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Inflation - Growth Nexus: A Vector Error Correlation Modelling Of The Nigerian Experience

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Abstract: *The aim of the study was to assess the relationship between general price level and economic growth in Nigeria using the Vector Error Correction Model. Using data covering 1970 to 2009, the result showed a long run relationship among the variables. The result from the variance decomposition showed that the volatility of import had significant effect on domestic price level and hence on the growth process in Nigeria. As a result, government policy that targets imports could play significant role in controlling domestic inflation which will improve the level of economic growth.*

Keywords: Consumer Price Index, Import, Vector Error Correction and Variance decomposition

1. Introduction

Inflation and economic growth have drawn considerable attention over the past decades in theoretical and empirical growth literature. This has been a great source of concern to policy makers, economists as well as Central Banks around the world, Nigeria inclusive. The effects of high inflation on the economy are generally considered to be predominantly harmful. This is why the achievement of price stability has always been one of the fundamental objectives of macroeconomic policy in both developed and less developed countries. Price stability does not mean that an economy necessarily records zero growth in the general level of prices of goods and services over time (Orubu, 2009). Indeed, some degree of price inflation is regarded as a normal development in a growing economy – so long as such price increases remain within the range of low single digit (Batini,

2004; Burdekin and Siklos, 2004; Owoye, 2007). Price stability obtains, when economic agents (households and firms) no longer significantly take into consideration the expected change in the general price level in their current economic decision making.

In Nigeria, inflationary pressures reflecting in persistently rising prices have been an issue of concern to policy makers since the late 1960s. Thus, through the 1070s and well into the first five years of the 1980s, anti-inflation policy became a regular feature of governments' over-all economic policy agenda. Inflationary pressures heightened substantially after the adoption of the structural Adjustment Programme in 1986, with the inflation rate rising as high as 56.0% and 50.0% in 1988 and 1989 respectively. Despite a mild respite in 1990 with a single digit rate of 7.0% , the inflation rate climbed up steadily to about 44.0% in 1992, and up as high as about 72.0% in 1995. Since 1997, inflationary pressures seem to have relatively slowed down (Orubu, 2009). The consequences of high inflation on the Nigerian economy have been so adverse. This is because prices bring different market actors together. Because of the unstable rate of inflation in Nigeria, economic agents find it difficult to plan and budget ahead of time, thus sometimes carryover the budget of one year to almost the end of the other year.

The relatively high and unstable rate of inflation has imposed a drag on productivity and economic growth in Nigeria. This is particularly so when firms are forced to shift resources away from products and services thereby discouraging investment and retarding growth. An example of this that is fresh in the memories of Nigerians is the collapse of the textile industries in Nigeria. High rate of inflation in Nigeria has also eroded the value of fixed nominal payments such as rents, wages, pensions as well as taxes. The regular demand for higher wages by all cadres of the Nigerian labour force from academic staff Union of University, the Nigerian Labour Congress etc. has been as a result of high and unstable rate of inflation. During a period of high inflation depositors who are paid fixed interest rates on loans or deposits suffer and this has led to a reduction in the tendency to save which have in turn affected the ability

of the banks to give out loans for investment. High rate of inflation have led to shortages of goods in Nigeria at one point or the other. This shortage of goods domestically has led to the massive importation of goods into the country. This has become worrisome given the phenomenon of imported inflation. The high and unstable rate of inflation in Nigeria has actually reduced the standard of living of the people compared to other countries in Asia and even in Africa. The reason for this is straight-forward; an increase in the general price level such as that triggered by fuel subsidy removal without palliatives decreases the purchasing power of money.

The primary aim of this study is thus to assess the relationship between the general price level and the level of economic growth in Nigeria using the Vector Error Correction Model. This will enable us to ascertain the authenticity of the monetary policy direction in Nigeria. This study is important because high levels of inflation may hinder the achievement of other macroeconomic objectives such as full employment, rapid and sustained growth and tolerable balance of payment. A study of the impact of inflation on growth will also highlight the need for equitable distribution of income in a country like Nigeria with vast income disparity. Another significance of the study of the impact of inflation on growth is that the general price level is necessary in achieving a relatively stable exchange rate and manageable debt profile. Most of the studies on the impact of inflation on economic growth in Nigeria have focused on domestic factors; but this study will contribute to the existing literature because it shows the role of imports which is an external factor on the domestic price-growth model.

2. Measurement of Relative Price Variability in Nigeria

The measurement of inflation in an economy requires the application of objective methods by the statistical agencies in differentiating changes in nominal prices of a common category of goods and services, and isolating such changes from those that have to do with changing values of the goods and services, variation in the prices of which are being

measured over time. The price of a set of goods and services can only be said to have been inflated if there has been no change in its value over a time interval and yet its price has increased significantly. In the same manner, an increase in the prices of a limited set of goods and services does not however constitute inflation. In order to establish inflation, the price change with respect to a large "basket" of representative goods and services must be measured, using an appropriate price index - Consumer Price Index (CPI), the Producer Price Index (PPI), and the Implicit Gross Domestic Product Deflator. The CPI measures the prices of wide selection of goods and services purchased by a typical consumer, across all the regions of a country. The PPI measures the average changes in prices received by producers regions of a country. The PPI measures the average changes in prices received by producers for their output. It is essentially a measure of the pressure being put on producers as a result of the cost of production. It is also referred to as the Wholesale Price of all goods and services that are included in the GDP, and is measured as the nominal GDO divided by the real GDP. In many countries, the CPI is the preferred index for measuring inflation, apparently because it represents a more widely accepted and understood measure of inflation. Consequently, its use is therefore more likely to promote accountability on the part of the monetary authorities, as well as public understanding and acceptance (Cockerell, 1999). The CPI essentially uses data collected by surveying households to determine the proportion of the typical consumer's expenditure that is spent on specific goods and services, with appropriate weights on the average prices of the items purchased. The weighted average prices are then combined to calculate the overall price. A base year price is normally chosen, and given a value of 100, while the price index in a subsequent period is then expressed in relation to the base period price.

Change in relative prices is called relative price variability or volatility and is used as an indicator of the real costs of inflation in relation to its effect on commodity price changes. Real costs of inflation occur as a result of changes in relative prices caused by a differential transmission of inflation across particular products or markets. The resulting price

structure is distorted from initial cost and may induce resource misallocation and welfare loss (Domberger, 1987).

Domberger, (1987) extended the consideration of the real costs of inflation by noting that by disrupting the relative price structure between products within a particular market, inflation could also produce real costs by affecting changes in intra-market relative price volatility. Relative price variability is measured by constructing an index to show changes over time in relative prices among a commodity group. A commodity's relative price is defined as its nominal price divided by the average price of all commodities in the group. Relative price variability is defined as the variance across a set of commodities of the rates of change of individual nominal prices (Ball and Romer, 1993).

The nominal rate of price change of each commodity can be decomposed into an aggregate component, interpreted as the inflation rate, and a relative price component.
That is

$$P_{i't} = P^*_t + Z_{i't} \quad (1)$$

Where $P_{i.t}$ is defined as the natural logarithm of the nominal price of the commodity in period t, P^*, is the natural logarithm of a price index for the N commodities in period, and $Z_{i.t}$ is the natural logarithm of the relative price of commodity i in period t.

$$P_t = \sum_{1=1}^{N} W_{i't} P_{i.t} \quad (2)$$

Where $W_{i.t'}$s are price index weights that sum to one. Taking first differences of and rearranging terms, the rate of commodity i's relative price,

$$Z_{i,t-} Z_{i,t-1} = (P_{i,t} - P_{i,t-1}) - (P^*_{t-} P^*_{t-1}) \quad (3)$$

The weighted sum of each commodity's relative price, using $W_{i.t}$ as weight,

$$\sum^{n} W_{i,t} Z_{i,t} - Z_{i,t-1}) = \sum^{n} W_{i,t} \{(P_{i,t-} P_{i,t-1}) - (P^*_t - P^*_{t-1})\}$$

(4)

$i=1$ $i=1$

Is always zero. The weighted sum of squares of each commodity's relative price,

$$V = \sum_{i=1}^{n} W_{i,t}[(P_{i,t} - P_{i,t-1}) - (P^*_t - P^*_{t-1})]^2 \quad (5)$$

is always positive when nominal rates of change differ among idnivdual commodities. As the differences increase, V_t also increases. Therefore, $V_{t,}$ which is an approximation of the variance of relative price changes from period t-1 to t for the N commodities, is used as the measure of relative price variability.

3. Theoretical Underpinnings

There seem to be a general consensus among economists that inflation is essentially a monetary phenomenon. In the short and medium term, inflation could be affected by pressures originating from both the demand and supply sides of the economy, but the extreme monetarist view is that macro-variables such as wages and other costs adjust quickly enough to make their influences on inflation, merely marginal on the general inflation trend line. On a broad line of classification, two basic theories have been advanced to explain inflation and its dynamics. These are

The fundamental argument of the demand-oriented theories of inflation is that inflation arises in an economy when aggregate demand is greater than aggregate supply. One variant of the demand-pull explanation is based on Keynesian analysis, and it posits that it is the level of national expenditure that determines the price level. Thus if for some reason, aggregate demand is greater than the full employment level of income, an inflationary gap will crop up and this will trigger up the prices of goods and services in the economy. The implicit assumption behind this explanation is that the resulting excess demand cannot be satisfied by running down on existing goods and services, or by increasing imports, postponing demand or by diverting

supplies from the export sector to the domestic market. Thus a necessary condition for price inflation to occur when aggregate demand is greater than aggregate supply is that the economy should be operating at, or at least very close to its full employment level of output. In other words, demand pull inflation is more likely when there is full employment of resources and when short-run aggregate supply is inelastic.

The supply-oriented theories have to do with cost-push influences. They have to do with drops in aggregate supply due to increasing prices of inputs such as labour, imported inputs and higher taxes by government. Here inflation is assumed to be caused by increases in the cost of production that are independent of the production that does not rely on aggregate demand. If there is sustained increase in the prices of raw material used in production, producers for whom raw material are useful will pass on the increase in the cost of production to consumers by way of higher prices in order to maintain their profit levels.

Apart from the two core theories of demand briefly examined above there are other complementary explanations of inflation such as in-built expectations, structuralism and international linkages. When economic agents' expectations of inflation are ascending, such expectations tend to perpetuate inflation into a trajectory. For example, real purchasing power of their incomes, the expectation that the inflation may rise by a certain percentage point in the future, could make them to demand for a rise in pay to compensate for the loss of their real incomes that may result if the expected rate is realised. The danger in inflationary expectations is that they tend to be self-fulfilling. When this happens and triggers a price increase at a later round, the resulting wage-prices spiral has the tendency of driving the inflation rate on to a trajectory.

There is also the structuralist explanation of inflation, which essentially blends elements of the demand and supply theories, it is based on the argument that inflation is inevitable in an economy that is attempting to grow in the presence of structural bottlenecks. In the typical developing country for which the theory is constructed, such difficulties

include inelastic supply of agricultural production particularly in the food and raw material subsector, foreign exchange shortages, poor development of the financial sector, raising prices of imported goods in the face of inelastic demand for imports, large deficits and rapid population growth (Kirkpatrick and Onis, 1985, Orubu, 1996).

Adherents of the structuralist view generally recommends a supply side approach to the problem of inflation. Generally, once inflation has started, after a while, it becomes increasingly difficult to disentangle initiating factors from those that are propelling it. However, the monetarists argue that all non-monetary causes of inflation are not ultimate causes. First, the pure demand theory does not explain what gives rise to excess demand in the first instance. To monetarist, it is an increase in the supply of money above the quantity that is needed to finance the volume of transactions produced in the economy that gives rise to excess demand. With respect to the supply-side argument, an extreme monetarist view would be that there is no such thing as cost-push inflation.

Producer may try to pass on higher cost of production by way of selling at higher prices to customers. But in the absence of an increase in the money holding by customers, most producers would sell fewer goods, with resultant fall in output and loss of jobs. Higher costs can therefore be passed to consumers by way of higher prices only when consumers have more money to pay the higher prices. The modern monetary explanation of inflation is a re-echo of the old classical view as expressed in the quantity theory of Money. Given the classical assumption of full employment and the implied constant velocity of circulation, it can be shown that the elasticity of the price level with respect to the money stock is necessarily equal to unit.

If we assumed for simplicity that the money is demanded solely to satisfy the transaction motive, the simple behavioural correlate of the quantity theory based in an equilibrium model of the money market yields the conclusion that the rate of inflation would rise as money stock rises, but

will fall as the output of the economy increases. Within this framework, excess demand pressure can be roughly measured as the positive gap between the rate of growth of the money stock and that of output.

4. Empirical Literature

The Central Bank of Nigeria (CBN) (1974) study focused on the impact of inflation on output growth and several other macroeconomic variables: gross fixed investment, savings, inventories, residential investment, exports and foreign capital inflow. Inconclusive results were obtained because the coefficients were not statistically significant Cookeierman (1979) analysed sectoral inflation in 14 OECD countries, classifying the commodities into tradeables and non-tradeables. The result showed that inflation is non-tradeable goods exceeds inflation in tradeabels. Demand shift toward non-tradeabels and faster growth of total factor productivity in the tradeable goods sector were identified as the prime cause of the differential inflation.

Domberger (1987) studied the relationship between agricultural prices and the general price level in Greece. He used econometric methods for non-stationary variables, preceded by cointegration and unit root tests. Agricultural price deflator was regressed on GDP deflator and the per capita volume of agricultural production. The results showed that agricultural prices overshoot in the short run, while the adjustment speed to the long-run inflation neutrality as slow. In the context of developed and developing countries, there have been extensive empirical studies to date that attempt to focus on the relationship between inflation and economic growth. Barro (1995) explored the inflation-economic growth relationship using a large sample covering more than 100 countries from 1960 to 1990. His empirical findings indicated that there existed a statistically significant negative relationship between inflation and economic growth if a certain number of the country characteristics (e.g. fertility rate, education, etc) are held constant.

More specifically, an increase in the average inflation rate by 10 percentage points per year reduced the growth rate of

real per capita GDP by 0.2 to 0.3 percentage points per year. In other words, his empirical analysis suggests that the estimated relationship between inflation and economic growth was negative when some reasonable instruments were considered in the statistical process. Finally, he added that there is at least some reasons to consider that higher long-term inflation reduces economic growth. Bruno and Easterly (1995) examined the determinants of economic growth using annual CPI inflation of 26 countries which experienced inflation crises during the period between 1961 and 1992. In their empirical analysis, inflation rate of 40 percent and over is considered as the threshold level for an inflation crisis. They found inconsistent or somewhat inconclusive relationship between inflation and economic growth below this threshold level when countries with high inflation crises were excluded from the sample.

In addition, the empirical analysis suggested that there existed a temporal negative relationship between inflation and economic growth beyond this threshold level. The robustness of the empirical results was examined by controlling for other factors such as shocks (e.g., terms of trade shocks, political crises, and wars). Finally, they found that countries recover their pre-crisis economic growth rates following successful reduction of high inflation and there is no permanent damage to economic growth due to discrete high inflation crises. Sarel (1995) mentioned that inflation rates were somewhat modest in most countries before the 1970s and after that started to be high. Therefore, most empirical studies conducted before the 1970s show the evidence of a positive relationship between inflation and economic growth and a negative relationship between the two beyond that time period due to the severe inflation hike. Malia (1997) conducted an empirical analysis using a small sample of Asian countries and countries belonging to the Organisation for economic Cooperation and Development (OECD) separately. After controlling for labour and capital inputs, the estimated results suggested that for the OECD countries there existed a statistically significant negative relationship between economic growth and inflation including its first difference. However, the relationship is not statistically significant for the developing countries of Asia.

The crucial finding of this empirical analysis suggested that the cross-country relationship between inflation and long-term economic growth experienced some fundamental problems like adjustment in country sample and the time period. Therefore, inconclusive relationship between inflation and economic growth can be drawn from comparing cross country time-series regressions with different regions and time periods. Mallik and Chowdhury (2001) examined the short-run and long-run dynamics of the relationship between inflation and economic growth for four South Asian economies: Bangladesh, India, Pakistan, and Sri Lanka Applying cointegration and error correction models to the annual data retrieved from the International Monetary Fund (IMF). They found two motivating results.

First, the relationship between inflation and economic growth was positive and statistically significant for all four countries. Second, the sensitivity of growth to changes in inflation rates was smaller than that of inflation to changes in growth rates. Turkey was the focus of Caglayan and Filiztekin (2003), who investigated the link between inflation and relative price variability in that country, along with the impact of structural changes in the behaviour of inflation, using panel data techniques to control for aggregate shocks. The results showed that the effect of inflation is non-neutral and lower in magnitude during the high inflationary period. Relative price variability increased in inflationary as well as deflationary periods.

In spite of the extensive studies done elsewhere on the relationship between inflation and relative price variability, adequate studies have not been done for Nigeria. Rather, most studies on inflation have focused on explaining Nigerians inflationary process (Asogu, 1991). Only a few studies analysed the effects of inflation on the economy. This study adopts the CBN (1974) study which has inconclusive result creating a research gap. However, this study is different because, other than the rate of domestic inflation, this study also included a measure of imported inflation using total import as a proxy. Thus introducing the influence of external factor. This study also applied modern

econometric techniques in assessing the inflation growth relationship. Another uniqueness of this study is that it covers the pre-structural Adjustment, Structural Adjustments and post Structural Adjustment periods 1970 to 2009.

5. Materials and Methods

The The Vector Error Correction Model (VECM) was used for the analysis because it restricts the long run behaviour of the endogenous variables to converge to their cointegrating relationships while allowing for a short run adjustment (Gujaratti, 2003). The VECM is of the form:

$$\Delta y_t = \alpha\beta' y_{t-1} + \sum_{i=1}^{n} \Gamma_j \Delta y_{t-1} + \pi + \varsigma_t,\ t = 1, \ldots, T$$

Where y_t is a vector of endogenous variables which include exchange rate, domestic price, interest rate and money supply. αs parameters measures the speed of adjustment through which the variables adjust to their long run values and the β' vectors are estimates of the long run cointegrating relationships among variables in the model. π is the drift parameter and is the matrix of the parameters associated with the exogenous variables the stochastic error term is also included in the specification.

The model to be estimated is thus stated below:

$$LRGDP = b_0 + Lb_1CPI + Lb_2SAV + Lb_3IMP + U_t$$
$$b_1 < 0 \quad b_2 > 0 \quad b_3 < 0$$

Where:

RGDP = Real Gross Domestic Product
CPI = Consumer Price Index
SAV = Aggregate Saving
IMP = a proxy for imported inflation
L = Natural Logarithm
U_t = Random Variable

The analysis of inflation growth relationship in Nigiera commenced with a look at the descriptive statistic. The result is shown int able 1 below:

Table1: Summary of Descriptive Statistic

	RGDP	IMP	CPI	SAV
Mean	256582.0	568885.1	2068.926	1644054
Median	251054.3	67608.55	282.9500	26726.25
Maximum	716949.7	4381930	8205.900	17837821
Minimum	4219.000	756.000	3.200000	341.0000
Std. Dev.	1989985	1001410	2819.661	4604838
Skewness	0.619120	2.340866	1.108744	2.738987
Kurtosis	2.683655	8.110708	2.737850	8.716242
Jarque-Bera	1.722184	1.063241	1.309962	2.923411
Observations	40	40	40	40

Source: Authors' Computation

The result in table 1 shows the descriptive statistic among the variables. The skewness which measures the asymmetry of the distribution fo the series around its mean has values greater than 0 except in one case. This indicates skewness to the right which implies that the distribution has a long right tail. The kurtosis which measures the peakedness or flatness of the distribution with an expected value of 3.0 shows that the domestic price and the Real Gross Domestic Product satisfies that condition. However, those of import and savings are leptokurtic (greater than 3). The Jarque-Bera test was used to test whether the random variables with unknown means and dispersion are normally distributed. It measures the difference between skewness and kurtosis. The Jarque-Bera test has the null hypothesis of normally distributed residuals. The probability value indicates an acceptance of the null hypothesis that the errors are normally distributed.

The test for stationarity of the variables is the next step fo the analysis. The summary of the Augmented Dickey Fuller (ADF) and Philip Perron (PP) unit root tests are shown in table 2 below:

Table 2: Summary of ADF and PP unit Root Tests Results

Variables	ADF			PP		
	Level	1st Difference	Order of Integration	Level	1st difference	Order of Integration
RGDP	1.359490	-3.896847*	1(1)	1.725714	-5.799121*	1(1)
IMP	-2.156916	-3.971171*	1(1)	-2.628883***	-8.967566	1(0)
LCPI	0.781752	-2.891708**	1(1)	-1.042341	-2.801423**	1(1)
SAV	1.130609	-3.425859**	1(1)	1.546985	-5.308538*	1(1)

NB: * Indicates statistical significance at the 1% level
** Indicates statistical significance at the 5% level
***Indicates statistical significance at the 10% level

The result of the ADF and PP unit root tests shows that all the variables except IMP in the Pp test were non stationary. All the variables are however carried along because as noted by Harris (1995) and Gujaratti (2003), variables that are integrated at different orders can also be tested for cointegration. The summary of the Johansen cointegration test is shown in table 3 below.

Table 3: Summary of Johansen cointegration Test

Hypothesised	Eigen value	Trace Statistic	5% CV	1% CV	Max-Eigen Statistic	5% CV	1%CV
None**	0.891059	168.9457	49.21	54.46	84.24	27.07	32.24
At most 1**	0.812662	84.70176	29.68	35.65	63.64	20.97	25.52
At most 2**	0.379856	21.05772	15.41	20.04	18.16	14.07	18.63
At most 3	0.073505	2.001156	3.76	6.65	2.90	3.76	6.65

Trace test indicates 3 cointegrating equation at both 5% and 1%, Max-eigen test indicates 3 cointegrating equations at the 5% level.

In table 3 above, both the trace and max-eigen statistics suggest the existence of a long run relationship among import, Real Gross Domestic product, Consumer Price Index and aggregate savings. Under this circumstance favouring a Vector Autoregression (VAR) in level or first difference, as opposed to a Vector Error Correction Model (VECM) may lead to misspecification because cointegration is established.

The number of cointegrating equations and the number of lags provided a guide for specification of VECM. The result of the VECH is shown in table 4 below:

Table 4: Vector Error Correction Result

Vector Error Correction Estimates
Date: 12/29/11 time: 10.52
Sample(adjusted): 1973 2009
Included observations: 37 after adjusting endpoints
Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1
LRGDP(-1)	1.000000
Limp(-1)	25.29814 (3.09896) [8.16343]
LCP1(-1)	-30.87474 (3.77789) [-8.17249]
LSAV(-1)	1.101014 (1.59997) [0.68815]
C	-123.9839

Error Correction	D(LRGDP)	D(LIMP)	D(LCPI)	D(LSAV)
CointEq1	0.014263 (0.00814 [1.75236]	-0.067029 (0.01702) [-3.93762]	0.012978 (0.00431) [3.01157]	-0.015578 (0.00835) [-1.86562]
D(LRDGP(-1))	-0.446313 (0.15917) [-2.80402]	0.728298 (0.33288) [2.18785]	-0.063210 (0.08427) [-0.75006]	0.047950 (0.016329) [0.29366]
D(LRDGP(-2)	-0.144770 (0.12396) [-1.16784]	0.120385 (0.25925) [0.46435]	-0.166608 (0.06563) [-2.53850]	-0.04120 (0.12717) [-0.11103]
D(LIMP(-1))	-0.280489 (0.16747) [-1.67489]	0.628812 (0.35024) [1.79539]	-0.174043 (0.08867) [-1.96291]	0.403055 (0.17180) [2.34608]
D(LIMP(-2))	-0.198326 (0.11604)	0.345790 (0.24268)	-0.056758 (0.06144)	0.044667

	[-1.70911]	[1.42486]	[-0.92382)	(0.11904)
				[0.37522]
D(LCPI(-1))	0.740314	0.038743	0.181507	
	(0.21309)	(0.44565)	(0.11282)	-0.155413
	[3.47419]	[0.08694]	[1.60881]	(0.21860)
				[-0.71094]
D(LCPI(-2))	0.106317	-1.461994	-0.183377	
	(0.24490)	(0.51218)	(0.12966)	-0.420150
	[0.43412]	[-2.85443]	[-1.41425]	(0.25124)
				[-1.67232]
D(LSAV(-1)	0.217654	0.055703	-0.084403	
	(0.18212)	(0.38087)	(0.09642)	-0.024796
	[1.19513]	[0.14625]	[-0.87535]	(0.18683)
				[-0.13272]
D(LSAV(-2))	0.023164	-0.279867	-0.135798	
	(0.15760)	(0.32960)	(0.08344)	-0.000761
	[0.14698]	[-0.84911]	[-1.62746]	(0.16168)
				[-0.00471]
C	0.035228	0.184147	0.348712	
	(0.10684)	(0.22345)	(0.05657)	0.305408
	[0.32971]	[0.824410]	[6.18205]	(0.10961)
				[2.78636]
R-Squared	0.619037	0.612447	0.501702	0.366097
Adj.R. squared	0.492049	0.483263	0.335603	0.154796
Sum sq.resids	3.765904	16.47149	1.055652	3.963245
S.E. equation	0.373467	0.781060	0.197733	0.383128
F. statistic	4.874772	4.740882	3.020498	1.732583
Log likelihood	-10.22952	-37.52891	13.29933	-11.17441
Akaike AIC	1.093488	2.569131	-0.178342	1.144563
Schwarz SC	1.528871	3.004514	0.257041	1.579946
Mean Dependent	0.072560	0.181360	0.210927	0.285486
S.D dependent	0.524013	1.086550	0.242585	0.416738
Determinant Residual Covariance		0.000309		
Log likelihood		-37.18324		
Log Likelihood (d.f. adjusted)		-60.49923		
Akaike Information Criteria		5.648607		
Schwarz Criteria		7.564293		

A comparison of the coefficient of the error correction terms (cointeq 1) at the bottom of table 4 for the first vector shows that LIMP has the most significant coefficient with a t value of -3.93762 and has the right negative sign. The SAV

also have the right sign with a t value of -1.86562. this suggests that the import and savings equations constitute the true cointegrating relationship in the first cointegrating vector. The others are either not significant or are wrongly signed. The result insinuates that about 0.07 percent of the disequilibrium in import is corrected each year and about 0.02 percent of the disequilibrium in savings is corrected each year. The error correction term for domestic price and Real Gross Domestic Product are statistically flawed. The error correction for RGDP (0.01) is wrongly signed while also falls out of the acceptable region of -1<error term<1). The result thus shows how Real Gross Domestic product responds to variation in the rate of inflation, import as well as aggregate savings. The variance decomposition of the variables forms the next section.

The result of the variance decomposition is shown in table 5 to 8 below:

Table 5: Variance Decomposition of LRGDP

Period	S.E.	LRGDP	LIMP	LCPI	LSAV
1	0.373467	100.0000	0.000000	0.000000	0.000000
2.	0.447992	89.60682	4.578479	1.94127	3.872579
3.	0.538700	85.39174	9.592099	1.385916	3.630243
4.	0.634267	82.65864	13.19617	1.057449	3.087744
5.	0.703608	84.21248	11.66107	0.978328	3.148124
6.	0.752837	84.94162	10.90118	0.861830	3.195274
7.	0.800723	85.21105	10.64114	0.772528	3.375282
8.	0.857683	84.72082	11.19219	0.680194	3.474683
9.	0.909375	84.69414	11.17052	0.660666	3.474683
10.	0.952088	84.89756	11.01368	0.607225	3.481533

Table 6: Variance Decomposition of LIMP

Period	S.E.	LRGDP	LIMP	LCPI	LSAV
1	0.781060	0.633618	99.36638	0.000000	0.000000
2.	0.873066	2.336541	82.81160	14.84573	0.006132
3.	0.900334	5.000381	78.92283	13,97288	2.103914
4.	0.923407	6.905445	75.09348	13.69962	4.301459
5.	0.999110	5.953445	77.91305	12.10136	4.132143
6.	1.053946	5.378423	75.57442	15.19150	3.855655
7.	1.087485	5.396037	75.35151	14.68130	4.571153
8.	1.110074	5.526263	74.39742	14.55485	5.521465
9.	1.141902	5.346028	74.63054	14.33989	5.783549
10.	1.173882	5.103905	74.03193	15.03289	5.831272

Table 7: Variance Decomposition of LCPI

Period	S.E.	LRGDP	LIMP	LCPI	LSAV
1	0.197733	8.933524	25.51559	65.55089	0.000000
2.	0.310356	6.855288	50.69092	41.72537	0.728423
3.	0.398713	5.455083	62.24831	28.56795	3.608661
4.	0.454486	4.198391	66.06340	24.57118	5.167021
5.	0.493400	3.794166	65.81675	24.72943	5.659648
6.	0.529892	3.974329	65.62838	24.31247	6.084824
7.	0.571599	3.792787	66.92390	22.93099	6.352319
8.	0.613109	3.501795	68.13561	22.07577	6.386823
9.	0.648364	3.197632	68.54154	21.76963	6.49119
10.	0.678993	3.161527	68.66315	21.44439	21.44439

Table 8: Variance Decomposition of LSAV

Period	S.E.	LRGDP	LIMP	LCPI	LSAV
1	0.383128	0.028804	0.139921	2.599483	97.23179
2.	0.541302	0.014475	1.036884	5.529893	93.41875
3.	0.680930	0.364712	8.072758	6.106667	85.45586
4.	0.791155	2.167779	12.75275	4.825224	80.25424
5.	0.886231	2.407858	13.30218	4.670265	79.61970
6.	0.970180	2.265077	11.73825	5.012233	80.98444
7.	1.04882	2.321492	11.31581	5.367541	80.99516
8.	1.115539	2.467835	11.4561	5.139133	80.90742
9.	1.18707	2.513866	11.74931	5.047869	80.68896
10.	1.245631	2.507530	11.60069	5.073247	80.81854
Cholesky Ordering: LRGDP, LIMP, LCPI, LSAV					

The result of the variance decomposition as shown in tables 5 to 8 indicates the percentages of variance as explained by the shock from the variable itself and the shocks from other variables in the model. An assessment of the result revealed that majority of the variances in the variables have been as a result of their own shocks. However, variables such as import and consumer price index had significant impact on the variances of other variables through the share of their shocks to these variables. For example, the share of import to other variables variances which explain the impact of imported inflation has been highly significant during the period under consideration. Although the share of Real Gross Domestic Product to its own shock was as high as 100 percent and 84.9 percent in the first and last period, the contribution of Real Gross Domestic Product shock to consumer price index declined from about 8.9 percent in the first period to 2.2 percent in the last period.

Following the variance decomposition of imports, other than its own shocks, shocks from consumer price index had the highest contribution to the variance decomposition of import. The contribution of IMP to the variance decomposition of consumer price index rose from 25.5 percent in the first period to about 68.7 percent in the last period. The implication of this result is that the volatility of import has significant effect on domestic price level in Nigeria and also on the level of economic growth. As a result, government policies that targets imports could play significant role in controlling domestic consumer inflation which will improve the level of economic growth.

6. Conclusion

The aim of this paper was to assess the relationship between the general price level and the level of economic growth in Nigeria using the VECM. The analysis started with the descriptive statistic which showed that the errors are normally distributed and that the distribution has a long right tail. The time series properties of the variables were assessed using the ADF and PP unit root tests. All the

variables were found to be non-stationary, except import in the PP test. The cointegration and VECM established a long run equilibrium relationship among the variables. The result of the variance decomposition finds evidence of fluctuations in domestic prices induced by changes in import. The same was not true for savings. The result from the parsimonious ECM model in the appendix further showed that imported inflation had a negative impact on the level of economic growth in Nigeria. It is thus recommended that any attempt by government to stabilise inflation and increase growth should first discourage excessive importation through an expansion in domestic production.

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Appendix

Dependent Variable: DLRGDP
Method: Least Squares
Date: 12/29/11 time: 11:27
Sample(adjusted): 1972 2009
Included observations: 38 after adjusting endpoints

Variable	Coefficient	Std.Error	t-Statistic	Prob.
DLIMP	-0.604560	0.148166	-4.080291	0.0003
DLIMP(-1)	-0.452825	0.202501	-2.236160	0.0313
DLSAV	0.528198	0.182635	2.892096	0.0076
DLSAV(-2)	-0.103830	0.239450	-0.433620	0.6675
ECM(-1)	-0.569649	0.141370	-4.029489	0.0003
C	0.223466	0.139457	1.602397	0.1189
R-Squared	0.344543	Mean dependent var		0.132214
Adjusted R-squared	0.242128	S.D dependent var		0.634348
S.E. of regression	0.552236	Akaike info criterion		1.794258
Sum squared resid	9.758884	Schwarz criterion		2.052825
Log likelihood	-28.09091	F-statistic		53.36418
Durbin-Watson stat	1.971841	Prob(F-statistic)		0.000000