Effect of External Debt on Performance of the Agricultural Sector in Kenya

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ABSTRACT

Agriculture forms the backbone of the economy in most developing and developed countries. Its production has increased significantly over the last three to four decades. In 2018, it contributed to about 4% of global gross domestic product (GDP), and in 2020, it accounted for 35 percent of the gross domestic product (GDP) and 65 percent of foreign exchange earnings in Kenya. It's also a primary source of raw materials for both national and international industries. However, its performance has been declining over the years, and there is a dearth of information with regard to how external debt has affected the sector's performance. Thus, this study sought to investigate the effect of external debt on the performance of the agricultural sector in Kenya. A correlational research design was adopted. The time series data used in the study was obtained from the databases of World Development Indicators and Statista, covering the period from 2012 to 2020. The data was analyzed using EViews software. The findings revealed that external debt had a significant positive effect on the performance of the agricultural sector in Kenya. Therefore, according to the study, the government of Kenya needs to invest more external debt in agriculture to spur agricultural sector growth.

Keywords: Agricultural Sector, External Debt, Performance

I. INTRODUCTION

Agriculture is a vital sector in achieving the goals of global development; a wholesome, inclusive, and sustainable food system is needed. The 2030 Sustainable Development Agenda paves the way to future inclusive prosperity. Food systems and agriculture play the primary linkage between citizens of a nation and the environment, hence assisting in the achievement of Sustainable Development Goals (SDGs) (Food and Agriculture Organization [FAO], 2018).

By 2050, agricultural development will be among the most effective strategies to feed a population of 9.7 billion people and increase shared prosperity (World Bank, 2020). Comparing agriculture to other sectors, its growth is nearly two to four times more successful at generating and increasing the incomes of the poorest people. In 2016, research revealed that about 65% of working poor individuals depended greatly on agriculture for their livelihood. Agriculture is similarly deemed essential to the growth of the economy; in 2018, it accounted for 4% of the world's GDP, and in some emerging nations, it contributes more than 25% of GDP (Liao et al., 2018).

Considering the East African Community (EAC), agriculture is crucial to employment, growth, the eradication of poverty, and food security. Around 70% of the region's rural population receives employment from this industry, with women making up the majority (Karugia et al., 2013). The EAC has relied largely on international aid for development (Vanheukelom, 2016).

According to the economic analysis by the World Bank (2018), Kenyan households that were entirely engaged in agricultural activities contributed to a 31.4% decrease in rural poverty. Therefore, for the non-poor and the poor citizens in most rural setups, agriculture continues to be the main source of livelihood. Similar to this, the agricultural industry has been the major employer in Kenya, contributing to 35% of the nation's GDP in the year 2020, which is one of the highest percentages in African nations (Muinga et al., 2019). This therefore makes it important to determine the connection between agricultural growth and external debt.

II. EMPIRICAL LITERATURE

According to Okolie (2015), who used a descriptive survey to examine the debt crisis, debt relief, and economic status in Nigeria, the study revealed a negative significant relationship between external debt and growth. It was concluded that the slow economic rise in Nigeria was established to be a result of huge external debt owed by the country, hence leading to a shortage of fiscal discipline brought about by overdependence on oil revenue, amongst others. The study by Okolie revealed the nexus between external debt and economic growth in Nigeria, whereas this study shows the nexus between external debt and agricultural sector performance in Kenya.

Oliver et al. (2019) studied 13 countries for the period 1965–2011; they affirmed that in 1982, there was a significant effect of the debt crisis with regards to the slowdown of domestic investment, which was considered so intense, particularly in agriculture. The amount of agricultural output that was achieved had an inverse relationship with the country's total external debt for the 13 least-developed nations for the period 1982–2010. This was achieved using OLS in measuring the debt crisis size effect on agricultural output. The study by Oliver et al. (2019) reveals the nexus between agricultural sector performance and the external debt of LDCs, but not necessarily Kenya.

While conducting an investigation into the empirical evidence about the connection between Lebanon's external debt, economic expansion, and exports for the period 1970–2013, Wadad (2015) reported that the variables had relationships in both the short term and the long run. An insignificant effect was also revealed in the relationship between external debt and growth. He further recommended that sourcing domestic loans be considered since, according to Abubakar and John (2015), returns on investment will not be subject to taxation by external creditors. The study by Wadad revealed the connection between external debt and economic expansion, which does not really show the expansion in specific sectors like the agricultural sector. This study, however, reveals the nexus between external debt and agricultural sector growth.

During the period of 1975–2006, when the correlation between external debt and economic growth in Nigeria was studied, Adedoyin et al, (2016) found that external debt had a negative association with economic growth in Nigeria. From the findings, the study encourages debt accumulation in a synchronized manner for activities scheduled for repayments. The study by Adedoyin et al. (2016) revealed the nexus between Nigeria's external debt and economic growth, but much is not revealed in the agricultural sector.

The study by Yeshineh and Alekaw (2018) looked at the influence of external debt on the growth of Ethiopia's service sector and agricultural sector from 1981–2012 and found that both the growth of Ethiopia's service sector and its agricultural sector have contributed favorably to the country's overall economic growth. In addition, aggregate levels of external debt have a negative impact on the expansion of the agricultural economy. Furthermore, the direction of causality in this relationship is unidirectional, which means that the expansion of agricultural output is adversely affected by the burden of debt (Brownson et al., 2014). The studies unraveled the nexus between the agricultural sector and external debt in Ethiopia, whereas this study focuses on Kenya's agriculture and external debt.

According to Obadan and Ohiorenoya (2013), while examining the process of succession planning in small business enterprises in the hotel industry in Benin City, it was found out that the level of foreign borrowing required by a nation is contingent upon the proportion of its total domestic output allocated to overall expenditure. In order to have a positive impact on economic growth, it is imperative that foreign borrowing be accompanied by a rise in domestic savings and investment. Hence, in order for nations to reduce their reliance on external borrowing, they must enhance their domestic savings in order to sustain their targeted development rate. The study primarily focused on external debt and the hotel industry, whereas this study focuses on the nexus between external debt and the agricultural sector.

From the reviewed studies, it is clear that less research has been done on the connection between external debt and agricultural sector growth. Therefore, this study aims to contribute to the existing literature by studying the nexus between external debt and agricultural sector growth.

III. METHODOLOGY

This study employed a correlational research design, which brought out the relationships between variables. The time series data used in the study was obtained from the databases of World Development Indicators and Statista, covering the period from 2012 to 2020.

3.1 Econometric Model

The researchers employed a multiple regression to test the hypothesized relationship between Agricultural sector performance and external debt. The model was as follows.

$$A_t = \beta_0 + \beta_1 I_t + \beta_2 F_t + \beta_3 E_t + \varepsilon_t$$

Where, A_t is the Agricultural sector performance, $\beta_0$is the intercept, I_t is inflation , F_t is the foreign direct investment, E_t is the External Debt and ε_t is the stochastic term, t is the time, $\beta_1, \beta_2, \beta_3$ are regression estimate parameters which represent the slopes of I, F and E showing the changes in Agricultural sector performance; A when I, F and E changes.

IV. RESULTS

4.1 Descriptive Statistics

Table 1 shows the descriptive statistics for Agricultural sector performance measured by contribution of agriculture to the Gross Domestic Product of Kenya.

Table 1

Descriptive Statistics

	A	E
Mean	19.7825	2.225513
Median	19.46	2.296334
Maximum	22.62	4.673457
Minimum	18.32	0.075467
Std. Dev.	1.247515	1.291426
Skewness	0.857772	0.105788
Kurtosis	2.884277	1.807726
Jarque-Bera	5.420218	2.688184
Probability	0.06653	0.260776
Sum	870.43	97.92257
Sum Sq. Dev.	66.92063	71.71461
Observations	44	44

A-Agricultural Sector Performance
E-External Debt

The agricultural sector's performance (A) in Kenya was measured as a percentage of the sector's contribution to Kenya's GDP, with an average of 19.78250, a minimum value of 18.32, a maximum value of 22.62, showing the maximum growth in the agricultural sector for the period under study, and a standard deviation of 1.247515. Additionally, agricultural sector performance (A) exhibited a P-value of 0.066530, which is greater than the significance level of 0.0500. Consequently, the null hypothesis, which states that agricultural sector performance (A) follows a normal distribution, was accepted. External Debt (E) had an average value of 2.225513, a minimum value of 0.075467, a maximum value of 4.6734557, and a standard deviation of 1.291426. The external debt (E) exhibited a P-value of 0.260776, which is greater than the significance level of 0.0500. Consequently, we accept the null hypothesis that the variable follows a normal distribution. Additionally, it was found that the values of skewness and kurtosis for all variables were above the threshold of 0.05. This finding indicates that the distribution of variables around their means exhibited asymptotic normality in terms of both skewness and kurtosis.

4.2 Correlation Analysis

The results of the pairwise correlation analysis used in this study to ascertain the kind and direction of the relationship between variables are provided in Table 2. It shows that agricultural sector performance and external debt had a moderately positive correlation (r = 0.359591).

Table 2

Correlation Analysis

Variables	A	E
A	1.000000	0.359591
E	0.359591	1.000000

4.3 Augmented Dickey –Fuller Unit Root Test

This study adopted the Augmented Dickey-Fuller (ADF) test to check for unit root. The null hypothesis of this test shows the existence of a unit root. Considering the ADF test, the decision criteria for rejecting the null hypothesis are based on the ADF T-statistic being greater than 5% and 1% critical value, irrespective of the sign. Additionally, the P-value has to be greater than 0.05. Table 3 displays the ADF test results at different levels.

Table 3

Augmented Dickey Fuller ADF Results at Levels

At Levels						
Variables	**ADF T-statistic**	**Prob**	**Critical values**			**Conclusion**
			1%	5%	10%	
A	0.510476	0.9852	-3.592462	-2.931404	-2.603944	Unit root
E	-1.871647	0.3420	-3.596616	-2.933158	-2.604867	Unit root

Table 3 displays the augmented Dicker-Fuller test results. The variables exhibited a unit root at level: agricultural sector performance (p value 0.9852 > 0.0500) and external debt (p value 0.3420 > 0.0500). The ADF T-statistic values were greater than 1%, 5%, and 10% of the critical values. This suggested that the alternative hypothesis of stationarity was rejected in favor of the null hypothesis that there is a unit root. As a result, the time series data was not level-stationary.

Table 4

Augmented Dickey Fuller ADF Test at First Difference

First difference						
Variables	**ADF T-statistic**	**Prob**	**Critical values**			**Conclusion**
			1%	**5%**	**10%**	
A	-6.266486	0.0000	-3.596616	-2.933158	-2.604867	*Stationary*
E	-13.47240	0.0000	-3.596616	-2.933158	-2.604867	*stationary*

Table 4 shows that agricultural sector performance (A) is stationary at the first difference with a p-value of 0.000 < 0.05. The ADF-Test statistics are (-6.266486) greater than 1% (-3.596616), 5% (-2.933158), and 10% (-2.604867) critical values, respectively. External debt (E) had a p value of 0.0000 < 0.0500. Therefore, the alternative hypothesis that the variables had no unit root was accepted in place of the null hypothesis, and it was concluded that the time series data was stationary at the first difference."

4.4 Optimum Lag Length Determination

The study determined the number of lags to be included in the model based on AIC criteria. Table 5 indicates that at a lag length of two, there was the highest number of lag orders selected by the criterion, which were indicated by the (*).

Table 5

Lag Length Determination

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-243.4762	NA	3.817602	12.69109	12.86171	12.75230
1	-123.1236	209.8455	0.018203	7.339673	8.192781	7.645761
2	-79.70744	66.79412*	0.004590	5.933715	7.469310*	6.484673*
3	-66.23988	17.95675	0.005617	6.063583	8.281666	6.859412
4	-47.54936	21.08673	0.005651	5.925608	8.826177	6.966308
5	-21.96121	23.61983	0.004474*	5.433908*	9.016964	6.719478
* indicates lag order selected by the criterion						

4.5 VEC cointegration Test

Table 6

Vector Error correction Model

Vector Error Correction Estimates				
Standard errors in ( ) & t-statistics in [ ]				
Cointegrating Eq:	CointEq1			
A(-1)	1.000000			
E(-1)	-2.112312			
	(0.35950)			
	[-5.87568]			
C	-12.60483			
Error Correction:	D(A)	D(I)	D(F)	D(E)
R-squared	0.745327	0.940043	0.649120	0.667275
Adj. R-squared	0.411068	0.861349	0.188591	0.230573
Sum sq. resids	1.199554	4.802442	0.495832	22.82323
S.E. equation	0.273810	0.547862	0.176038	1.194342
F-statistic	2.229791	11.94557	1.409508	1.527988
Akaike AIC	0.540136	1.927310	0.343333	3.485965
Mean dependent	0.098158	-0.038684	-0.058434	0.024446
S.D. dependent	0.356794	1.471328	0.195428	1.361586

According to Table 6, the researcher failed to reject the null hypothesis at a 5% significance level since the F-statistic (2.229791) of the Bounds test was smaller than critical values.

4.6 Regression results

A multivariate regression analysis was adopted to establish the nexus between external debt and agricultural sector performance. Table 7 displays the output of the regression analysis.

Table 7

Regression Results

Dependent Variable: A				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
E	0.5309	0.03043	17.44670	0.00891
F	0.1324	0.05261	2.51705	0.08026
I	-0.2546	0.08830	-2.88303	0.00775
C	6.1977	1.47702	4.19611	0.00677
R-squared	0.935191	Mean dependent var		2.983845
Adjusted R-squared	0.928369	S.D. dependent var		0.062040
S.E. of regression	0.016604	Akaike info criterion		-5.249371
Sum squared resid	0.010477	Schwarz criterion		-5.044581
Log likelihood	117.8615	Hannan-Quinn criter.		-5.173851
F-statistic	137.0855	Durbin-Watson stat		2.002264
Prob(F-statistic)	0.000000			

Table 7 indicates that the measure of goodness of fit (R2) value of 0.935191 and the probability value of F-statistic was 0.00000<0.05, implying the fitness and statistical significance of the regression model at a 5% level of significance. Furthermore, an R2 of 0.935191 implied that the variance in agricultural sector growth was predicted by a variance of 93.52% in the explanatory variables.

The following is the regression equation obtained;

$A_t = f(I_t, F_t, E_t)$……4.1

In expansion equation 4.1 becomes

$A_t = \beta_0 + \beta_1 I_t + \beta_2 F_t + \beta_3 E_t + \varepsilon_t$ ……4.2

$A_t = 6.1977 - 0.2546 I_t + 0.1324 F_t + 0.5309 E_t + \varepsilon_t$ ……4.3

4.7 Diagnostic Tests

4.7.1 Autocorrelation

When an error term from one period crosses into another, the resulting time series data exhibits autocorrelation. The linear regression error term suggests that consecutive error term values are sequentially independent (Baltagi, 2008). Under the null hypothesis that there is no serial correlation, the Langrage multiplier (LM) test for serial correlation was employed to ascertain whether there was any association. In the event that the probability value (p-value) is more than 0.05 percent, the null hypothesis is not disproved.

Table 8

Autocorrelation Langrage Multiplier (LM)

VEC Residual Serial Correlation LM Tests						
Sample: 2010Q1 2020Q4						
Included observations: 38 Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	Df	Prob.	Rao F-stat	Df	Prob.
1	15.67470	16	0.4759	0.988683	(16, 28.1)	0.4938
2	11.03600	16	0.8073	0.648914	(16, 28.1)	0.8166
3	9.367215	16	0.8975	0.537246	(16, 28.1)	0.9030
4	19.11663	16	0.2627	1.271426	(16, 28.1)	0.2802
5	12.84117	16	0.6843	0.775832	(16, 28.1)	0.6979

The results of the LM test in Table 8 show that all the p-values were higher than 0.05. As a result, the null hypothesis was accepted, indicating that there is no autocorrelation issue.

4.7.2 Multicollinearity

Multicollinearity typically happens due to significant correlations involving two or more predictor variables. To evaluate multicollinearity, one uses the variance inflation factor. Multicollinearity is deemed to occur when the variance inflation factor exceeds 10 (Stroia & Laurens, 2018). If the centered VIF value is lower than 10, multicollinearity does not exist.

Table 9

Test for Multicollinearity using Variance Inflation Factors

Sample: 2010Q1 2020Q4		
Included observations: 44		
	Coefficient	Uncentered
Variable	Variance	VIF
I	0.014968	8.435796
F	0.181314	7.445387
E	0.042255	3.514235
P	0.141052	9.851173

The test results in Table 9 shows that all the centered values of VIF were lower than 10 hence Multicollinearity does not exist.

4.7.3 Heteroscedasticity

The Glejser test was employed in the present investigation to ascertain whether the error components within the model exhibited a consistent variance. The null hypothesis for the test is that there is no heteroscedasticity, meaning that the variance is constant (homoscedasticity). If the p-value exceeds 5%, the null hypothesis is retained. Heteroscedasticity is a common outcome when the variance of the error term varies across different values of the independent variable. The results are presented in Table 10.

Table 10

Glejser Test for Heteroscedasticity

Heteroscedasticity Test: Glejser			
F-statistic	2.145635	Prob. F(4,39)	0.0934
Obs*R-squared	7.936351	Prob. Chi-Square(4)	0.0939
Scaled explained SS	6.921509	Prob. Chi-Square(4)	0.1401

The null hypothesis of constant variance was maintained since Table 10 F-statistics probability was greater than 0.05. Hence, there was no heteroscedasticity. This therefore implies the presence of homoscedasticity.

4.7.4 Residual Normality

The study conducted a normality test to make sure the residual values in the model were distributed normally. VEC residual normality test was conducted, and the outcomes are shown in Table 11.

Table 11
VEC Residual Normality Tests

Null Hypothesis: Residuals are multivariate normal				
Component	Skewness	Chi-sq	Df	Prob.*
1	-0.736527	3.435660	1	0.0638
2	-0.508265	1.636113	1	0.2009
3	-0.801319	4.066708	1	0.0437
4	-0.140206	0.124499	1	0.7242
Joint		9.262980	4	0.0549

All the probability values associated with the VEC residual normality tests, as presented in Table 11, exhibited a magnitude greater than 0.05. This led to the acceptance of the null hypothesis that the residuals exhibit multivariate normality. This observation indicates that the residuals of both variables have a regular distribution. The normality of the residuals was not contested at a significance level of 5%.

4.8 Results and Discussions

From the regression outcome in Table 7, external debt had a coefficient of 0.5309, which is statistically significant, and it means that there is a positive linkage between external debt and agricultural sector performance, such that a 1% rise in external debt leads to a rise in agricultural sector performance of 0.5309%. Because of this, the impact of external debt on the agricultural industry's performance in Kenya is statistically significant and displays an expectedly good indication. The results of this study concur with those of Adetual (2009), who thoroughly investigated the influence of foreign debt on agricultural output in Nigeria. It was found that external debt had a considerable impact on agricultural productivity. In addition, the study disagrees with Okolie (2015), who used a descriptive survey to examine the debt crisis, debt relief, and economic status in Nigeria. The study revealed a significant negative relationship between external debt and growth. It was concluded that the slow economic rise in Nigeria was established to be a result of huge external debt owed by the country, hence leading to a shortage of fiscal discipline brought about by overdependence on oil revenue, amongst others. Also, the findings agree with Wadad (2015), who did an investigation of the empirical evidence about the connection between Lebanon's external debt, economic expansion, and exports for the period 1970–2013 and reported that the variables had relationships in both the short term and the long run. An insignificant effect was also revealed in the relationship between external debt and growth. He further recommended that sourcing domestic loans be considered since, according to Abubakar and John (2015), returns on investment will not be subject to taxation by external creditors.

5. CONCLUSION & RECOMMENDATIONS

5.1 Conclusions

The study examined the nexus between external debt and agricultural sector performance in Kenya, using time series data from 2012 to 2020. The findings from the regression output revealed that external debt had a significant positive effect on the performance of the agricultural sector in Kenya, with a regression coefficient (β2) of 0.5309 and a p-value of 0.00891< 0.05. The study concludes that external debt boosts agricultural sector performance.

5.2 Recommendations

The government should consistently increase the external debt directed to agriculture to spur growth in the sector. Increasing external debt will equally promote infrastructure development and, hence, boost agricultural growth.

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