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Relationship between Export Earnings Fluctuation and Nigeria's Economic Growth (1987-2015)

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Abstract: This study examines the relationship between export earnings fluctuation and economic growth of Nigeria. Export earnings in Nigeria has over the years fluctuated, especially earnings from oil sector which constitute the major sources of government revenue in Nigeria. The data for this research work was obtained from the CBN Statistical Bulletin and analysed using ordinary least square (OLS) analysis. Export fluctuation index was calculated using the normalization approach combined with a 4 year moving average method. Gross Domestic Product (GDP) was regressed against Nigeria Oil Export (NOXP), Nigeria Non-oil Export (NNXP), Domestic Investment (INV) and Export Fluctuation (EF). The result shows that the export earnings have little or no effect in the short-run. Co-integration test reveal that the entire variables have long run relationship with GDP in Nigeria within the sample period. The unit root test indicates that the entire variables were stationary at level, first or second differencing.

Key words: Export earning · Economic growth · Nigeria · Gross domestic product

INTRODUCTION

Economic growth is the desire for higher levels of real per capital income. Economists, policymakers, public and private sectors work ceaselessly trying to attain economic growth by the use of development and growth models and polices. Over the years, development economies as trade provide both foreign exchange earnings and market stimulus, for accelerated economic growth. Nigeria, which is a developing economy, is basically an open economy with international transactions constituting a significant proportion of her aggregate output.

The economic development of Nigeria to a large depends on her trade with other nations, [1], in his study of the Nigerian economy, investigated the link between and growth via quantitative methods and noted that a strong positive relationship exists between export and economic changes [2]. Nigeria's trade relations revolve the oil and natural gas sectors after the economic reforms of 2005, the government is making diversify its export profile beyond the oil sector, to sectors such minerals and agricultural products. Presently through oil and natural gas are the most important exports products for Nigerian trade. The country exports approximately 2.341m barrels per day, according to the 2015 figures. In terms of total oil export, Nigeria ranks 5th in the world as at 2015, Nigeria has approximately 37.19B barrels oil reserves [3]. Despite large scale liberalization efforts, this sector is under close check of the government agencies.

Prior to oil production, which surged after the 1970s, agricultural sector was the largest export sector for Nigeria, after the country became a largely oil-intensive economic and agricultural sector took a back sit. However, it still provides employment to almost 70% of the total working population [4]. But the ability of trade to engineer growth in developing countries has increasingly being under mined dilapidating effects of fluctuations in export earnings and the direction of trade is concentrated in favour of developed countries, consequently the cyclical movements in this countries are promptly transmitted to less developed countries, leading some of the exports earning fluctuations in developing countries [5].

Export fluctuations have been discussed in most development literature. It has been shown that annual fluctuations in export earnings are more prominent in third world countries and there is an appeal to the proposition that fluctuations in the export sector, per se, must deter economic growth and development, official United Nations publication and the development plans of many countries condemn export earning fluctuations. Many developing countries have very low domestic demand for

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their productions, which makes export earnings as the main source for their economic growth, so it becomes an important variable for all economies because they are linked through globalization and receive foreign exchange reserves selling out exports that is an important source for developing countries to recover their balance of payment gap and for the payment of their imports. It is against this background that this work studies the impact of our export earning fluctuations on the economic growth [6].

The issue of export fluctuations has resurfaced as an important international trade issue with increasing trade deflicts of many developing countries in Africa. Like many other countries, Nigeria requires a substantial level of imports of capital and intermediate goods, oil and raw-materials. The ability to import these goods however depends on the export earnings, the terms of trade, the extent of foreign borrowing and the exchange rate of our country.

Export earnings fluctuations could have different effect on economic growth, decrease export earnings or fluctuations in export earnings imply inability to import input or inability to import them at the time when needed during production process. Therefore, export earnings stability and growth of export earning will have a strong impact on economic growth [7]. Export earning fluctuations also affect the government development plans because government takes large number of revenues to finance this plans from export taxes and duties.

Looking down memory lane, we found out that Nigeria remained a net exporter of agricultural products between 1960 and 970 [8]. Goods exported includes palms oil, palm kernel cotton, groundnut, etc; agricultural through export of non-oil products had a rosy record contribution of up to 80% of the gross domestic product and providing employment of over 70% of the work population. But recently there has been a steady decline in terms of agricultural product, to export and an abandonment of sector by a large percentage of the work force [9].

It is therefore important to assess the impact of our export earning fluctuations on economic growth and more so because the economy is said to be doing well in spite of those challenges, according to 2013 figures, the country has been recording impressive growth rates and in fact had a 7% rate of growth in 2014. The study assesses the impact of export earning fluctuations on GDP of Nigeria and the impact of export earning fluctuations on domestic investment in Nigeria with a time range of 1987 to 2015.

Methodology and Estimation Procedures: The study adopted the quantitative research design using ordinary least square (OLS) method of regression. Ordinary least square (OLS) is adopted because of its simplicity and estimates obtained from this procedure have optima properties including linearity, Unbiasedness, minium variance, zero mean value of the random term, etc. [10]. The data for this research projects were obtained majorly from Central Bank of Nigeria annual report and account, bulletins and CBN economic and financial reviews and other mainstream economic publications.

The study adopts the standard normalization approach combined with a moving average method. The merits of this method are that it distinguishes between rise and fall, temporary and permanent and stochastic and predictable changes of export earnings. This approach has been used by Akpokodje (2000), [11], to estimate export earnings fluctuation for Nigeria. The export earnings fluctuation index (FTt) is obtained by applying the formula below:

$$F_t = \frac{|Xt\text{-}X4j}{\sigma 4j} \quad (1)$$

Where; $X4_j$ = $¼\sum_{j=t-3}^{t}$ Xj, X_t = export earnings; $\sigma 4_j$ = standard deviation of the export earnings of a four-year period; $X4_{j=}$moving average over the same four-year period.

Justifications for the use of the research variables are explained thusly; The GDP being the leading world economic indicator of growth is a representation of the productive capability and results of an economy; it is used as the dependent variable to better capture the efect of other independent variable on the Nigerian economy. Secondly, Nigeria Oil Export sector is the leading variable of Nigeria's earning power, majority of our export is actualized through this channel, the study needs an export variable for the model, therefore our oil export is subtituted since it is a major export variable. Thirdly, Nigerian Non Oil Export captures the export from other sectors of the economy apart from the oil sector. It signifies export produce from the agricultural, mining, manufacturing sectors etc. thus its relevance in the model. The Export Earning Fluctuations is one of the key variables used in the study, it is part of the export variable, its relevance is expressed in the research topic tiself and Domestic Investment or capital formation as it is widely known is one of the leading economic indicators of growth, also if has been proven to have a significant effect on GDP (Gross Domestic Product).

Hypotheses has earlier been stated in this study with the view of evaluating the impact of export earnings fluctuation on economic growth of Nigeria. In capturing the study, we use the neoclassical growth model, otherwise refered to as the growth accounts form the basis of the economies to be analyzed and it is used in conjunction with aggregate production function. This application has been widely used; using a production function approach, it states that the growth rate of output (GDP) is principally determined by the following factors: The rate of growth of gross labour/or the rate of growth of its quality, multiplied by the labour income share; the rate of growth of gross capital input and/or the rate of growth of its quality, multiplied by the capital income share; and change in technology or total factor productivity (TFP).

This is given as:

$$g = f(L, K, T) \quad (2)$$

Where; g = growth of GDP; L = Labour; K = capital formation/investment; and T = technology.

The above equation is remodeled to accommodate other determinants of economic activities which include the key variables to be considered in this study. These include Nigeria oil export, Nigeria non-oil export, Export fluctuations and investment. In this case the export variable is divided into the Nigeria Oil Export, Nigerian Non-Oil Export and the Export Fluctuations. Thus, the model is symbolically represented in its functional form as:

$$GDP = f(OXP, NOXP, EF, INV) \quad (3)$$

Where; GDP= Gross Domestic Product; OXP= Oil Export; NNXP= Non-Oil Export;
EF= Export Fluctuation; INV= Investment

The linearized model specification for the analysis is given as

$$GDPtb_o + b_1NOXP + b_2NNXP + b_3EF + b_3INV+Ut \quad (4)$$

Where; b_o= Constant term/parameter intercept; b_1 and b_2 =Coefficients of the parameters estimates; $U=_t$ Error term

As efforts will be made to rescale the data, the log function is thus expressed as follow:

$$LOG\ (GDP) = b_0 + b_1LOG(NOXP) + b_2LOG(NNXP) + b_3LOG(EF) + b_4LOG(INV) + Ut \quad (5)$$

At this level of research using time series data; the researcher estimates the model with Ordinary Least Square (OLS) method. This method is prefered to others as it is the best linear unbiased estimator with minimum variance, zero mean value of the random terms, etc [4]. In the preliminary test, the following tests shall be conducted. They include: Unit Root Test, Co-Integration Test, Granger Causality test, Error Mechanism test (ECM) and Co-efficient of determination among others.

RESULTS

Having estimated the model, the variables considered are gross domestic product (GDP) (dependent variable), Nigeria oil export (NOXP), Nigeria non-oil export (NNXP) Export fluctuations (EF) and Domestic investment (INV) were all used as the independent variables. The result covers the period of year 1987 – 2015.

From the table 1 above, the result reveal that both gross domestic product and export fluctuation were stationary at level while the Nigerian Oil export and Investment were stationary at first difference and the Nigerian Non-Oil export was stationary at second difference given the 5% level of signifcance. Hence, since all the variables are not stationary at the level and are not integrated of the same order, co-integration analysis is justified. We there proceed to conduct the long run relationship of the variables and their short term speed of adjustment to equilibrium.

Presentation of Results:

Table 1: Unit Root

Augmented Dickey Fuller Result at Level, First and Second Difference, Trend only								
Variables	ADF @ Level	1st Difference	2nd Difference	Critical value (1%)	Critical value (5%)	Prob. (%)	Order of integration	Remark
GDP	4.745560	4.413048	3.209989	-3.661661	-2.976263	1.0000	1(1)	Stationary
OXP	0.204740	-4.372543	-4.879850	-3.661661	-2.960411	0.9685	1(2)	Stationary
NNXP	-1.805274	-2.003848	-8.113964	-3.689194	-2.971853	0.3703	1(3)	Stationary
EF	-5.255787	-5.488313	-3.894998	3.699871	2.976263	0.0002	1(1)	Stationary
INV	-0.599311	-5.091657	-5.331218	-3.661661	-2.960411	0.8568	1(2)	Stationary

Source: Researcher's Computation using E-views 7.0

Table 2: Cointegration Test

Unrestricted Co integration Rank Test (trace)				
Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical value	Prob.**
None*	0.918682	171.4431	69.81889	0.0000
At most 1 *	0.879006	103.6895	47.85613	0.0000
At most 2 *	0.631864	46.66514	29.79707	0.0003
At most 3 *	0.512613	19.68398	15.49471	0.0110
At most 4	0.010286	0.279173	3.841466	0.5972

Trace test indicates 4 co integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

* MacKinnon-Haug-Michelis (1999) p-values

Source: Research's Computation using E-views 7.0

Table 3: Granger Causality Test

Lags: 3			
Null Hypothesis	Obs	F-Statistic	Prob.
NOXP does not Granger Cause GDP	29	6.71735	0.0022
GDP does not Granger Cause NOXP		4.43661	0.0139
NNXP does not Granger Cause GDP	29	16.2517	9.E-06
GDP does not Granger Cause NNXP		12.4787	6.E-05
EF does not Granger Cause GDP	26	1.14376	0.3569
GDP does not Granger Cause EF		1.87317	0.1684
INV does not Granger Cause GDP	29	10.5338	0.0002
GDP does not Granger Cause INV		3.87862	0.0229
NNXP does not Granger Cause NOXP	29	7.37621	0.0013
NOXP does not Granger Cause NNXP		13.1526	4.E-05
EF does not Granger Cause NOXP	26	1.76940	0.1871
NOXP does not Granger Cause EF		0.00999	0.9986
INV does not Granger Cause NOXP	29	5.42447	0.0060
NOXP does not Granger Cause INV		8.00763	0.0060
EF does not Granger Cause NNXP	26	0.05638	0.9819
NNXP does not Granger Cause EF		1.14823	0.3552
INV does not Granger Cause NNXP	29	11.2109	0.0001
NNXP does not Granger Cause INV		7.83579	0.0010
INV does not Granger Cause EF	26	0.33925	0.7972
EF does not Granger Cause INV		0.28099	0.8384

Source: Researcher's Computation using E-views 7.0

From table 2 above, since the computed trace statistic i.e. (171.4431, 103.6895 and 46.85613) is greater than their respective T-Adf. i.e. the critical value (69.81889, 47.85613 and 29.79707) at 5% levels of significance or since the Eigen value (0.918682, 0.879006 and 0.613864 > 0.05) are greater than 5% level of significance, we reject Ho and conclude that there is at least four co-integrating equation and that all the variables are co integrated. Put differently, there is a sustainable long-run relationship (i.e. steady-stated path) between gross domestic products (GDP), Nigeria oil export (NOXP), Nigeria non-oil export (NNXP), Export fluctuation (EF) and Domestic investment (INV).

$$GDP = -1409.966 + 2.96586NOXP - 46.22664NNXP - 202.4506EF + 9.55468INV$$
$$(0.30629) \quad (9.10718) \quad (479142.) \quad (0.71788)$$

The result above is the coefficient of the explanatory variables which indicate the direction of strength of the relationship between explanatory variables and economic growth in the long run. The figures in the parenthesis were the asymptotic standard error. The result reveal that one million increase Nigeria oil export will bring about N2,965,867 increase on the gross domestic product, at the same time one million increase in Nigeria non-oil export will bring about N4,622,664 decrease in gross domestic product, also one million increase in export fluctuations will bring about N2,024,506 decrease in the gross domestic product, again one million increase in domestic investment will bring about N9,552,468 increase in the gross domestic product, all other factors affecting gross domestic product remaining constant.

In attempt to investigate properly the link between export earning fluctuation and Nigeria's economic growth led the researcher to test for the causality between the two phenomenon in question. From the pair wise granger caudality tests, the first null hypothesis which say that GDP does not Granger Cause EF is accepted since the P-value (0.1684) in the third row is greater than 5% level of signifance, in order words 0.1684 > 0.05.

On the other hand, the second null hypothesis is the same row, which says that EF does not Granger Cause GDP, is accepted since the P-value (0.3569) is more than the 5% level of significance. From the analysis, it is a clear indication that there is no unidirectional relationship between economic growth and export earning fluctuation in Nigeria.

In the fourth row the null hpothesis that says investment does not granger cause GDP is rejected because the p-value is less than 5%, in that same row the null hypothesis that says GDP does not granger cause investment is also rejected because p-value in less than 5%, in essence investment has a direct influence on GDP and vice versa. In the second row the null hypothesis Nigerian non oil export does not granger cause GDP is accepted because p-value exceeds 5%, the next hypothesis that says GDP does not granger cause Nigerian non-oil export is accepted because the p-value is greater than 5%, in essence the Nigerian non oil export does not influence GDP and vice versa. In the first row the null hypothesis for both causality are accepted since their p-values exceeds 5%, in essence oil exports does

Table 4: Vector Error Correction Estimates

Error Correction:	D(GDP)	D(NOXP)	D(DNNXP)	D(EF)	D(INV)
CointEq1	-0.34449	0.021623	-0.009194	2.40E-05	-50729667
	(0.19475)	(0.04120)	(0.00388)	(4.7E-05)	(2.1E+07)
	[-1.56327]	[0.52488]	[-2.367631]	[0.51337]	[-2.45438]
D(GDP(-1))	0.899813	0.037049	-0.001054	0.0000106	57573051
	(0.32288)	(0.06830)	(0.00644)	(7.8E-05)	(3.4E+07)
	[2.78682]	[0.54244]	[-0.16366]	[1.36491]	[1.68010]
D(GDP(-2))	0.211001	-0.064225	-0.000970	-0.000137	-94668909
	(0.28796)	(0.06091)	(0.00574)	(6.9E-05)	(3.1E+07)
	[0.732275]	[-1.05437]	[-0.16891]	[-1.98332]	[-3.097691]
D(NOXP(-1))	-5.080066	0.333877	-0.028580	-3.44E-05	-6.62E+08
	(2.05684)	(0.43509)	(0.04101)	(0.00049)	(2.2E+08)
	[-2.46983]	[0.76737]	[-0.69684]	[-0.06956]	[-3.03241]
D(NOXP(-2))	-1.560699	0.487368	-0.103968	0.000390	3.25E+08
	(2.52486)	(0.53410)	(0.05035)	(0.00061)	(2.7E+08)
	[-0.61813]	[0.91251]	[-2.06509]	[0.64397]	[1.21272]
D(DNNXP(-1))	-1.184816	-12.14843	-0.933560	-0.007001	1.07E+10
	(16.3418)	(3.45686)	(0.32585)	(0.00392)	(1.7E+09)
	[-0.07250]	[-3.51430]	[-2.86495]	[1.78418]	[6.16292]
D(DNNXP(-2))	24.39227	-4.388778	-0.436585	0.001369	9.75E+09
	(19.3431)	(4.09174)	(0.38570)	(0.00464)	(2.1E+09)
	[1.26103]	[-107260]	[-1.13193]	[0.29478]	[4.751371]
D(EF(-1))	237.9039	23.97758	1.316506	0.065659	6.51E+10
	(1019.14)	(215.585)	(20.3217)	(0.24472)	(1.1E+11)
	[0.23343]	[0.11122]	[0.06478]	[0.26830]	[0.60222]
D(EF(-2))	-901.2159	-365.2672	32.14956	-0.649895	-1.97E+11
	(1020.15)	(215.798)	(20.3418)	(0.24496)	(1.1E+11)
	[-0.88341]	[-1.69263]	[1.58046]	[-2.65303]	[-1.81660]
D(INV(-1))	-9.46E-10	3.17E-10	-2.02E-11	-2.17E-13	-0.345581
	(1.8E-09)	(3.8E-10)	(3.5E-11)	(4.3E-13)	(0.18868)
	[-0.53190]	[0.84326]	[-0.57013]	[-0.50919]	[-1.83152]
D(INV(-2))	8.99E-10	8.64E-10	9.12E-12	5.59E-13	-0510023
	(1.3E-09)	(2.7E-10)	(2.5E-11)	(3.0E-13)	(0.13450)
	[0.70933]	[3.22222]	[0.36093]	[1.83786]	[-3.79187]
C	3855.079	3.894592	79.90056	-0.132201	5.75E+11
	(2095.32)	(443.233)	(41.7806)	(0.50314)	(2.2E+11)
	[1.83986]	[0.00879]	[1.91239]	[-0.26275]	[2.58443]

R^2 = 0.7573D-W = 2.1465

F-statistics = 17.94F*(P-value) = 0.000001

Source: Researcher's Computation using E-views 7.0

influence GDP and vice versa. In the tenth row the null hypothesis that export fluctuations does not cause investment is accepted because the p-value is greater than 5%, in the same row, the second null hypothesis that investment does not granger cause export fluctuations is accepted since the p-value exceeds 0.05.

Vector Error Correction Mechanism: The existence of a long-run co-integration equilibrium provides for short-term fluctuations. In order to strengthen out or absolve these fluctuations, an attempt was made to apply the Error Correction Mechanism (ECM). As noted, the ECM is meant to tie the short-run dynamics of the co-integrating equations to their long-run static dispositions.

From the result the coefficient of error correction term is -0.3044. This shows that 30.44% of the errors in the short run are corrected each year. Thus, the coefficient captures the speed for adjustment at which the short-run of GDP ties with its long-run. The result is significant since the coefficient of multiple determinations (0.7573) is greater than 60%. And also, the error correction coefficient has ngative sign which indicate that there is feedback from the previous year's disequilibrium or that the explanatory variables have power to correct the disequilibrium each year.

Also the computed R^2 value (0.7573) of which is the coefficient of multiple determinations indicates that our model satisfies the requirment for goodness of fit. The value shows that 75.73% of the variations in he gross domestic product (GDP) are explained by the variation of the explanatory variables namely; Nigeria oil export (NOXP), Nigeria non oil export (NNXP), Domestic investment (INV) and export earning fluctuations (EF), while the remaining 24.27% is explained by variable not included in the model. The regression plane of the model indicated that the joint influence of the explanatory variable is t-statistically significant. This is confirmed by the P-value [0.4258] of F-statistic of Breusch-Godfrey Serial Correlation LM test.

Economic theory imposes a restriction on the signs and magnitudes of economic relationships. In view of this, the coefficients of the explanatory variables in the estimated model presented above all confirm to the a priori expectations as analyzed below.

From the regression result presented in table 3 other factors (affecting GDP) remaining constant, the researcher deducted as follows:

As Nigeria Oil Export (NOXP) increases by, say, one million, Gross Domestic Product (GDP) on the average increases by N2,965,876. As Nigeria Non Oil Export (NNXP) increases by, say, one million naira, Gross Domestic product (GDP) on the average increases by N4,622,664. Also as Export fluctuations increases by, say, one million naira, Gross Domestic Product (GDP) on the average decreases by (N2,024,506) and as Domestic investment (INV) increases by, say one million naira Gross Domestic Product (GDP) on the average increases by N955,246,899.

CONCLUSION

The empirical research reveals that export earnings fluctuation captured by the moving average changes in oil and non-oil export had significant long-run influence on Nigeria economic growth during the period under review. The results shows that oil and non-oil changes have no significant relationship in the short-run but have a significant negative relationship with economic growth in the long-run.

The implicaition is that in the long-run it could lead to loss of foreign exchange, capital flight and an unfavourable balance of payment which will in turn culminate into reduction in our ability to sustain economic growth at large. Nigeria needs to improve her trade policies with the rest of the world for the country to stabilize our sources of exports to keep a persistent balance of payment and sustained level of economic growth. The negative sign of the ECM indicates that the dependent variable has power to adjust to short term fluctuations of the explanatory variables in the long-run. This sign is necessary giving the inconsistent nature of export earning in Nigeria, which are often distorted by the social economic, political condition, regional policies and prevailing economic condition in the country.

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