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Gross Domestic Savings, Agriculture Production and Cameroonian Economic Performance: A Times Series Analysis

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Abstract: This paper investigates the gross domestic savings, Agriculture production and economic growth in Cameroon covering for the period of 1967-2015. The results are estimated using times series analysis. The results show that gross domestic investment is significant at 0.002 and have a positive relationship with the economic growth and agriculture production is not statically significant but have a positive relationship in short run. The result of long-run relationship shows that gross domestic savings have statistically significant at 0.05 and positive relationship with economic growth while agriculture production is not statically significant but have positive relationship with economic growth The paper recommends policy efforts that would strengthen agricultural production by targeting approach that will attract foreign direct investment inflows into agriculture sector to complement existing efforts at boosting domestic agricultural production. In another term, Cameroonian domestic agriculture sector be focused on and fully in order for it to impact positively and significantly the economic growth.

Keywords: Domestic savings, Agriculture production, Economic growth, Times series analysis, Cameroon

I. INTRODUCTION

Is the Cameroonian agriculture production, gross domestic savings impact positively and significant the economic growth? As reported by nations encyclopedia website (2016) agriculture remains the backbone of Cameroon's economy, employing 70 percent of its workforce, while providing 42 percent of its GDP and 30 percent of its export revenue. Due to the good climate and fertile soil, the country produces a variety of agricultural commodities both for domestic consumption and for export.

According to Cameroon tour website (2016) Cameroon has experienced an increase in agricultural products exportation (cotton, cocoa and coffee), but with a fall in world prices for primary products, the country faced a serious crisis with affected negatively the revenue of exportation estimated at about 329 billion FCFA, this being about 8.2 % of the Gross Domestic Product (GDP) in 1985. Economic growth was negative and from 1985 to 1988, exchange rate decreased by half. The agriculture production in Cameroon continued to decrease in the recent years.

Lydie et.al (2011) argued that, there is no improvement in agriculture especially in Bamenda because farmers still tilling the soil with hoes and cutlasses and also Maputo Protocol which stated that 10 percent of the national budget should be spent on agriculture is not respected. The introduction to fertilizers, modern farming methods has impact the agriculture production but acquiring

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enough land and getting funds of extension still a big problem specially in the Northwest regions.

According to index mundi website (2016) gross domestic savings (% of GDP) in Cameroon was 11.32 as of 2014. Its highest value over the past 49 years was 29.10 in 1982, while its lowest value was 10.76 in 1966. Although the problems faced by Cameroonian agriculture sector still plays a vital role on economy development.

The aim of this paper is to investigate the agriculture production and gross domestic saving's role in the economic development as well the causal link between them.

This paper is organized as follows. Section I introduce the study. Section II provides a brief review of literature on impact of agriculture production and gross domestic savings on economic growth. The section III sets out the methodology employed in our analysis. Section IV takes the results and discussions. finally, section V concluding the study and managerial implications are outlined.

II. Review of Literature

Hartarska and Nadolnyak (2015) by investigating on the impact of Agricultural credit and economic growth in rural areas by using two alternative panel data sets and fixed effects models to estimate the causal effect covering the period of 1991-2003 period and annual data for 2003-2010 Period, found a positive effect between agricultural lending and agricultural GDP per rural resident. They also found a positive link between credit and economic growth in rural areas. Houssem (2010) by examining the role of agriculture in economic growth and its interactions with other sectors of the Tunisian economy using Johansen's multivariate approach over the period of 1967-2007, found that all Tunisian economic sectors cointegrated and tend to move together. Brown et.al (2014) by examining county-level linkages between community-focused agriculture and growth in total agricultural sales and economic growth Using Census of Agriculture data, regional growth models are estimated on real personal income per capita change between 2002 and 2007, found no relationship between community-focused agriculture and growth in total agricultural sales at the national level, but do in some regions of the United States. In another term, community-focused agriculture did not make significant contributions to economic growth.

Johnson (2012) by investigating on potential contribution of agriculture to economic growth in less-developed countries argued agriculture can become a leader in economic growth by providing labor- intensive employment for rapid increase in food production. He also argued that with the help of technical advisers, combinations of improved technology can impact the agriculture production. Abeid et. al (2016) by investigating on the impact of political stability in Tanzania covering the period of 1996-2014 found that gross domestic savings is not statically significant but have positive relationship with economic growth. Jagadeesh (2015) by investigating the role of savings in Economic growth in Botswana by using Auto Regressive Distributed Lagged (ARDL) model by Pesaran, Shin and Smith (1999) covering the period of the period of 1980 to 2013, found that there is significant relationship between Savings and Economic growth. Misztal (2010) by analyzing the cause and effect relationship between economic growth and savings in advanced economies and in emerging and developing countries by using cointegration and granger causality test, found that an existence of one-way causal relationship between gross domestic savings and gross domestic product in the case of developed countries as well as in developing and transition countries. In addition to that the result show an absence of causal relationship between gross domestic product and gross domestic savings both in developed economies and developing and transition countries. Mohan (2006), by addressing the relationship between domestic savings and economic growth for various economies with different income levels using time series annual data, found the existence of

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causality running from economic growth rate to growth rate of savings. Najarzadeh1 et.al (2014) by examining the relationship between Savings and Economic Growth in Iran covering the period of period 1972- 2010 is used with an Autoregressive Distributed Lag Model found that there is a positive and significant impact of savings on total and non-oil economic growth. In addition to that the results show that there is a long-run causal relationship between savings and economic growth, and between saving and non-oil economic growth

Nwanne (2014), by examining the implications of savings and investment on economic growth in Nigeria using ordinary least square regression over the period of 1981-2014 found that the change in gross domestic savings movements has negative and significant effect on the change in economic growth in Nigeria. Turan and Gjergji (2014) By investigating the causal relationship that exists between savings and economic growth in Albania between the years 1992 and 2012 using Johansen Cointegration Test found that savings and economic growth are cointegrated, therefore showing the existence of a stable long-run equilibrium relationship.

Beshir (2016) by using co-integration and vector error correction model (VECM) to examine the effect and causal relationship between the growth, found a high correlation between growth and saving. However, the causality issue is not yet settled. Abu (2010) by employing the Granger-causality and co-integration techniques to analyze the relationship between saving and economic growth in Nigeria during the period 1970-2007. The results indicate that economic growth and savings are cointegrated. In addition, the granger causality test reveals that causality runs from economic growth to saving.

III. METHODOLOGY

In this section, we present the methodology of our study. The paper used times series yearly data to examine the relationship between agriculture production, gross domestic savings and economic growth covering the period of 1967-2015. The Vector error correction model (VECM) is employed to establish the long run as well the short run relationships among our variables.

The mathematical specification of the model is:

$$GDP_t = f(\mathrm{AGP}_t, GDS_t)\varepsilon_t \quad \text{.....(1)}$$

The model employed included

$$GDP_t = \alpha_0 + \alpha_1 AGP_t + \alpha_2 GDS_t + \varepsilon_t \quad \text{.....(2)}$$

where:

GDP = Gross Domestic Product proxy for economic growth (% of GDP)

AGP = agriculture production, value added (% of GDP)

GDS = gross domestic savings as (% of GDP)

Based on the two explanatory variables in the model above which can explain the economic performance in Cameroon, we have assumed that, producing more and saving more in an economy leads to higher level of growth. Defined as a change in the gross domestic production of country over the year, economic growth is an important variable used by economists, police-makers to check whether the country is developing and prospering.

Many factors can impact the economic growth (political stability, control of corruption, infrastructure, foreign direct investment) but for this analysis, we are going to used only two variables.

Including forestry, hunting, and fishing, as well as cultivation of crops and livestock production, value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs and also calculated without making deductions for depreciation (work Bank Data base, 2016), agriculture production value added (as % GDP) play a key role in economy and in our model because it will help us to check its substantial impact on economic performance.

Calculated as gross domestic product final consumption expenditure (total consumption) according to Work Bank data base website, gross

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domestic investment play also an important role in economic development because it will cause a high domestic savings investment which is in return affect the domestic economic investment and its impact can be observed through economic growth.

The theoretical expectations for the model

Variables	Expected sign
AGP	+
GDS	+

Estimation procedure

Unit Root Test

Before perform VECM regression is it is very important to conduct unit root rest to avoid spurious results. the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) will be employed. ADF is conducted by: augmenting" the equation by adding the lagged values of economic growth (GDP) ΔGDPt-1. Suppose, the equation for GDPt in our model, the ADF here consists of estimating the following:

$$\Delta LGDP_t = \beta_0 + \beta_1 + \partial \Delta LGDP_{t-1} + \sum_{i=1}^{m} \lambda_1 \Delta GDP_{t-i} + \varepsilon_t ...(3)$$

Where:

εt = white noise error

Where εt is a white noise error term and,

$\Delta GDPt = (GDP_{t-1} - GDP_{t-2})$ The difference lags numbers to be include in our model. The presence of unit root indicates that the variable is non-stationary, but after first or second difference, the variables will become stationary.

Cointegration

After the unit root test, we are going to check if there is an existence of long-run relationship among our variables. The study therefore, employed the cointegration test by Johansen (1988, 1991). To examine the impact of agriculture production, gross domestic savings, we posit the ECM of the form:

$$\Delta GDP_t = \gamma + \sum_{i=1}^{p} \beta_{1i} \Delta GDP_{t-i} + \sum_{i=1}^{q} \beta_{2k} AGP_{t-k}$$

$$+ \sum_{i=1}^{q} \beta_{3l} \Delta GDS_{t-l} + \varphi ECM_{t-1} + \mu_t .....(4)$$

All the variables are as previously defined, with the coefficient of the ECM being φ

Granger Causality Test

An existence of long –run relationship among our variables, doesn't always confirm the presence of causation. According to the concept of Granger causality, A causes B, if and only if the past values of A help to predict the changes of B. While, 'B causes A' if and only if the past values of B help to predict the changes of A. The predicted results can be as follow (A as dependent variable and B the independent variable):

- Unidirectional causality from B to A
- Conversely, unidirectional causality from A to B
- Feedback or bi-directional causality A B
- Independence when the coefficients of the both variables are not statically significant.

V. RESULTS AND DISCUSSIONS

Table 1: Descriptive Statistics of Variables

	GDP	AGP	GDS
Mean	3.701975	25.70107	18.19517
Median	4.128371	24.35907	18.47941
Maximum	22.00300	33.64508	29.09960
Minimum	-10.91207	20.41626	10.84942
Std. Dev.	5.951569	3.785440	4.946097
Skewness	0.139292	0.521302	0.399604
Kurtosis	4.537261	1.890562	2.478620
Jarque-Bera	4.983257	4.732334	1.859078
Probability	0.082775	0.093840	0.394736
Sum	181.3968	1259.353	891.5632
Sum Sq. Dev.	1700.216	687.8187	1174.266
Observations	49	49	49

Source: author's computation using Eviews 8.

The table 1 present the summary of the descriptive statistics of the variables employed in our analysis.

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The descriptive statistics help us to have an idea on the trend, normality and stability of the variables used in our model. The standard deviation, skewness, kurtosis, Jarque-Bera and probability confirmed that the variables are stable and normal.

Table 2: ADF Unit Root Test

At level			
Variable	Lag [Order]	t-stat	Prob*
GDP	(0) [0]	2.132844	0.2332
AGP	(0) [0]	-2.032866	-2.0328
GDS	(0)[0]	-2.422201	0.1412
First difference			
GDP	(0) [1]	10.26547	0.0000
AGP	(0) [1]	-9.351687	0.0000
GDS	(0) [1]	-7.930599	0.0000

*Note: *, **, *** indicate significance at 1%, 5% 10% level.*

From the results of ADF unit root test in table 2, the null hypothesis of unit root for the variables included in our model cannot be reject at level. The variables which are not stationary at level, became stationary at the first difference.

Table 3: Philips Person Unit Root Test.

At level			
Variable	Lag [Order]	t-stat	Prob*
GDP	(0) [0]	-5.504347	0.0000
AGP	(0) [0]	-1.878321	0.3395
GDS	(0)[0]	-2.258989	0.1891
First difference			
GDP	(0) [1]	16.03488	0.0000
AGP	(0) [1]	-9.351687	0.0000
GDS	(0) [1]	-8.596289	0.0000

*Note: *, **, *** indicate significance at 1%, 5% 10% level.*

The table 3 presented the results of unit root test. It also indicates that the variables the non-stationary variables at levels but became stationary at first difference. Based on the results of table 2 and 3, we can conclude that all variables are integrated of order one [1].

Table 4: Johansen Trace Test for Co-integration

Hypothesized No. of CE(s)	Eiqenvalue	Trace Statistics	0.05 Critical Value	Prob. **
None *	0.419774	35.47853	29.79707	0.0099
At most 1	0.137506	9.894673	15.49471	0.2889
At most 2	0.060679	2.942102	3.841466	0.0863

*Trace test indicates 1 cointegration) at the 0.05 level and * denotes rejection of the hypothesis at the 0.05 level.*

Source: Prepared by the authors, based on Eview 8

Table 5: Johansen Maximum Eigen values for Co-integration

Hypothesized No. of CE(s)	Eiqenvalue	Trace Statistics	0.05 Critical Value	Prob. **
None *	0.419774	25.58386	21.13162	0.0110
At most 1	0.137506	6.952571	14.26460	0.4948
At most 2	0.060679	2.942102	3.841466	0.0863

*Trace test indicates 1 cointegration) at the 0.05 level and * denotes rejection of the hypothesis at the 0.05 level.*

Source: Prepared by the authors, based on Eview 8

The Table 4 and 5 show the presence of 1 cointegration when economic growth is regressed on agriculture production and gross domestic investment. By employing the trace test-statistics, the null –hypothesis of no cointegration is rejected at 5% significance level since the test statistics are more than their respective critical values. The results for Johansen Maximum Eigen values for Co-integration and Johansen Trace Test for Co-integration confirmed an existence of long-run relationship between our variable. Based on the indication that, there is 1 cointegrating vector among our variables.

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Table 6: Granger causality test

Null Hypothesis	F-Statistics	P-value.
GDS does not Granger Cause GDP	7.81687	0.0013
GDP does not Granger Cause GDS	0.06140	0.9405
AGP does not Granger Cause GDP	0.90300	0.4131
GDP does not Granger Cause AGP	1.18391	0.3161

***, *** denote rejection of the hypothesis at the 0.05 and 0.10 levels*

Source: Prepared by the author, based on Eview 8

The table 6, presented the result of granger causality. The gross domestic savings granger cause economic growth because the P-value is less than 5%. This mean that, there is short-run causality running from this variable to gross domestic product growth. However, the agriculture production does not granger cause economic in Cameroon.

Table7: Short Run Estimates and Error Correction Model (VECM)

Variable	Coefficient	Std. Error	T. Statistic	Prob
D (GDS (-1))	0.922322	0.282041	3.270168	0.0021
D (AGP (-1))	0.590938	0.467778	1.263286	0.2131
D(ECM-1)	-0.461168	0.154179	-2.991123	0.0045

Source: Author's Computation using Eviews 8,
*Note: *, **, *** indicate significance at 1%, 5% 10% level*

The table 7 presented the result of short-run estimate. The estimated coefficient of the error correction vector is -0.461168. this negative and significant probability confirmed an existence of cointegration between our variables. Gross domestic investment is significant and have positive relationship with economic growth while agriculture as value added of GDP is not significant but have positive relationship with economic growth. It positive value shows an increase in economic development. A 100 increase in agriculture all things being equal will lead to 59% increase in economic growth. both this result confirmed that agriculture production and gross domestic savings are necessary of economic development improvement in Cameroon.

The table 8: Long-run analysis

Variable	Coefficient	Std. Error	T. Statistic	Prob
C	-11.96085	6.294564	-1.900187	0.0637
GDS	0.392921	0.163470	2.403628	0.0203
AVD	0.331253	0.213592	-1.550870	0.1278

The table 8 presented the result of long-run estimate. The findings from analysis of the long-run relationships confirmed that gross domestic savings have statistically significant at 0.05 and positive relationship with economic growth while agriculture production is not statically significant but have positive relationship with economic growth.

Table 9: Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.175237	Prob. F(2,46)	0.1251
Obs*R-squared	4.233788	Prob. Chi-Square (2)	0.1204
Scaled explained SS	4.709728	Prob. Chi-Square (2)	0.0949

Source: Author's Computation using Eviews 8

Table 10: Breusch-Godfrey Correlation LM Test

F-statistic	**2.017552**	**Prob. F (2,44)**	**0.1451**
Obs*R-squared	4.116158	Prob. Chi-Square (2)	0.1277

Source: Author's Computation using Eviews 8

The table 9 and 10 showed the results of residual diagnostic of serial correlation and Heteroscedasticity, normality test as well Multivariate Normality (figure 2) It has seen our model passes the test of serial correlation, heteroscedasticity, non-normality.

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Stability test

The figure 1 presented the result of stability through both CUSUM of Squares and CUSUM the figure indicates the recursive residual test have passed the stability test at 5% level of significance.

Figure 1

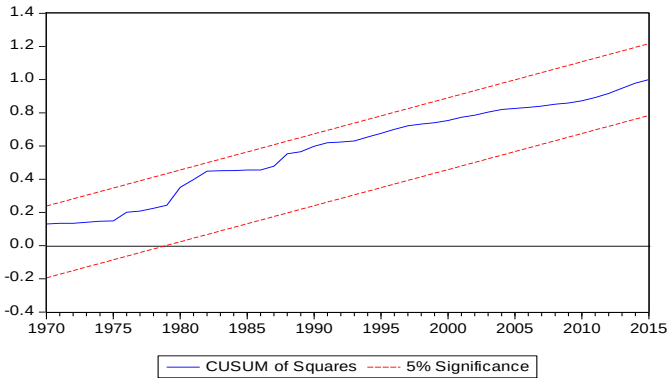


Figure 2

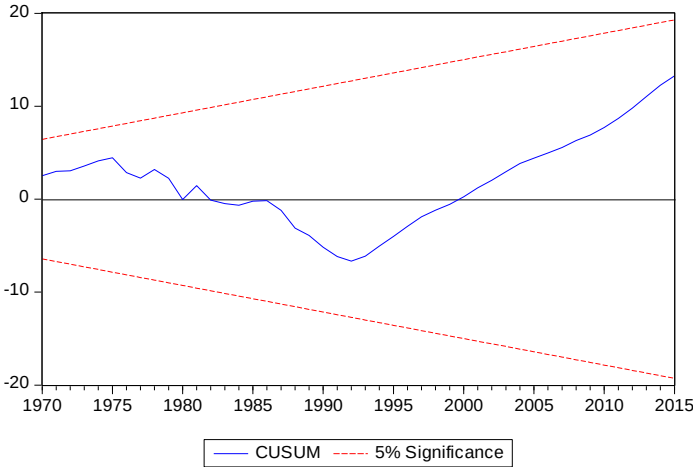
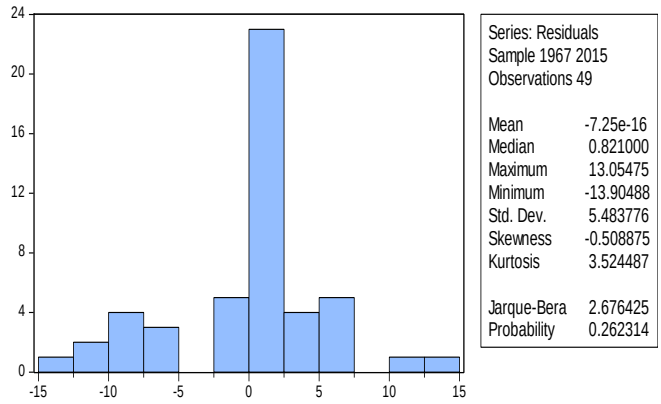


Figure 3: Multivariate Normality Test



V. Conclusions and recommendations

In this paper, yearly data covering the period of 1967-2015 were used vector correction model (VECM) to explore the impact of agriculture production, gross domestic savings and their causality direction on economic growth of Cameroon. The findings from analysis of the long-run relationships confirmed that gross domestic savings have statistically significant at 0.05 and positive relationship with economic growth while agriculture production is not statically significant but have positive relationship with economic growth. The results of short-run show that gross domestic savings have a significant and positive relationship with economic growth, however agriculture production is not statically significant but have positive relationship with economic growth.

Cameroonian agricultural sector should be reconsidered by policymakers for more emphasis on improving infrastructure and providing more help to human resources. The result of our analysis showed that agriculture sector in the country does not fully benefit the economic development.

Agriculture Needs More Action, Less Talk. Agriculture in Cameroon still backward because traditional tools such as: hoes, cutlasses and unprocessed seeds. The government need help the farmers by giving them tools like tractors and create many cooperatives and even banks for agriculturists. In another term, more investment needed in agriculture sector and if possible subsidize agriculture for long-run economic development.

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