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Investigating the Role of Diversification on Economic Growth in Nigeria; New Evidence from SVARs

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Abstract

Fluctuations in oil prices have caused economic contractions and challenges to oil-exporting economies. In particular, Nigeria suffers both the previous and current global oil price shocks and this has raised concerns among policymakers, governments, and economic analysts because of the impact of oil and oil prices in Nigeria's macroeconomic development. However, this paper investigates the role of diversification on economic growth in Nigeria using annual data from 1986 to 2018. The techniques applied showed that only remittances and official development assistance have affected economic growth in the short run. However, the coefficients of one period lagged indicated that the system is capable of adjusting to its long-run equilibrium condition after some shocks in the system. The findings from variance decomposition indicated that diversification plays a positive role on economic growth in both the short and long-run horizons. By overall implication, the study concludes that diversification has a positive role on Nigeria's economic growth. Therefore, the study recommends the need for the government to provide active and inclusive policies such as soft loans and commercial agricultural programs to improve its export of agricultural output competitiveness, improve supervisory and regulatory frameworks in the financial sector to ease remittances inflow. For these reasons, diversifying the economy from oil revenue is the ultimate goal for achieving sustainable economic growth and development goals or targets by the year 2030.

Keywords: Nigeria; Diversification; Economic growth; Cointegration Agriculture.

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1. Introduction

Globally, oil and fuel-related commodities have become sources of significant revenue to oil producing economies over the last five decades. For example, World Bank ranked Kuwait, Oman, Saudi Arabia, Bahrain, Iraq, Qatar, Libya, Venezuela, and Nigeria as the top countries that largely depend on oil exports and revenues over 80 percent. However, T. Bowler, 2015 [1], argues that fluctuations in oil prices have been causing serious economic contractions and challenges to these economies. For example, from 1985 to 1986 a supply shock posed pressure on oil prices to decline while from 2008 to 2009, the decline in oil prices resulted from a collapse in demand. Yet, there was a stunning decline from $108 per barrel in January 2014 to a less than $38 per barrel in June 2016 (i.e., 65 percent decline in the price of Brent oil). Recently, in March 2020, there was a historical sharp decline in the oil prices to below $20 due to global lockdown, fall in oil demand, slow or closure of business activities caused by the outbreak of corona virus the world over. The price drop was last seen in 18 years when the international benchmark of Brent oil dropped by 8,7 percent to $22.76 per barrel in 2002. The recent drop in the oil prices had raised concerns among policymakers, governments, and economic analysts because of the impact of oil and oil prices on the global macroeconomic development. For example, Saudi Arabia has since started far-reaching economic reforms that would diversify its economy over the next decades from its so much dependence on oil revenue and falling oil prices under the vision 2030 program. Therefore, it becomes imperative for Nigeria as a nation to adopt economic alternative reforms that will enhance economic growth and which are independent of oil revenue since it is evident that the Nigerian economy generates its incomes largely from oil and gas up to about 35 percent of Gross Domestic Products, 95 percent export incomes as well as 70 percent of government revenue. The fact is that a rise in oil price inevitably influences net export as well as the budget incomes of oil-exporting economies and in turn, will strengthen financial development, primarily through expansionary monetary policy [2;3;4]. However, a decline in the oil price usually contracts the growth of these economies particularly those economies that do not have an oil price benchmark in their budgetary plans. For example, Nigeria's oil income fell to $41.33 billion (organization for petroleum exporting countries [5]. This means that the drop in oil prices in the global market induces a weak budget implementation in the Nigerian economy and this may pose difficulties in accomplishing a feasible level of development. It is a known fact that in the 1960s before the 1970s discovery of oil, agriculture and the non-oil sectors contributed as much as 65% to the export-based (as a% GDP). For example, the oil boom of 1973 to 1974 brought about a significant impact on the Nigerian economy indeed till the early 1980s. Agriculture and other non-oil sectors' contributions dropped drastically to 30% [6]. U. E. Chigbu 2005 [7], argues that farming gave more than 80% of Nigerian trade profit within the 1960s, 65% of the whole yield of the GDP created by business, and around 50% of government income. L. Ekechukwu 2009 [8], also maintains that tourism another non-oil sector that is known to form employments at different levels that are fundamental to the development of the Nigerian economy. G. C. Creaco and his colleagues 2003 [9], observed that tourism is currently one of the world's biggest businesses. It is a known fact that the world economy depends largely on three major industries and these are media transmission, tourism, and innovation [10]. The government in this manner ought to get the relative significance of tourism to their locale, counting tourism's commitment to financial activities within the zone [11]. With the recent advancement in information and communication technology, the service sector is coming of age to enhance the socio-economic development and advancement of any country. M. A. Latha 20016 [12], argues that

the development rate of the service sector is contributing much more as well as creating employments that expand incomes more than any other sector. Accordingly, Cape Verde and Senegal like Nigeria, in turn, rank among the strike beneficiary of remittance in West Africa. As a little Island country, Cape Verde's economy like intensely subordinate on settlement and this may be seen in their commitment to the nation's GDP. Concurring to official gauges, almost one-third of the populace of Cape Verde live overseas, even though few researchers put the figure well over that, contending indeed that the number of displaced people surpasses the entire inhabitant populace of Cape Verde [13].Similarly, S. Mopathra and his colleagues 2011 [14], finds that remittances received by African countries from their citizens abroad have significantly been higher than FDI, equity flows, and portfolio debt to the extent that it can only compared with official development assistance from both bilateral and multilateral donors. Accordingly, it can be understood that remittances are being considered as a moderately appealing source of foreign aid for nations that can be utilized to advance financial advancement and resolve any emergency circumstance. Diversification is a technique that reduces the risk of dependence on one line of production to a new field(s) which stimulates and expands the existing or traditional products or revenue. Diversification does not hinder specialization but ensures that national resources are channeled into the best alternative uses or line of investment and production [15]. Economic diversification could be a pillar of sustainable economic growth development. The empirical findings related to economic diversification have become a subject of concern among researchers to formulate further hypotheses to explain if diversification plays any role on growth and to ask how does the level of agriculture production, service sector output, official development assistance, remittance inflow, and tourism affect growth with particular interest to developing nations such as Nigeria because it can be understood that the literature is related to economic complexity in developed economies and panel analysis[16,17,18,19,20]. Therefore, this study seeks to feel this gap because the need for diversification has been acknowledged as well as put forward in key internationally agreed development goals such as the Decade 2011-2020 (Istanbul Programme of Action) for developing nations and the Sustainable Development Agenda for 2030 among other programs. Our key contribution to the literature is to investigates the role of diversification on growth in Nigeria and to answer how does the level of agriculture production, service sector output, official development assistance, remittance inflow, and tourism affect growth in Nigeria because the need for diversification has been acknowledged as well as put forward in major globally established development goals such as the Sustainable Development Agenda for 2030 among other programs which are seldom considered. Our contribution to the study is in this direction and to the best of researchers' knowledge will help in creating jobs, fostering structural transformation, and achieving sustainable economic growth in Nigeria. The objective of this study is to empirically investigate the role of economic diversification on economic growth in Nigeria using annual data from 1986 to 2018. The paper is organized as follows; section two reviews the related literature, the methodology is discussed in section three, section four presents the analysis and discussion. Finally, section five discusses the research conclusion and implications.

2. Literature Review and Theoretical Framework

Several research findings have been related to economic complexity and these findings have uncovered some stylized facts concerning the pattern of diversification of economies. These patterns are mostly associated and limited to theories of economic growth, technological change, structural transformation, and trade [21]. This study will connect these findings to enrich our understanding of the role of diversification on economic growth.

The knowledge of the relationship could be of economic benefit to policymakers in Nigeria to design and implement policies as well as strategies that will enhance economic growth. For example, E. Report 2016 and H. Lei **a**nd his colleagues 2014 [22,17], empirically find that economies that diversified their production and export base tend to have higher levels of GDP. Similarly, R. Hausman **a**nd his colleagues 2014 and UNECA, 2015 [19,23], argue that economies that diversify tend to export products that are highly needed in terms of demand than their existing exports. C. S. Hendrix, 2019 [24] argues that nations with higher levels of oil and gas reliance and having a larger population have been found to witness effective diversification particularly in the course of the commodities boom. However, Doreen W. 2020 [25,26,17], maintain that empirical regularity confirms that the usual product line of an economy influences the impending and innovative products that may perhaps surface in the country. Thus, H. Lei **a**nd his colleagues 2014 C. Fereire 2017 [27], argued that empirical regularity is discussed in various literature strands and that diversification depends largely on pathways because it is difficult for economies to diversify directly from an existing product-mix to another new product that is far away when compared with the capacities of both productions. E. W Djimeu **a**nd his colleagues [28], consider that diversification approaches ought to consider the recurrent position of the economy. For example, oil booms may negatively influence economic diversification in the economies with low diversification plans while the oil boom will not affect the highly diversified economies. However, other studies see diversification as a political instead of a financial issue. For example (Malik, 2016) argues that most oil economies rest on support and control where mostly the governing elite have no incentive to diversify. M. Hvid, 2013 [29], asserts that diversification is a means of securing stable national revenue levels in the future in an economy. G. E. Esu **a**nd his colleagues 2015 [30], finds that diversifying the Nigerian economy can induce large scale industrialization of the real non-oil sector, technological spillovers that can benefit both trade and investment, and help in improving the agricultural sub-sector, to mention but just a few. Equally, M. A. Yusuff **a**nd his colleagues 2015 [31], findings reveal that a unilateral causality and positive long-run association between tourism development and economic growth in Nigeria. Using input and output techniques, T biau Lin **a**nd his colleagues 1984[32], found that the labor productivity and the content of valued added of tourism particularly when compared to domestic manufacturing is comparatively high because involves the use of a small number of laborers, little energy, fair amounts of capital as well as appreciable amounts of skills in tourism development. They argued that due to minimal import protectionism in Hong Kong, tourism growth is more stable than many major commodity exports. O. I. Oji, 2011 [33], found a positive association connecting economic growth, FDI, domestic saving, and government expenditure on agriculture. However. lawal **a**nd his colleagues [34], found that government expenditure has not pursued the usual pattern but the contribution of the Agric sector to the GDP indicates a clear connection in the sector with government expenditure. In a study in Turkey by M. Zurtuk 2009 [35], who investigated the connection between the development of tourism and economic growth, the study finds a unidirectional causality running from tourism development to economic development. Similarly, F. M. Kreishan, 2009 [36], finds a positive association linking economic development and tourism development. Another finding from the study shows a unidirectional impact running from tourism earnings to economic performance. The foregoing mixed and inconclusive empirical findings related to economic diversification have become a subject of concern among researchers to formulate further hypotheses to explain if diversification plays any role on growth and to ask how does the level of agriculture production, service sector output, official development assistance, remittance inflow, and tourism affect growth with particular interest to developing

nations such as Nigeria because it can be understood that the literature is related to economic complexity in developed economies and panel analysis(see: [16,17;18,19,20]. Therefore, this study seeks to feel this gap.

2.1 Theoretical Framework

It is known that; most economic theories are related to the optimum allocation of scarce resources. However, these theories have not been accepted within the realm of economic diversification because they failed to specifically deal with economic diversification. For example, K. Paul, 1991 [37], believes in the varieties of products with imperfect substitutes failed to specify which nations should specialize in a specific product because of the continuum assumption of symmetric goods and services. Also, economic theories that concentrate on technological progress have a chance to be related to diversification. For instance, studies on growth hypothesis have emphasized that technological change has a role to play in achieving growth [27]. However, none of these models or theories examined above gives details about economic magnitudes of output growth but the employment effect is reasonable to investigate this approach related question that connects diversification with the basic economic dynamics of affected countries. This study is within the framework of structural economic dynamics (SED) along with endogenous technological changes [38,39,40]. This can be beneficial particularly in the agricultural sector output global competitiveness as well as development in production and consumption pattern in line with a generalized form of Engel's law. D. Gualerzi, 20012 [41], argues that SED recognizes the effect of potential goods and services within the demand for old products mix. Similarly, R. Plassard, 2015 [42], maintained that the model utilizes the Keynes-kulecki rule of effective demand. However, the model does not incorporate full employment, instead, it uses the adjacent possible concept to formalize path dependence in line with the diversification process [43]. Accordingly, the model formalizes economic diversification endogenously determined in the model which can be applied to a multi-sector economy pursuing economic diversification**.**

3. Material and Methods

3.1 Data sources and Description

The study employs data from world development indicators (WDI) database for the periods of 1986 to 2018 to reflect the turning point of structural adjustment policies and changes in Nigeria after 1986 to study the role of diversification on economic growth in Nigeria using Vector Error Correction Model (VECM) and Structural Var (SVAR) approach. We included an annual percentage of Gross Domestic Product Per Capita (GDPC) as the dependent variable to capture the per-capita welfare effects in terms of growth dynamics. We also employed Agricultural production output (AGO) measured as a % of GDP, Service sector output (SSO) as % of GDP. Official development assistance (ODA) was measured as % of gross capital formation. Remittances receipt (RMTU) measured in current U.S. dollars, and the receipts on tourism (TRS) measured as a% of GDP

3.3 Model Specification

Various functional forms describe the model's relationship (i.e., role of diversification on the economic growth of an economy. Therefore, the study varies with the related models reviewed in the study as it takes into account

the agriculture, service sector output, and tourism receipt variables described above. The model is specified as below:

$$GDPC = \text{f}(\text{AGO}, \text{SSO}, \text{ODA}, \text{RMT}, \text{TR}) \quad (1)$$

Linear Relationship is as follows:

$$\text{GDPC} = \beta_0 + \beta_1 \text{AGO} + \beta_2 \text{SSO} + \beta_3 ODA + \beta_4 RMTU + \beta_5 TRS \quad (2)$$

Econometric Relationship is as follows:

$$\text{GDPC} = \beta_0 + \beta_1 \text{AGO}_t + \beta_2 \text{SSO}_t + \beta_3 ODA_t + \beta_4 RMTt + \beta_5 TRS + \mu_t \quad (3)$$

Where:

$GDPC_t$ = gross domestic product per capita (annual% in current US dollars)

AGO_t = agricultural production given by index of agricultural production (% of GDP)

SSO_t = Service sector output (% of GDP)

ODA_t = Official development assistance received (% of gross capital formation)

RMT_t = Remittances inflow received (at current US dollars)

TRS_t = Tourism (international receipts measured as a % of GDP.

μ_t= Stochastic Error Term

t= Time period

β_0= the intercept of the model

β_1,$\beta_2$and β_3= Regression Coefficients of the independent variables.

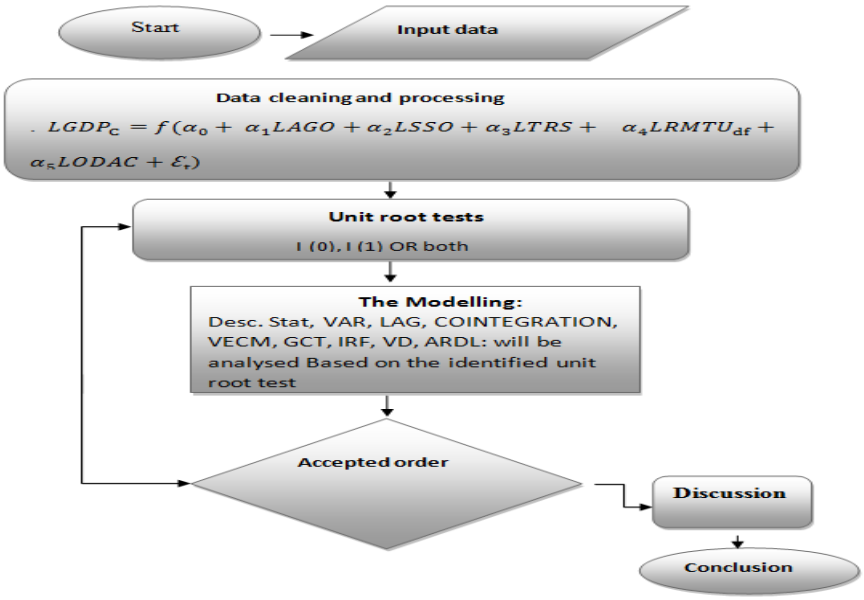

Figure 1: Schematic of the Estimation Technique

It is known that various economic data exhibit a nonstationary process. However, determining their appropriate order of integration is highly recommended to apply the best technique of analysis [44]. The study applied Augmented Dickey-Fuller (ADF), Philip Perron as well as Kwiatkowski, Phillips, Schmidt-Shin (KPSS)stationarity tests and the variable has been found to exhibit the same differenced order (i.e., I (1)) after which we applied cointegration to check the long-run association among our considered variables in the study. As required by F. Eangle and his colleagues 1987[45], the VECM which integrates both the short run and the long-run equilibrium conditions is analysed as specified below:

$$\Delta X_t = \alpha\beta_X t - 1 + \sum_{i-1}^{m} \Phi_i \, \Delta X_{t-1+} \; + \alpha x t - 1 + \alpha t - \sum_{i-1}^{m} \Theta j \alpha t - j\,\beta \quad + U_t - - - - - (10)$$

Where: α and β are both *k X m* matrices, ΔX_t indicates first difference as $\Delta X_t = X_t - X_{t-1}$, Φi represent the AR coefficients. Finally, Θj represents MA coefficients. The cointegrating equation is defined by $\beta' x_{(t-1).}$ β is composed of the coefficients for the *m* cointegrating vectors. Accordingly, we carried diagnostic and robustness checks, Granger causality test, Impulse Response and Variance Decomposition to validate the findings with a certain degree of confidence.

4. Empirical Results and Discussion

From table 1 which shows unit root test using augmented dickey fuller (ADF), Philip Peron (PP), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS). The results show that all the variables are stationary taking into consideration their ADF and PP statistics as well as their probability values. The KPSS result also shows that the variables are also stationary because the t-statistics values are greater than the critical values at all levels of significance.

Table 1: Unit Root Results

Variables (1986-2018)	ADF (1) (P-Value)	PP (2) (P-Value)	KPSS (3) (5% Value)
LGDPC	-7.612066 (0.0000)	-19.76202 (0.0000)	0.396591 (0.146000)
LAGO	-7.680534 (0.0000)	-12.98879 (0.0000)	0252004 (0.146000)
LSSO	-4.541109 (0.0000)	-10.52807 (0.0000)	0.614480 (0.146000)
LTRS	-9.522515 (0.0000)	-8.746294 (0.0000)	0.17468 (0.146000)
LRMTU	-7.690478 (0.0000)	-7.886943 (0.0000)	0.57770 (0.146000)
LODAC	-7.572997 (0.0000)	-6.471924 (0.0000)	0.506204 (0.463000)

Table 2: Descriptive Statistics

	LGDPC	LAGO	LSSO	LTRS	LRMTU	LODAC
Mean	43.41153	0.099348	0.120129	-85093.75	7.60E+08	0.125068
Median	53.48863	0.104126	0.192775	169500.0	51040252	0.079289
Maximum	401.1098	12.48973	6.046954	3240000.	1.24E+10	12.31320
Minimum	-554.4307	-6.596607	-7.252547	-8040000.	-9.28E+08	-14.03112
Std. Dev.	226.6949	3.101164	2.828366	1993151.	2.28E+09	3.476139
Skewness	-0.835416	1.649696	-0.484584	-2.068390	4.328579	-0.774341
Kurtosis	3.691561	9.581848	3.445835	9.396341	22.60215	14.22632
Sum	1389.169	3.179125	3.844142	-2723000.	2.43E+10	4.002167

The descriptive result indicated that LGDPC has a mean value of 43, while LAGO, LSSO, LTRS, LRMTU, and LODAC have 0.099, 0.120, -8509, 7.60 and 0.125 respectively. LGDPC has a median value of 53.4, LAGO with 0.10, LSSO 0.192, LTRS 1695, LRMTU 51040, and LODAC with 0.079 respectively. The standard deviation from the table shows that LSSO, LAGO, and LODAC have approximately a standard deviation of 3, which shows that, they are thrice far from the sample mean. While LGDPC, LTRS, and LRMTU have 226, 199, 2.28, respectively. In terms of skewness, LGDPC, LSSO, and LODAC are normally distributed with asymmetric around its mean. LAGO and RMTU have positive skewness which implies long right tail with higher values than the sample mean, while LTRS is negatively skewed. LGDPC and LSSO are mesokurtic with a normal distribution, while LAGO, LTRS, LRMTU, and LODADC are leptokurtic with a peak curve with higher values than the sample mean.

Table 3: Lag Selection Criteria

LAG	LOGL	LR	FPE	AIC	SC	HQ
0	-1585.026	NA	4.68e+38	106.0684	106.3486*	106.1580
1	-1568.980	24.60332	1.86e+39	107.3987	109.3603	108.0262
2	-1495.700	83.05128*	2.13e+38*	104.9133*	108.5564	106.0788*

(*) indicates the recommended lag by the criterion.

Knowing the specified lags in the analysis is significant in time series analysis because it helps in obtaining the required outcome. From the VAR order selection criteria in table 3 both AIC, LR, FPE, HQ specify 2 lags, except Schwarz criteria which specify 0 lag. Therefore, 2 lags will be used throughout the analysis.

Table 4: Cointegration Test

Hypothesis		Eigen-value	Trace		Maximum Eigen-value	
H_0	H_1		Statistics	Probability**	Statistics	Probability**
r= 0	r>1	0.926998	197.2288	0.0000*	75.90085	0.0000*
r≤1	r≥2	0.765059	121.3279	0.0000*	42.00426	0.0043*
r≤ 2	r≥3	0.739619	79.32365	0.0000*	39.02263	0.0011*
r≤3	r≥4	0.549638	40.30102	0.0022*	23.13338	0.0258*
r≤4	r≥5	0.389926	17.16764	0.0277*	14.33108	0.0488*
r≤5	r≥6	0.093181	2.836556	0.9021	2.836556	0.9021

The (*) indicates rejection of the null hypothesis of no cointegration at the five percent significance. The (**) denotes the Mackinnon, Haug, and Michelis (1999) probability values. The trace test and maximum Eigen-value show 5 cointegrating equations at 5% (0.05) significance level. This shows a long-run association among the considered variables and the null hypothesis of no cointegration is rejected as both trace and max Eigenvalue indicated five cointegrating equations and also the probability values are less than 5% level of significance. Therefore, we conclude that LGDPC, LAGO, LSSO, LTRS, LRMTU, ODAC are cointegrated or they have a long-run relationship. Hence the result validates the use of vector error correction mechanism.

Vector Error Correction Model (VECM) Results

The table presents the VECM results given that the variables of interest met the preconditions for the analysis as follows:

Table 5: Vector Error Correction Model (VECM) Results

Variables	Coefficients	St. Error	Test-Statistics	P-values
ECM_{t-1}	-0.685988	0.321557	-2.133332	0.0498
LGDPC	0.508476	0.427337	1.189870	0.1521
LAGO	6.311857	12.15202	0.519408	0.6111
LSSO	2.518076	15.63478	0.161056	0.8742
LTRS	-161E-05	1.74E-05	0.921348	0.3715
LRMTU	-1.69E-07	6.47E-08	-2.610002	0.0197
LODAC	35.66811	13.32698	2.676384	0.0173
Constant	19.16585	38.92093	0.492430	0.6295

From table 5, the VECM result shows the short-run dynamics and the error correction term (ECM_{t-1}) which shows how the system can adjust to its long-run state of equilibrium. Accordingly, the coefficient of the error term should be negative and statistically significant if the long-run equilibrium status is to be restored in the subsequent period. Thus, our model has met this condition given that the one-period lag coefficient of the error term (ECM_{t-1}) is negative (-0.6860 approximately) and is statistically significant (0.0498). By implication, the negative sign shows that the system is capable of adjusting to its long-run equilibrium condition after some shocks in the system. The value 0.6860 reveals that about 68% of the adjustments are corrected annually to converge back to equilibrium. This indicates that the speed of adjustments will take 2 years on average for the Nigerian economic system to converge to its long-run equilibrium condition after some disorder in the economic policy system. The policymakers and government need to take active policy measures to achieve the countries long term economic performance that can withstand global competitiveness. The short-run coefficient shows that only remittance and official development assistance have more impact on economic growth in Nigeria. This explains the developing and dependence nature of the Nigerian economy which needs to be addressed for the betterment of the country. Overall, the short-run coefficient is highly significant because of the goodness of fit from the R-squared (R^2), i. e R^2>60%) and adjusted R^2 of the model. The f-statistics and the probability value are statistically significant at 5% as explained in table 7.

Table 6: VEC Granger Causality/Block Exogeneity Wald Test

Dependent Variable: D(LGDPPC)			Eq1 of Eq6
Excluded	Chi-sq.	Df	Probability
D(LAGO)	0.599891	2	0.7409
D(LSSO)	0.069015	2	0.9661
D(LTRS)	1.276940	2	0.5305
D(LRMTU)	14.64314	2	0.0007
D(LODAC)	8.082484	2	0.0176
All	26.54374	10	0.0031

Table 6 shows Vector error correction granger causality result using block homogeneity wald test indicate that Using LGDPC as a dependent variable, individually, it was only LODAC and LRMTU can granger cause LGDPC, but jointly all the variables can granger cause LGDPC at 5% level of significance. This calls for active policy engagements that can improve other sectors such as Agric, tourism, and service to address the dependence culture on monocultural export, foreign aids, and development assistance from abroad which are based or attached with severe conditions. However, the full table that contains the remaining five equations is presented in the appendix. Using LAGO as a dependent variable, individually, LGDPC can granger cause LAGO at 5% level of significance, but jointly, all the variables can only granger cause LAGO at 10% level of significance. So also, using LSSO as a dependent variable, individually, LGDPC and LRMTU can granger cause LSSO at 5% level of significance, but jointly all the variables can granger cause LSSO at 5% level of significance. Taking LTRS as a dependent variable, individually and jointly none of the variables can granger cause LTRS at all levels of significance. Furthermore, using LRMTU as a dependent variable, individually, only LAGO can granger cause LRMTU at 5% level, but jointly all the variables can granger cause LRMTU. Finally, using LODAC as a dependent variable, individually, LGDPC, LAGO, and LRMTU can granger cause LODAC, but collectively, all the variables can granger cause LODAC at all levels of significance. Therefore, we conclude that the variables can granger cause each other hence out of six variables, jointly four have probability values less than 5% level of significance.

Table 7: Statistical and Diagnostic Tests

Statistical Tests		Diagnostic Tests	
R^2	0.712246	B-G Serial Corr. Lm Test	0.2109
Adjusted R^2	0.462858	B-G-P Het-TEST	0.7802
Schwarz Criterion	14.40306	R-Reset Test	0.1941
F- Statistic	2.855983	Jarque - Bera Test	29.43246
Probability	0.027553	Q-Statistics: See Appendix	>0.05

Table 7 shows the estimated results based on the goodness of fit and diagnostics which validates the goodness of fit of our model since it has passed all the major econometric tests such as serial correlation, heteroscedasticity, normality, and Ramsey reset tests. Also, the results show evidence of the goodness of fit of the model, no serial correlation, no specification error in the model given the coefficients of the power of the fitted dependent variable is greater at all significance level. These are supported by the residual stability robustness checks from Cusum and Cusum of squares in figure 2 below.

Where the decision requires the plots statistics to fall within the significance level boundary of 0.05 as specified in [46]. The study concludes that the ECM model is stable overtime because the plots from both tests satisfied the above 0.05 stability condition.

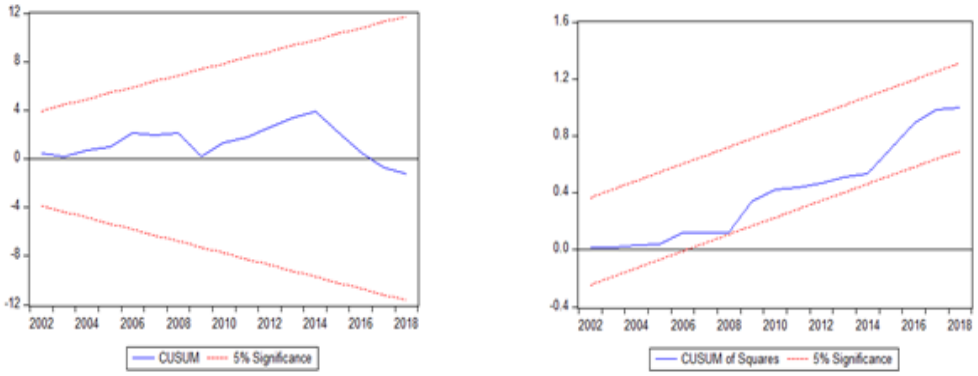

Figure 2: Cusum and Cusum Squares Test

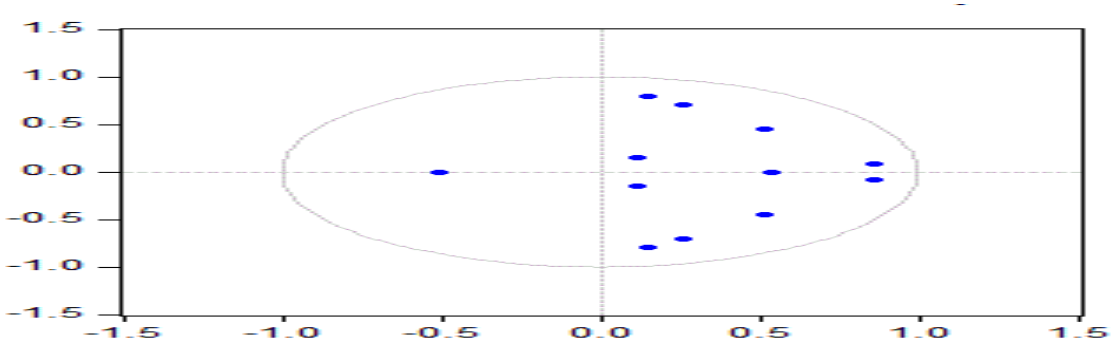

Figure 3: The root of AR Polynomials

The characteristics polynomials show the roots of the VAR are stationary since they all lie within the unit circle which shows they are stable within the sample period.

Impulse response traces the effect on present and future values of the exogenous variable of one standard deviation shocks to one innovation. Figure 4 Shows the innovation shocks for 10 years. One standard deviation shock on LAGO will have a negative effect on LGDPC in the first year until half of the second year where it becomes positive up to half of the third year, then negative until the fifth year, then it reverts to positive up to the eight-year through the ninth year and lastly positive in the tenth year. Also, one deviation shock on LSSO has a negative effect on LGDPC in the first quarter until half of the fourth quarter where it becomes positive through the fifth quarter up to sixth quarter where it becomes negative until half of nineth quarter and positively in the tenth quarter. One standard deviation shock has a negative effect on LGDPC in the first quarter until the third quarter where it becomes positive up to half of the fourth quarter, then it becomes negative till half of the eight quarter and positive till half of the nineth quarter and negative in the last quarter. One standard deviation shock on LRMTU has a positive effect on LGDPC in the first quarter up to half of the second quarter where it becomes negative till half of the third quarter where it becomes positive up to half of the fourth quarter where it

maintains negative effect until sixth quarter. It becomes positive up to half of the sixth, then becomes negative until nineth quarter and positive in the tenth quarter. One standard deviation shock of LGDPC to own sock maintains positive effect until the fifth quarter and positive again up to nineth quarter through the tenth quarter.

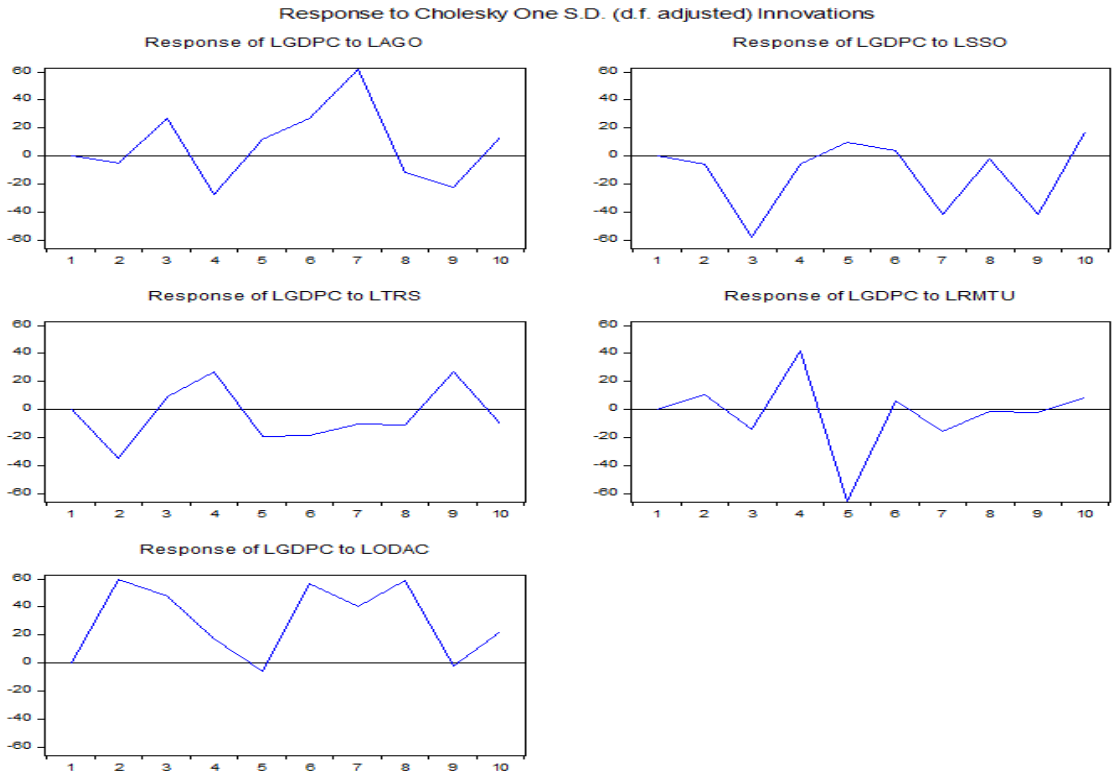

Figure 4: Impulse Response Result

Table 8: Variance Decomposition of LGDPC

Period	S.E.	LGDPC	LAGO	LSSO	LTRS	LRMTU	LODAC
1	200.2199	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	289.9181	94.04846	0.030266	0.042867	1.454904	0.128297	4.295210
3	331.1689	89.31688	0.695939	3.129346	1.184402	0.273766	5.399662
4	357.6816	88.02927	1.203150	2.707675	1.574828	1.617794	4.867286
5	383.1347	86.23918	1.146107	2.420382	1.628252	4.301463	4.264618
6	438.6123	87.23830	1.244384	1.854559	1.427354	3.302958	4.932441
7	472.9558	85.63691	2.808587	2.370818	1.277379	2.947181	4.959129
8	499.2848	85.59125	2.577416	2.128999	1.198592	2.645781	5.857965
9	514.5343	85.30905	2.618279	2.665282	1.396395	2.493368	5.517627
10	538.5366	86.19542	2.449742	2.534266	1.314051	2.297995	5.208527
Variance Decomposition of LAGO:							
Period	S.E.	LGDPC	LAGO	LSSO	LTRS	LRMTU	LODAC
1	3.118937	18.52762	81.47238	0.000000	0.000000	0.000000	0.000000
2	4.589637	11.23205	76.86628	4.671455	2.170329	1.118272	3.941616
3	4.765966	14.29310	72.41763	5.630903	2.017912	1.464458	4.176004
4	5.063373	19.26775	65.01178	6.434020	1.942101	3.534092	3.810258
5	5.577095	22.31696	61.47617	6.551686	1.993148	4.412008	3.250026
6	5.819733	25.39140	58.58338	6.199558	1.967557	4.847683	3.010424
7	5.909651	26.42611	57.52292	6.074188	2.075253	4.893370	3.008160

8	6.212129	25.52157	59.46750	5.503903	2.028856	4.434475	3.043698
9	6.594197	25.47338	60.05840	4.907437	1.860100	4.478180	3.222500
10	6.805979	28.06019	57.93464	4.607022	1.771201	4.598975	3.027970
Variance Decomposition of LSSO:							
Period	S.E.	LGDPC	LAGO	LSSO	LTRS	LRMTU	LODAC
1	2.777074	0.006276	7.489545	92.50418	0.000000	0.000000	0.000000
2	3.834693	0.556888	19.27123	65.40687	4.284449	4.491114	5.989455
3	4.631604	9.224035	18.08875	58.15571	5.137295	3.193875	6.200329
4	5.355381	15.07672	13.65519	55.00145	5.910246	5.098788	5.257609
5	5.533290	16.47360	12.92389	55.24298	5.546506	4.822683	4.990335
6	5.820700	15.49506	12.04265	57.93119	5.132574	4.465252	4.933277
7	6.268296	15.23209	10.67730	60.57817	4.817822	4.431612	4.263005
8	6.524802	16.89138	10.42844	60.02213	4.463302	4.218222	3.976527
9	6.792724	17.32672	9.993983	60.67357	4.400689	3.904513	3.700525
10	7.074797	17.16305	9.945642	61.51260	4.159914	3.803525	3.415272
Variance Decomposition of LTRS:							
Period	S.E.	LGDPC	LAGO	LSSO	LTRS	LRMTU	LODAC
1	3118907.	3.125933	25.39082	3.958005	67.52524	0.000000	0.000000
2	3566825.	2.393006	21.06826	9.544164	65.29767	0.992582	0.704316
3	4161911.	5.723634	20.01907	9.241982	62.39122	1.657636	0.966462
4	4505368.	8.663670	19.38802	9.672920	59.91975	1.465116	0.890515
5	4873447.	8.440285	18.78005	8.541797	62.09411	1.374413	0.769349
6	5262757.	7.662300	18.43429	8.883572	62.59060	1.574685	0.854562
7	5614780.	7.524574	19.16453	10.14862	60.92871	1.397935	0.835634
8	5927334.	8.704456	18.92033	9.912234	60.28042	1.432725	0.749838
9	6211654.	8.884867	19.33551	9.442228	60.23233	1.411646	0.693420
10	6491250.	8.681161	19.16430	9.694350	60.45159	1.373562	0.635035
Variance Decomposition of LRMTU:							
Period	S.E.	LGDPC	LAGO	LSSO	LTRS	LRMTU	LODAC
1	2.23E+09	22.39947	7.315489	0.878006	8.109962	61.29708	0.000000
2	2.60E+09	19.68331	20.78741	1.413999	5.995863	51.12993	0.989486
3	3.15E+09	18.63384	33.99635	1.652777	5.025339	39.95613	0.735565
4	3.37E+09	18.10751	30.97325	2.554706	5.983114	38.93701	3.444409
5	3.58E+09	23.13023	27.94309	4.724564	6.224543	34.62763	3.349940
6	3.76E+09	27.53569	25.90539	5.479961	5.657175	32.07898	3.342808
7	4.04E+09	27.00675	25.82675	6.778211	5.124999	32.33339	2.929891
8	4.11E+09	26.98710	25.79605	6.560413	5.272225	32.52392	2.860293
9	4.30E+09	26.42077	26.23346	5.986483	5.534977	33.09241	2.731911
10	4.47E+09	27.26839	26.34939	5.796824	5.160690	32.39291	3.031796
Variance Decomposition of LODAC:							
Period	S.E.	LGDPC	LAGO	LSSO	LTRS	LRMTU	LODAC
1	2.059551	21.38807	0.172462	18.13906	0.070829	50.36302	9.866556
2	2.459765	15.11654	6.503122	24.97370	0.340768	46.04277	7.023096
3	3.022754	10.07526	11.78468	17.29119	6.958400	49.07810	4.812370
4	3.323466	13.73463	17.85736	17.27113	6.099467	40.94672	4.090699
5	4.421826	11.20261	39.29670	9.763322	8.794291	25.25379	5.689284
6	4.772648	11.97313	34.38911	9.625110	9.882552	22.64954	11.48055
7	5.201066	10.13077	32.76444	18.94431	8.531450	19.89184	9.737194
8	5.217873	10.10225	32.95743	18.82292	8.639145	19.78453	9.693725
9	5.354626	10.22558	34.06132	17.99495	8.673029	19.20230	9.842818
10	5.529771	11.90026	31.93978	19.50188	9.163888	18.00517	9.489014
Cholesky Ordering: LGDPC LAGO LSSO LTRS LRMTU LODAC							

From table 8 where **LGDPC** is the dependent variable, **the t**hird year represents a short run horizon and seventh to tenth year as the long-run horizon in Cholesky variance decomposition ordering in this study. In the short run horizon, the innovation own shock of LGDPC accounts for 89.3% variation in LGDPC. Apart from its shock of LGDPC, the innovation shock of LAGO accounts for 0.69% variation in LGDPC. While innovation shocks to

LSSO, LTRS, LRMTU, and LODAC can account for 3.12%, 1.18%, 0.27%, and 5.39% in LGDPC respectively. In the long-run horizon, innovation shocks to LGDPC account for 86,2% variation in its shock. While innovation shocks in LAGO, LSSO, LTRS, LRMTU, and LODAC can account for 2.45%, 2.53%, 1.31%, 2.29%, and 5.21% to LGDPC respectively.

5. Discussion

This research investigates the role of diversification on economic growth in Nigeria with new evidence from structural vars analysis (SVARS) based on impulse response and variance decomposition after Cointegration, vector error correction and granger causality using block exogeneity wald test in the study. Accordingly, agricultural sector, service sector, tourism, remittances and official development assistance are perceived to represent diversification to explain GDP per capita. Therefore, from the results obtained, there is a long run relationship between diversification and economic growth in Nigeria within the period of study. Hence this research concludes that remittances, service sector and official development assistance play a significant role in the development process in both the short and long run. Therefore, policies that can boost agriculture, as well as enhance effective financial system that can ease channels of remittances should be provided. Below are the basic findings of the research:

- There is a long run relationship or association among the variables of the study.
- Remittance and official development assistance have more impact on economic growth in Nigeria within the period of study.
- Jointly, all the variables under study can granger cause each other within the study period.
- In the short run horizon, apart from gross domestic product per capita own shocks or innovation, services sector and official development assistances has more impact or contribution to GDPC.
- Also, in the long run, services sector and official development assistance has more significant contribution to gross domestic product per capita in Nigerian economy.

6. Conclusion

This research investigates the role of diversification on economic growth in Nigeria with new evidence from structural vars analysis (SVARS) using annual data from 1986 to 2018. Our key contribution to the literature is the investigation of the role of diversification on growth and the answer to how does the level of agriculture production, service sector output, official development assistance, remittance inflow, and tourism affect growth in Nigeria because the need for diversification has been acknowledged as well as put forward in major globally established development goals such as the Sustainable Development Agenda for 2030 among other programs which are seldom considered. The techniques applied showed that only remittances and official development assistance can affect economic growth in the short run. However, the coefficients of one period lagged indicated that the system is capable of adjusting to its long-run equilibrium condition after some shocks in the system. The findings from variance decomposition indicated that diversification plays a positive role on economic growth in both the short and long-run horizons. Thus, agricultural output and remittances have a greater impact on LGDPC in the short run, while official development assistance has a higher and positive role on LGDPC in the

long-run. By overall implication, the study concludes that agricultural output, service sector output, tourism, official development assistance, and remittances have long-run impacts on Nigeria's economic growth.

7. Recommendations

From the forgoing findings, our study provides the following recommendations:

- There is a need for government to provide active policies such as soft loans and commercial agriculture to improve its export of agricultural output competitiveness,
- Government should improve supervisory and regulatory frameworks in the financial system to ease remittances inflow into the economy.
- The government should provide real time enabling technological environment to assist the Services sector to compete internationally.
- Official deployment assistance received should be properly utilized and channeled into productive sectors of the economy to achieve sustainable development in the economy.
- On a final note, Nigeria is an oil-dependent economy which suffered both the previous and current global oil price shocks. For this reason, diversifying the economy from oil revenue is the ultimate goal for achieving sustainable economic growth and development goals or targets by the year 2030.

However, the major limitation of this research includes the inability of the researchers to use qualitative research technique because of the financial constraint of the researchers. However, this research is pioneering and ground breaking given that it offers a theoretical and empirical (i.e., quantitative) context on the nexus among diversification and economic growth in Nigeria with new evidence from Structural Var Analysis (SVARS) which is seldom considered. It is evident that Future researches on diversification will greatly benefit from the findings of our study to extent the quantitative and empirical analysis which include specific concentration on areas such as manufacturing, mining, technology and other related area in the Nigerian economy.

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Appendix 1

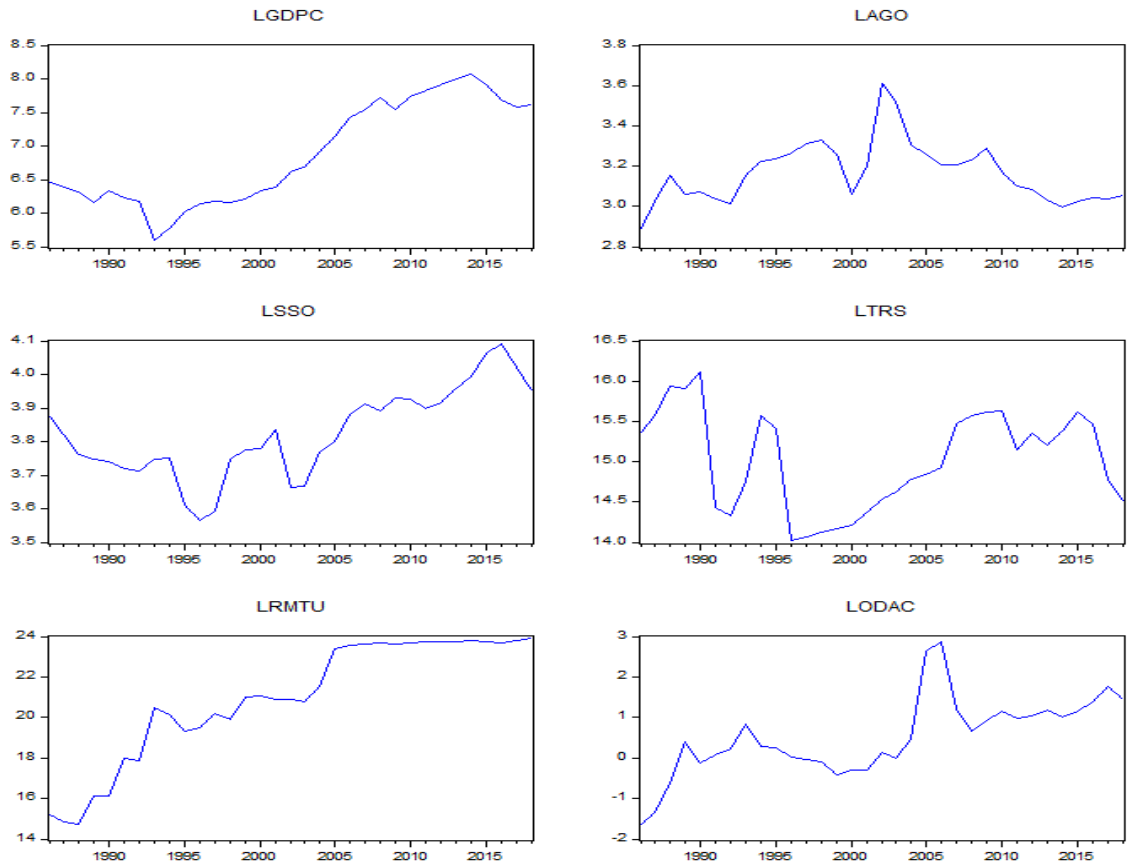

Figure 5

Appendix 2

Sample: 1986 2018
Included observations: 32

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.061	0.061	0.1314	0.717
		2	0.100	0.096	0.4909	0.782
		3	-0.021	-0.033	0.5070	0.917
		4	0.044	0.038	0.5826	0.965
		5	-0.330	-0.334	4.9643	0.420
		6	0.218	0.289	6.9582	0.325
		7	0.056	0.073	7.0925	0.419
		8	-0.130	-0.252	7.8551	0.448
		9	-0.115	-0.054	8.4779	0.487
		10	-0.059	-0.164	8.6529	0.565
		11	-0.201	0.005	10.755	0.464
		12	0.060	0.161	10.951	0.533
		13	0.029	-0.190	10.997	0.611
		14	-0.022	-0.013	11.026	0.684
		15	-0.247	-0.311	14.916	0.457
		16	-0.086	-0.108	15.416	0.494

Figure 6

Appendix 3

VEC Granger Causality/Block Exogeneity Wald Tests
Date: 07/24/20 Time: 15:52
Sample: 1986 2018
Included observations: 29

Dependent variable: D(LGDPC)

Excluded	Chi-sq	df	Prob.
D(LAGO)	0.599891	2	0.7409
D(LSSO)	0.069015	2	0.9661
D(LTRS)	1.267940	2	0.5305
D(LRMTU)	14.64314	2	0.0007
D(LODAC)	8.082484	2	0.0176
All	26.54374	10	0.0031

Dependent variable: D(LAGO)

Excluded	Chi-sq	df	Prob.
D(LGDPC)	6.572560	2	0.0374
D(LSSO)	5.070600	2	0.0792
D(LTRS)	1.486974	2	0.4755
D(LRMTU)	4.182853	2	0.1235
D(LODAC)	4.394373	2	0.1111
All	17.18240	10	0.0704

Dependent variable: D(LSSO)

Excluded	Chi-sq	df	Prob.
D(LGDPC)	8.148042	2	0.0170
D(LAGO)	5.851384	2	0.0536
D(LTRS)	1.820400	2	0.4024
D(LRMTU)	6.348512	2	0.0418
D(LODAC)	0.199005	2	0.9053
All	24.07085	10	0.0074

Dependent variable: D(LTRS)

Excluded	Chi-sq	df	Prob.
D(LGDPC)	0.898662	2	0.6381
D(LAGO)	0.295992	2	0.8624
D(LSSO)	0.854670	2	0.6522
D(LRMTU)	0.564613	2	0.7540
D(LODAC)	0.296044	2	0.8624
All	4.157755	10	0.9399

Dependent variable: D(LRMTU)

Excluded	Chi-sq	df	Prob.
D(LGDPC)	2.075386	2	0.3543
D(LAGO)	10.56191	2	0.0051
D(LSSO)	0.051585	2	0.9745
D(LTRS)	0.468171	2	0.7913
D(LODAC)	2.752860	2	0.2525
All	23.55364	10	0.0089

Dependent variable: D(LODAC)

Excluded	Chi-sq	df	Prob.
D(LGDPC)	8.086209	2	0.0175
D(LAGO)	20.90194	2	0.0000
D(LSSO)	0.269296	2	0.8740
D(LTRS)	1.353759	2	0.5082
D(LRMTU)	13.93867	2	0.0009
All	85.73408	10	0.0000

Figure 7