economic crisis period, it reveals a well-defined long run equilibrium relationship among the variables. Money supply and real output are found to be neutral in the long run. The authors concluded that, their study is in support of the monetarist view that changes in income leads to changes in the stock of money through the demand for money in the short run.

Some studies however took a different approach to by employing different methodology to analyze the causal link among the variables under study. Kotlowski (2005) examined the long run causality between prices and money in the context of Polish economy during the transition period. The study employed monetary inflation model known as P-star model that was developed by the FED economist, which employs seasonal cointegration developed by Hylleberg, Engle, Granger and you. Their result reveal evidence of the existence of long run causal relationship between money and prices and these results follows the assumption of P-star inflation model. However, the analysis did not find any seasonal cointegration relationship in the P-star inflation model which can be construed as the money demand equation.

In a study that analyses Nigerian Data, Mukhtar et al (2013) examine the dynamic causality between money and macroeconomic variables using Nigeria as a case study from 1960 to 2011. The authors found that there exists long run relationship among the macroeconomic variables under study. Although the variables may deviate in the short run, however, forces will set in to realign the variables together. Exchange rate, output are said to be the main influencers of the variation in price level and also the lagged values of the price level. Exchange rate is also found

to be the main influencer of the variation in output and also the lagged values of the output. They highlighted the dominance of exchange rate as the main source of shocks that affects the Nigerian economy than any other variable. They concluded that money supply is neutral in the short run and cannot be used as a stabilization tool to control increase in price level and output in the Nigerian economy.

Jan et al. (2012) examines the dynamic causal chain of money, output, interest rate and inflation for Pakistan economy for the period of 1972-2010. Their result shows that money supply positively affects inflation both in the short run and in the long run. They also found real gross domestic products to be negatively related with inflation whereas interest rate and exchange rate exert positive effect on inflation in the long run. They concluded that money supply is not neutral but rather the main source of inflation in Pakistan. Their result supports the fisher quantity theory of money and monetarists view that inflation is always a monetary phenomena. In a similar study, Ahmed, M.A and Sulaiman, Z.S., (2011) investigates the long run Relationship between money supply, Real GDP, and price level in Sudan economy using data that spans from 1960 to 2005. They found a Granger causality relationship between money and prices by money having a direct effect on prices but not otherwise. The direction of GDP and prices was found to be unit-directional from real GDP to CPI without any feedback.

In summary, studies on causality among money and macroeconomic variables as analyzed some researchers found money to be neutral in the short run, while others did not find any significant evidence. H.B Tan and A.Z Baharumshah (1999) and Palamalai et al. (2014) and Mukhtar et al (2013) found money to be neutral in the short run. While others like Jan et al. (2012) found that money supply is not neutral but rather is the main source of inflation in Pakistan and finally R. Masih et al (1999) found their results to be in support of real business cycle theory (RBC).

Theoretical Underpinnings

The focus of this article is the causal relationship between money and macroeconomic variables. Although theory is unclear about the transmission channel between these variables, it is postulated that money affect prices through consumer price index which captures the rate of increase of price of goods and services in the economy. Because Nigeria is heavily dependent on imports, it is highly likely that the transmission channel will come through foreign trade and hence exchange rate is used as a proxy for foreign trade. The role money plays in an economy is largely inconclusive as there are different views held by different schools of thoughts. Keynesian economist postulated that money plays a minor role in determining income and prices because changes in income necessitate changes in money stock which leads to higher demand for money, Knoop A. T (2008). However, the opposite is true with the Monetarist theory which postulated

that money plays a dominant role in determination of income and prices. They hold the opinion that money plays a significant role in determining the level of income and prices as such when the supply of money is affected, prices and income will also respond to these shocks. Therefore, the causal relationship runs from money to income and prices without any feedback.

Real business cycle theory asserts that aggregate demand is irrelevant to real economic activity and money neutrality always holds. They postulated that only aggregate supply determines the level of real output in an economy Knoop A. T (2008). The theory in favor of money supply having an effect on output but rather affects interest rates and price level and has identified three main sources that affects productivity which are: changes in the prices of important inputs such as price of oil, changes in technology and changes in government regulation, Knoop A. T (2008). N. Erjavec, B. Cot. (2003) investigate the causal relationship among money supply and prices and found out that money cannot be independent stimulus to the economic activity in the short run in Croatia. Money is neutral in the short run and monetary policy cannot contribute towards price stability. They found that interest rate, exchange rate and output lead money supply and prices. The Granger-causal chain provides evidence that is consistent more with real business cycle theory than with other major macroeconomic paradigms.

Based on the above mentioned theoretical underpinnings, the answer still remain unresolved which call for the carrying out of this studies of the causal relationship between money and macroeconomic variables which has been tested on the following variables namely: Money supply (M2), Gross domestic product as the measure of output, interest rate, (IR), exchange rate (ER) and consumer price index (CPI) as a proxy for inflation. These variables are expected to be cointegrated.

Data and econometric methodology

The following variables are employed in order to capture the causal link among money supply and prices. The study employs yearly time series data that span from 1970 to 2013 which are obtained from Word development indicator database. The variables taken were GDP (GDP), money supply (M2), Exchange rate (ER), real interest rate (IR) and prices measured by Consumer price Index (CPI). All the level form variables are transformed into logarithm scale with the exception of interest rate which was already in percentage form.

Model specification and empirical result

Unit root test

A necessary condition in most cases is to test the unit roots of all the variables under study in order to find out if the variables are integrated in the same order. The ADF and PP suggests that the variables can be taken as I (1). The table shows that all variables were found non-stationary at 'level' form but are stationary when their first difference form is taken.

Table: 1 Tests of the unit root hypothesis: Annual data

ADF Test			PP Test		
VARIABLES	T-STAT	C.V	VARIABLES	T-STAT	C.V
Levels					
LGDP	-2.15	- 3.53	LGDP	2.59	-2.65
LER	-2.00	- 3.53	LER	0.39	-2.65
LM2	-2.75	- 3.53	LM2	2.54	-2.65
IR	-1.04	- 3.53	IR	-1.69	-2.65
LCP1	-2.29	- 3.53	LCP1	1.76	-2.65
First Difference					
DGDP	-3.96	- 2.95	DGDP	2.99	-2.67
DER	-2. 96	- 2.95	DER	-5.27	-2.67
DM2	-2.99	- 2.95	DM2	3.7	-2.67
DIR	-2.98	- 2.95	DIR	-7.25	-2.67
DCP1	-3.39	- 2.95	DCP1	-3.28	-2.67

Source: Self computed

Lag order Selection Criteria

The optimal order of the VAR as found in Table 2 is a necessary step to be carried out before proceeding for the cointegration. Both the Akaike information criterion suggests Schawarz Bayesian Criterion (SBC) suggest order 3. However, since we have short time series data (43 observations), it is highly likely to encounter the over-parameterization Pesaran B. and Pesaran H. M (2009) problem which might crop up and as such the orders suggested by the test is disregarded and therefore choose 2 as the order of VAR.

Table 2: VAR Order

Lag	LL	AIC	SBC
1	-2.7214	-32.7214	-57.2852
2	15.7668	- 39.2332	-84.2668

3	39.1635	- 40.8365	-106.3400
4	40.5238	-26.4971	40.55

Multivariate and Cointegration analysis

The standard method for finding cointegration, that is, Johansen cointegration test in Table 3 is found to have one cointegration vector at 90% and 95% significance level respectively. Based on the result from maximal Eigen value and trace statistics, which suggests that these variables are bound together by the long run equilibrium relationship, R. Masih et al. (1996).

Table 3: Johansen Cointegration test based on Eingen and Trace

H0	Alternative Hypothesis	T-Statistic	95% Critical Value	90% Critical Value
r=0	r = 1	41.07	37.86	35.04
r < 1	r = 2	26.32	31.79	29.13
r < 2	r = 3	24.01	25.42	23.10
r < 3	r = 4	10.88	19.22	17.18

Long Run Structural Modeling (LRSM)

A further analysis is conducted following obtaining the cointegrating relationship in order to enumerate the theoretical relationship among these variables. This analysis compares the statistical findings against the theoretical expectation. LRSM procedure is applied in order to find the direction of causality among the variables. The long-run estimates of the cointegrating vector normalized on GDP at the stage for the exact identification (Panel A of table 4). The results from the table reveal that CPI is statistically insignificant. This led us to apply over-identification restriction in order to confirm the insignificant result obtained in panel A as found in Panel B. The result confirmed the earlier findings that only CPI is insignificant. Since CPI is found to be insignificant, it shall not be dropped from this analysis owing to its importance to this study.

Table 4: Exact and over identifying restrictions on the cointegrating vector

Variables	Panel A	Panel B
	1.000	1.000
LGDP	**None**	None
LM2	-1.1643*	-1.2862
	.30626	.21603
IR	.049057*	.047829
	.015740	.017128
ER	-.56620*	-.63013
	(.15682)	.10678
LCPI	-.11686	**-.0000**
	.23589	**None**
Trend	.14819	.16563
	.057723	.052995
CHSQ(1)	.20114	.654

Note: The above result shows the maximum likelihood estimates subject to exactly identifying (Panel A) and over identifying (Panel B). The null hypothesis stands as the p-value is more than the critical value and this confirms our earlier test.

The result in Table 4 shows several interesting result starting from money supply which is negatively related with GDP and statistically significant. This means that when there is too much money in the economy, it does not increase the output in the Country. This is because Nigeria economy has suffered long problem of corruption and mismanagement of resources. Most of the funding for economic development provided by the government finds its way in to the pockets of some selfish individuals taking advantage of the absence of a proper check and balance system that could bring the culprits to justice. This negative relationship is expected due to the fact that most of the development project ended up getting abandoned halfway before their completion due to corruption that is endemic in the country and the consequence of this is loss of valuable resources to some few individuals.

The coefficient for interest rate is positive and significant. Although an increase in interest rate is expected to discourage borrowers from investment, the case in Nigeria is different as people

are not deterred by the high rate of interest because of their desperation to get cash for some business start ups or for their working capital. Therefore at whatever rate the banks offer the interest rate, the borrowers would be willing to accept as there are not many options available for them. The lending rate can go as high as 22% as compared to 3% deposit rate paid to depositors. Therefore, on getting financing from the financial institutions, borrowers will ensure the application of the resources to the most productive use. This will induce them to invest in business ventures that will provide good return on their investment and therefore this positive relationship is expected as many individuals whom were lucky to secure financing will engage in productive activities which will result in increased output in the economy.

The coefficient for exchange rate is negative and statistically significant. Variation in exchange rate significantly affects economic performance because of its impact on variables like output, export prices and import, Iyoboyi and Muftau (2014). Nigerian economy since 1986 has gone through various structural adjustment processes in order to maintain stable exchange rate. As of 1994, the exchange rate between Naira and U.S dollar was at N22.88 but the rate continues to deteriorate and with the recent global economic crisis, the exchange rate further depreciated to 150.01 at the end of 2009, Aliyu (2009). This findings is in line with theory as depreciation of exchange rate will expand output and since Nigerian is an import dependent economy, this will discourage importers from buying inputs from abroad and as a result of this increase in the number of currency unit required for foreign purchase will force the residence to be more creative in producing products domestically which will help create foreign markets for their locally manufactured goods and services which will result in increase the net export.

The coefficient of CPI is positive and statistically insignificant. This indicates that, increasing prices of goods and services does not hinder their production as producers found incentive to increase production which in return will increase their return on investment.

Vector Error Correction Model

Table 5: Granger causality Test based on Vector Error- Correction Model

ecm1(-1)	Coefficient	Standard Error	T-Ratio [Prob.]	Result
dLGDP	-.16988	.16378	0.309	Exogenous
dLM2	.27272	.12948	0.044	Endogenous
dIR	2.5253	2.5997	0.340	Exogenous
dLER	.85730	.24647	0.002	Endogenous
dLCPI	.021019	.081937	0.799	Exogenous

Because cointegration is unable to provide us with the direction of causality, we turn to VECM in order to obtain the causality as found in Table 5. From the above result, it is not surprising that GDP, IR and CPI variables are leading variables while M2 and ER are the followers. This indicates that GDP, IR and CPI are the first receptors of the market shock and transmit the effects to the M2 and ER variables. This implies that both of these variables are the initial receptors of the exogenous shock to the long term equilibrium relationship whereas the remaining two variables namely ER and Money Supply have to bear the burden of adjustment at different proportion endogenously so as to re-establish the long run relationship, A. M. M Masih and R. Masih (1996). This confirms our earlier assumptions that GDP variable is independent and therefore money supply is neutral and cannot be efficient in the stabilization of output and Price levels in the Nigerian Economy. This finding is in line with R. Masih et al. (1996) which found GDP to be the leading variable.

Of all the variables under study, GDP, IR and Prices contains better information about the sources of shocks that affect the economy and this will help policy maker to devote more attention these variables. For example, since Inflation is found to be exogenous, the monetary policy to be adopted by Central bank should aim at targeting inflation. This is evident by the current high interest rate environment which is aimed at steering the economy to a low target rate of inflation. This increase in interest rate would shrink the aggregate demand as investment spending will respond to the high interest rate and as a result will lead in turn to lower aggregate demand and decrease in output. In this analysis, it shows that money supply is not the main determinant of output in the economy and this finding is consistent with the real business cycle theory where money supply is lag behind GDP. This implies that, GDP plays a vital role in the economy by leading the changes in exchange rate and money supply.

In order to investigate the effect of global economic crisis on Nigerian economy, a dummy variable is created through vector error correction model using e-view. The dummy takes the value of 0 to represent the period before the financial crisis while the value 1 represent the period after the global crisis. The result reveal a negative coefficient and statistically insignificant with the p-value of 0.45 above the critical value. This suggests that, the Nigerian economy is not affected much by the economic crisis as opposed to our earlier assumptions. This means that most of the factors that affects the economy were driven domestically and not from the international market

**Table 6: Variance Decomposition: Ordering (LGDP, LM2, IR, LER, LCPI)**

Horizon	Variables	LGDP	LM2	IR	LER	LCPI
5	LGDP	**61**	6	4	7	21
	LM2	31	**59**	1	9	1
	IR	6	20	**60**	11	3
	LER	1	47	6	**44**	1
	LCPI	20	3	2	1	**74**
Horizon						
10	LGDP	**58**	3	3	10	26
	LM2	34	**56**	1	8	2
	IR	8	22	**55**	12	3
	LER	1	50	5	**42**	1
	LCPI	14	9	1	3	**73**
Horizon						
15	LGDP	**56**	2	3	11	28
	LM2	36	**54**	0	7	2
	IR	8	24	**53**	13	3
	LER	1	52	5	**40**	2
	LCPI	12	12	1	4	**72**
Horizon						
30	LGDP	**55**	1	2	13	29
	LM2	38	**53**	0	7	2
	IR	9	24	**51**	13	3
	LER	1	54	4	**39**	2
	LCPI	10	14	0	5	**71**
Horizon						
40	LGDP	**54**	1	2	13	30
	LM2	38	**52**	0	7	2
	IR	9	25	**51**	13	3
	LER	1	54	4	**39**	2
	LCPI	9	15	0	5	**71**

Notes: Figures in the first column refer to a horizon, which is number of years.

Although VECM help us identify the direction of causality, it is however unable to provide us with the relative endogeneity or exogeneity among the variables. The VDC test is used to forecast the out of sample causality. The above table 6 presents the VDC result in generalized form as this approach is not sensitive to the ordering of the variable. The result tends to suggest that CPI is relatively the leading variable being the most exogenous of all. For example, even after the 40th year, almost 71% of the variation in prices is explained by its own shock as compared to 39% in the case of Exchange rate. From the above ranking it can be seen that price is the first leader, followed by GDP, then M2 while IR is the first follower and ER is the most endogenous with. The ranking has been the same throughout the VDC analysis. Since CPI, GDP and Interest rate are found to be the most exogenous of all, government policy should be directed towards this three identified variables as any effect by this variables will directly be transmitted to the other endogenous variables.

Response and Persistent Profile

Figure 1: Persistent Profile

Persistence Profile of the effect of a system-wide shock to CV(s)
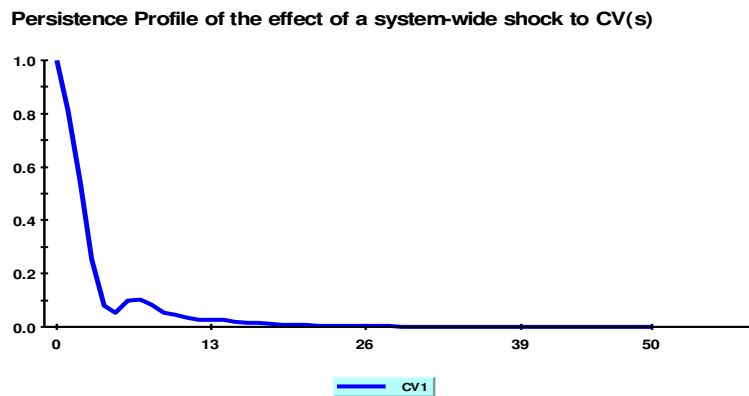
Persistent profile test is then applied (Figure 1) and the result reveal that when the entire cointegration relationship is shocked, it will take about 15 years for the equilibrium to be restored.

Conclusion

This study investigated the causality among macroeconomic variables such as money, prices and output using Nigeria as a case study. Annual data are sources from world Development indicator database that span from 42 years (from 1970 – 2012). The methodology employed uses several econometric techniques such as unit root test, cointegration, vector error-correction, variance decomposition and persistent profile in order to capture both within the sample and out of sample causality. The result obtained is quite in line with our expectation given the nature of the Nigerian economy that relies heavily on the crude oil revenue and also imports from abroad. The result of cointegration analysis reveals that there exist long run relationships among the variables under study. From the VECM analysis, it suggest that output, interest rate and prices are the leading variables and while exchange rate and money supply appear to have borne the brunt of the short run adjustments. This implies the findings to be in line with the real business cycle theory. In order to capture the impact of economic crisis on the selected variables, a dummy variable was created in the VECM analysis which is indicative of the absence of economic crisis impact on the Nigerian economy as evidenced by the insignificance of the coeffecient of the dummy variable.

These findings have economic implications in that output contains information about the sources of shock that affects the economy and hence output would be useful in predicting the future growth of the economy. As for the case of variance decomposition, CPI is the most exogenous variable of all. The implication of these findings is that, since the Nigerian economy is suffering from sustained increase in inflation, the monetary policy adopted should aim at controlling inflation by setting an inflation target which can act as a guide towards driving the economy in to the right direction.

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