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Impact of Capital Market on Agricultural Sector Output in Nigeria (1980-2018)

Okidim Iboh Andrew, Okuduwor Adibie Adibie, Obe-Nwaka Mba Oloi, Week Doodei Agbabou

Department of Agricultural & Applied Economics, Faculty of Agriculture, Rivers State University, Port Harcourt, Nigeria

Email address:

weekdoodei@gmail.com (Week Doodei Agbabou)

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Abstract: The growth and development of an economy is driven by the capital market due to its ability to generate long-term growth capital. The study analyzed the impact of capital market on agricultural sector output in Nigeria between 1981 to 2019. Specifically, the study's objectives were to; determine the effect of the share price of conglomerates on agricultural output; determine the effect of the share price of agricultural goods on agricultural output; determine the effect of the share price of consumer goods on agricultural output; determine the effect of the share price of indistrial goods on agricultural output and determine the effect of the share price of oil and gas on agricultural output. Result of the unit root test showed that all the variable were stationary at first differncing. The Johansen co-integration test result also showed that long-run relationship exist among the variables, hence the use of Vector Error Correction method (VECM) for the analysis. Result of the Vector Error Correction method (VECM) showed that share price of agricultural firms (SPA), had positive significant effect and share price of oil and gas sector had negative significant effect on agricultural output. The study recommends that during the times of the oil boom, proactive savings from revenue receipts should be encouraged thereby cobbing its negative impact on agricultural output.

Keywords: Agricultural Output, Conglomerates, Capital Market, Industrial Goods

1. Introduction

The capital market affords businesses and corporate bodies the opportunity to raise long-term funds through sales of bonds and shares. Private businesses and governments can rely on long-term savings of other people by selling stocks and bonds in the capital market. Any economic development and growth is driven by the capital market because it is essential for the formation of long-term growth capital [11]. According to [4], one of the key institutions that contribute to an economy's growth and development is the capital market. The capital market serves as an economic gauge for igniting economic activity, according to the research [6]. The Nigerian capital market took on a new trading dimension when its trading regulations were restructured as a result of the International Monetary Fund's (IMF) intervention through the Structural Adjustment Programme (SAP) in 1986. The 1986 International Monetary Fund (IMF) intervention through the Structural Adjustment Programme (SAP) in 1986. The 1986 International Monetary Fund (IMF) intervention known as the Structural Adjustment Programme (SAP) gave the Nigerian capital market a new trading dimension by reorganizing its trading regulations, allowing the agricultural sector to enter the stock exchange and seek out more funds to finance profitable projects, expand their business environment, and restructure their capital base for improvement in profit for the year as well as dividend payment to stakeholders. However, until the Structural Adjustment Programme (SAP) was abandoned in 1994, according to Oyefusi et al. [13], the goals had not been met since the government was unable to wisely implement any of its policy measures. Some important stock market indices, particularly in the post-SAP era, have exhibited indicators of increased performance over time. Domestic listed firms increased from 174 in 1993 to 215 in 2005, before falling to 183 in 2015 [16]. Between 1986 and 2015, the stock market

capitalization ratio climbed from 3.3% to 18.06%. The value of tradable shares increased from 0.25 percent in 1986 to 1.0 percent in 2015. From 1,407.4 basis points in 1985 to 370,406 basis points in 2015, the all-share index increased steadily [2]. Surprisingly, the agriculture industry has not expanded significantly despite the capital market's modest success.

Capital market's relationship and economic growth has been examined in a number of studies [1, 10, 15, 7, 14] also looked at capital market's relationship and industrial sector growth. Chinedu et al. [3], who used information on market capitalization, transaction value, and share index, examined the relationship between Nigeria's capital market and agriculture sector output. However, given the worries over share price swings in various sectors of the Nigerian stock exchange, there hasn't been much empirical research on the question of whether the capital market improves the agricultural sector. This study therefore seeks to close this gap. All these necessitated this present study that sought to achieve the following specific objectives:

i. determine the effect of the share price of conglomerates on agricultural output;
ii. determine the effect of the share price of agricultural goods on agricultural output;
iii. determine the effect of the share price of consumer goods on agricultural output;
iv. determine the effect of the share price of indistrial goods on agricultural output;
v. determine the effect of the share price of oil and gas on agricultural output.

2. Methodology

The data obtained were analysed using appropriate statistical and econometric tools such as Vector Error Correction Model (VECM), mean, standard deviation, skewness and kurtosis. Augmented-Dickey Fuller test was also used to test for stationariry whereas Johansen co-integration test cointegration test was used to test for cointegration so as to ascertain if the link between the dependent and independent variables is long-term.

The model used for this study was specified as follows:

$$AO = f(SPC, SPAG, SPCG, SPIG, SPOG) \quad (1)$$

Specifying equation 1 explicitly, the model becomes:

$$AO=b_0+b_1SPC+b_2SPAG+b_3SPCG+b_4SPIG+ b_5SPOG + e \quad (2)$$

Where:
AO = Agricultural Output (₦)
SPC = Share price of conglomerates (₦)
SPAG = Share price of agricultural goods (₦)
SPCG = Share price of consumer goods (₦)
SPIG = Share price of indistrial goods (₦)
SPOG = Share price of oil and gas (₦)
$b_1 – b_5$ = Coefficients to be estimated
b_0 = Constant
e= error term

In order to minimize spurious results, the study therefore, converted the data of the parameters above into their natural log form. Thus equation 2 became:

$$LogAO=b_0+b_1LogSPC+b_2LogSPAG+b_3LogSPCG+b_4LogSPIG+b_5LogSPOG+e \quad (3)$$

Where Log = Natural Logarithm.

However, as the study used the Vector Error Correction Model (VECM), equation 3 was included in the subsequent VECM model equations.

$$\Delta \text{LogAO}_t = a_0 + \sum_{i=1}^{K-1} \alpha_1 \Delta \text{LogAO}_{t-1} + \sum_{j=1}^{K-1} \alpha_2 \Delta LogSPC_{t-1} + \sum_{k=1}^{K-1} \alpha_3 \Delta LogSPAG_{t-1} + \sum_{l=1}^{K-1} \alpha_4 \Delta LogSPCG_{t-1} + \sum_{m=1}^{K-1} \alpha_5 \Delta LogSPIG_{t-1} + \sum_{o=1}^{r} \alpha_6 \Delta LogSPOG_{t-1} + \delta_1 ECT_{t-1} + e_{1t} \quad (4)$$

$$\Delta \text{LogSPC}_t = a_0 + \sum_{i=1}^{K-1} \alpha_1 \Delta \text{LogAO}_{t-1} + \sum_{j=1}^{K-1} \alpha_2 \Delta LogSPC_{t-1} + \sum_{k=1}^{K-1} \alpha_3 \Delta LogSPAG_{t-1} + \sum_{l=1}^{K-1} \alpha_4 \Delta LogSPCG_{t-1} + \sum_{m=1}^{K-1} \alpha_5 \Delta LogSPIG_{t-1} + \sum_{o=1}^{r} \alpha_6 \Delta LogSPOG_{t-1} + \delta_2 ECT_{t-1} + e_{2t} \quad (5)$$

$$\Delta \text{LogSPAG}_t = a_0 + \sum_{i=1}^{K-1} \alpha_1 \Delta \text{LogAO}_{t-1} + \sum_{j=1}^{K-1} \alpha_2 \Delta LogSPC_{t-1} + \sum_{k=1}^{K-1} \alpha_3 \Delta LogSPAG_{t-1} + \sum_{l=1}^{K-1} \alpha_4 \Delta LogSPCG_{t-1} + \sum_{m=1}^{K-1} \alpha_5 \Delta LogSPIG_{t-1} + \sum_{o=1}^{r} \alpha_6 \Delta LogSPOG_{t-1} + \delta_3 ECT_{t-1} + e_{3t} \quad (6)$$

$$\Delta \text{LogSPCG}_t = a_0 + \sum_{i=1}^{K-1} \alpha_1 \Delta \text{LogAO}_{t-1} + \sum_{j=1}^{K-1} \alpha_2 \Delta LogSPC_{t-1} + \sum_{k=1}^{K-1} \alpha_3 \Delta LogSPAG_{t-1} + \sum_{l=1}^{K-1} \alpha_4 \Delta LogSPCG_{t-1} + \sum_{m=1}^{K-1} \alpha_5 \Delta LogSPIG_{t-1} + \sum_{o=1}^{r} \alpha_6 \Delta LogSPOG_{t-1} + \delta_4 ECT_{t-1} + e_{4t} \quad (7)$$

$$\Delta \text{LogSPIG}_t = a_0 + \sum_{i=1}^{K-1} \alpha_1 \Delta \text{LogAO}_{t-1} + \sum_{j=1}^{K-1} \alpha_2 \Delta LogSPC_{t-1} + \sum_{k=1}^{K-1} \alpha_3 \Delta LogSPAG_{t-1} + \sum_{l=1}^{K-1} \alpha_4 \Delta LogSPCG_{t-1} + \sum_{m=1}^{K-1} \alpha_5 \Delta LogSPIG_{t-1} + \sum_{o=1}^{r} \alpha_6 \Delta LogSPOG_{t-1} + \delta_5 ECT_{t-1} + e_{5t} \quad (8)$$

$$\Delta \text{LogSPOG}_t = a_0 + \sum_{i=1}^{K-1} \alpha_1 \Delta \text{LogAO}_{t-1} + \sum_{j=1}^{K-1} \alpha_2 \Delta LogSPC_{t-1} + \sum_{k=1}^{K-1} \alpha_3 \Delta LogSPAG_{t-1} + \sum_{l=1}^{K-1} \alpha_4 \Delta LogSPCG_{t-1} + \sum_{m=1}^{K-1} \alpha_5 \Delta LogSPIG_{t-1} + \sum_{o=1}^{r} \alpha_6 \Delta LogSPOG_{t-1} + \delta_6 ECT_{t-1} + e_{6t} \quad (9)$$

Where
Δ = First difference operator
k-1 = showing that the lag length was reduced by 1 since VAR is differenced to obtain a VECM, thus a lag length was lost
α = Coefficients of the model's correction for short-run

dynamics adjusted for long-term balance

δ_{1-6} = A negative indicator for the speed of adjustment

ECT_{t-1} = the error correction term which is the the residual value that results from the cointegrating regression of the dependent variable on the regressor

e_{1t} = stochastic error term

3. Results and Discussion

Table 1. *Descriptive Statistics, Using the Observation 1981–2019.*

	LOGAO	LOGSPA	LOGSPC	LOGSPCG	LOGSPIG	LOGSPOG
Mean	8.718510	2.260812	2.757047	5.232640	3.413168	4.840769
Median	8.470481	2.620311	2.801541	5.357294	3.591818	5.510400
Maximum	9.772476	4.825269	4.537320	7.627496	5.154274	7.099615
Minimum	7.742189	0.131028	1.430311	2.841415	1.665818	2.002830
Std. Dev.	0.693449	1.434281	0.937786	1.658256	1.145491	1.726731
Skewness	0.176299	-0.044124	0.220104	-0.135548	-0.204989	-0.411371
Kurtosis	1.491715	1.562511	1.910789	1.597689	1.600156	1.565659
Jarque-Bera	3.798812	3.370514	2.242764	3.314949	3.457421	4.443135
Probability	0.149657	0.185397	0.325829	0.190620	0.177513	0.108439
Sum	331.3034	88.17166	107.5248	204.0730	133.1136	188.7900
SumSq. Dev.	17.79224	78.17215	33.41885	104.4929	49.86169	113.3008
Observations	38	39	39	39	39	39

Source: Author's Computation from Eviews 10

The descriptive statistics were summarized and presented in Table 1 with special reference to the mean, median, maximum, minimum, standard deviation, skewness, kurtosis, and probability of each variable. The mean value for agricultural output was around 8.718, 2.260 for share price of agricultural firms, 2.757 for share price of conglomerate firms, 5.232 for share price of congumer goods, 3.413 for share price of industrial firms, 4.840 for share price of oil and gas sector according to the findings. Share price of oil and gas sector had the highest standard deviation of 1.726, whereas agricultural output had the lowest standard deviation of 0.693. The distributions of all the variables were flat relative to normal because they all had kurtosis values less than three. The skewness of the selected variables were equally varied. Share price of agricultural firms, share price of consumer goods, share price of industrial firms and share price of oil and gas sector were all negative skewness variables, while agricultural output and share price of conglomerate firms were all positive skewness variables. At the 5% probability level, the Jarque-Bera statistic demonstrated that all the variables exhibited normal distribution. The standard deviation of all the variables were all lower than their means implying that these variables recorded a slow growth within the period under review.

Each variable has its stationarity checked in order to prevent the issue of false regression. Phillip-Perron test (PP) and Augmented Dickey-Fuller (ADF) were also employed. The unit root null hypothesis was examined in both pre-diagnostic tests. In cases where the test statistic is more negative than the crucial value or where the test statistic's absolute value is higher than the critical value, the unit root null hypothesis was rejected in favor of the stationary alternative. It is implied that there is no unit root in the series if the null hypothesis is rejected.

Table 2. *Results of Augmented Dickey Fuller and Philip-Perron Test at LEVEL and FIRST DIFFERENCE.*

Variables	Levels		1st difference		Remarks
	ADF	FP	ADF	FP	
LOGAO	0.024073 (0.9549)	0.025610 (0.9550)	-5.850641 (0.0000)	-5.849971 (0.0000)	1(1)
LOGSPA	-1.191726 (0.6677)	-1.629598 (0.4580)	-9.839823 (0.0000)	-27.08424 (0.0001)	1(1)
LOGSPC	-3.615588 (0.5127)	-1.620415 (0.4626)	-5.001387 (0.0002)	-5.093375 (0.0002)	1(1)
LOGSPCG	-0.522555 (0.8756)	-0.502292 (0.8798)	-5.219271 (0.0001)	-5.147853 (0.0001)	1(1)
LOGSPIG	-1.195150 (0.6666)	-1.234408 (0.6494)	-5.261711 (0.0001)	-5.218992 (0.0001)	1(1)
LOGSPOG	-1.498531 (0.5236)	-1.516297 (0.5147)	-5.798668 (0.0000)	-5.799122 (0.0000)	1(1)

Source: Author's Computation from Eviews 10, 2023

Both the ADF and the Phillip Perron test showed that all the variables were not stationary at levels, as the p-values of their respective t-statistics were greater than the absolute 95% critical value in both tests. However, after testing them at their first difference they were all stationary. This implies that all the variables were stationary at the first difference I (1). Therefore, the Johansen co-integration method was used to test for cointegration in the model since all the variables were stationary in the same order of integration I(1).

To ascertain whether cointegration existed in the model,

the study used Johansen's cointegration test. This method makes sure that the variables were meaningfully and accurately regressed. Table 3 displays the outcome.

Table 3. *JohansenCointegrationTestResult.*

Hypothesized No. of CE (s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.785112	147.2660	95.75366	0.0000
Atmost1*	0.651612	93.44858	69.81889	0.0002
Atmost2*	0.439726	56.54328	47.85613	0.0062
Atmost3*	0.410002	36.26678	29.79707	0.0078
Atmost4*	0.386829	17.79950	15.49471	0.0221
Atmost5	0.019257	0.680575	3.841466	0.4094

Trace test indicates 5 cointegrating eqn (s) at the 0.05 level

Hypothesized No. of CE (s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0.785112	53.81739	40.07757	0.0008
Atmost1*	0.651612	36.90530	33.87687	0.0211
Atmost2	0.439726	20.27650	27.58434	0.3223
Atmost3	0.410002	18.46728	21.13162	0.1133
Atmost4*	0.386829	17.11892	14.26460	0.0172
Atmost5	0.019257	0.680575	3.841466	0.4094

Source: Author's Computation from Eviews 10, 2023.

Five (5) cointegrated at a 0.05 (5%) level of significance, according to the results of the trace test. In addition, the trace statistics for the two equations were higher than each of their respective critical values at the 0.05 or 5% level of significance.

Similar to this, the maximum eigenvalue test finds three (3) cointegrations at a significance level of 0.05 (5%); the maximum eigenvalue statistic at this level was higher than the critical value at 0.05 (5%) level significance.

The trace and maximum eigenvalue of the model support this conclusion, which points to a long-run equilibrium relationship between the dependent and independent variables [8]. A typical argument for using a vector error correction model is the presence of co-integration among the variables used.

After co-integration analysis proved that the adopted variables had a long-term relationship, it was unable to determine the variables' short-term deviation. Error Correction Model solves this issue. The short-run dynamics and long-run modifications are both examined using the error correction model. The results of the Vector Error Correction Model are displayed in Table 4.

Table 4. *Vector Error Correction Model Result.*

	Coefficient	T-Statistic	Probability
Dependent variable: D (LogAO)			
ECM	-0.001587	-1.27037	0.00125**
D(LOGAO(-1))	-0.077540	-0.40955	0.18933
D(LOGSPA(-1))	0.006211	0.25696	0.02417**
D(LOGSPC(-1))	0.049157	0.84504	0.05817*
D(LOGSPCG(-1))	0.004052	0.04770	0.08494*
D(LOGSPIG(-1))	-0.042791	-0.76390	0.05602*
D(LOGSPOG(-1))	-0.002586	-0.06451	0.04009**
C	0.059514	3.12657	0.01903**
R-squared	0.127894	Loglikelihood	45.04791
Adj.R-squared	-0.090133	AkaikeAIC	-2.058217
Sumsq. resids	0.172558	SchwarzSC	-1.706324
S.E. equation	0.078503	Meandependent	0.054958
F-statistic	0.586598	S.D. dependent	0.075188

Source: Researchers computation from E-views 10; **-0.05 level of significance, *-0.10 level of significance

The estimations from the vector error correction model are summarized in Table 4. Since the ECT's integrating p-value was 0.00125, it was highly significant at the 5% level as necessary and had the expected negative sign (-0.001587). According to this finding, the present period's adjustment speed is roughly 0.15 percent, correcting the previous period's divergence from the long-run equilibrium.

The past value of agricultural output had a negative impact on its present value, as indicated by the coefficient of the past value of agricultural output, which was -0.077540. Thus, when all other independent variables are held constant, an increase in the past value of agricultural output will result in a present value decrease of about 7.7%. Since the p-value (0.18933) was more than 5% (i.e. at the 5% level of significance), the result was not significant.

The share price of agricultural firms (SPA) had a positive

coefficient of 0.006211 as was predicted, and its associated p-value of 0.02417 indicated that it was significant at the 5% level. As a result, an increase in SPA of 1% will result in an increase in agricultural output of 2.4%. Based on this outcome, it can be said that the share price of agricultural items has a big impact on agricultural output. The results of this study are at odds with those of the research [5], which discovered that the performance of the listed companies in the livestock subsector was significantly impacted negatively by the share price of Livestock Feed Production Nigeria PLC.

As indicated from the regression result, the coefficient of share price of conglomerates (SPC) was positive (0.049157). The implication of this is that, a percentage rise in share price of conglomerates will be accompanined with approximately 4.9% rise in agricultural output. However, the p-value stood at 0.05817 (>5%), implying significance of such impact at 10 percent. This finding is in consonance with the finding of [5] who found a positive and significant relationship between UAC Nigeria PLC and the livestock subsector.

Moreover, the coefficient of share price of consumer goods was 0.004052. This means that share price of consumer good had positive impact on agricultural output. Thus, while other independent variables are held constant, a percentage increase in the share price of consumer goods will amount to about 0.4 percent increase in agricultural output. Its corresponding p-value was 0.08494, which is greater than 5 percent (at 5% significant level). It can, therefore, be concluded that share price of consumer goods had an insignificant positive impact on agricultural output within the period under study. This finding is not in tanden with the fining of Egwu et al. [5] who found a negative and significant relationship between Nestle Nigeria PLC share price and the livestock subsector. However, this finding collaborates the finding of Nwako et al. [9] who found that the share price of consumer goods statistically affected Nigerian GDP growth rate.

In the same vein, the coefficient of share price of industrial firms was -0.042791. This means that share price of industrial goods had negative impact on agricultural output. Thus, holding other independent variables constant, a percentage increase in the share price of industrial goods will amount to about 4.2 percent decrease in agricultural output. Its corresponding p-value was 0.05602, which was greater than 5 percent (at 5% significant level). It can, therefore, be concluded that share price of industrial goods had an insignificant negative impact on agricultural output within the period under study. This finding agrees with that of Nwako et al. [9] who found a negative relationship between share price of industrial goods and economic growth in Nigeria.

The coefficient of the share price of oil and gas sector was negative (-0.002586). This implies that the share price of oil and gas negatively affect agricultural output. An increase in the share price of oil and gas sector will amount to 0.25 percent decrease in agricultural output in the period under review. Its p-value was 0.04009, which is less that 5 percent significant level. Thus it was concluded that share price of oil and gas sector had a significant negative impact on agricultural output in Nigeria. This finding correspondents with the finding of Okoro, E. G. [12] who found a negative relationship between the oil price volatility and the level of economic growth in Nigeria.

The predicted value of the independent variable is represented by the model's intercept (C), often known as the autonomous or constant i.e. agricultural output, when all independent variables i.e Share price of agricultural goods, share price of conglomerates, share price of consumer goods, share price of industrial goods and share price of oil and gas equal zero. This value stood at 0.059514 and was statistically significant at 5% level having had a p-value of 0.01903. The means that agricultural output will have an autonomous increase of about 5.9 percent when all the independent variable in the study equal zero.

The coefficient of determination (R^2) was 0.127894. This shows that share price of various firms explained 12.789% variation in agricultural output in Nigeria. Even while this might be viewed as being low, it is crucial to note that other factors besides share price success affect agricultural output as well. In Nigeria for instance, factors such as exchange rate, inflation rate, government expenditure to agriculture, interest rate on loans, etc are among the major predictors of agricultural output. It is also anticipated that simply share price performance would be a key contribution (explaining a significant variation in agricultural output), as the proposed model is not expected to include all the pertinent indicators.

4. Conclusion and Recommendations

This research has extensively studied issues relating to capital market and Nigeria's agriculture performance. The study revealed that share price of agricultural firms (SPA), share price of conglomerates (SPC) and share price of consumer goods had a positive relationship with agricultural output wheras share price of industrial firms and share price of oil and gas sector had negative relationship with agricultural output. The study recommended that since share price of agricultural firms positively affected agricultural output, more funding for businesses in the industry is needed from both the government and private investors. Additionally, policies should be designed to foster an environment that encourages the entry of more businesses into the capital market. This will lead to more competitive share prices, as there is little equilibrium where the short-term share prices of listed companies tend to converge on the long-term share prices.

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