International Journal of Development and Sustainability
ISSN: 2186-8662 – www.isdsnet.com/ijds
Volume 12 Number 5 (2023): Pages 144-164
ISDS Article ID: IJDS23021401

Impact of government expenditure on agribusiness development in Cameroon

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Abstract

The Sustainable development goals number 2.3 has emphasised on the need to double the agricultural productivity and incomes of small-scale food producers, particularly women, indigenous peoples, family farmers, pastoralists, and fishers, by 2030. The Cameroonian government with the objective of meeting this target within the deadline, recently implemented the Agricultural Value Chain Development Project in collaboration with the African Development Bank, with the aim of increasing the competitiveness of the agricultural sector. This study empirically examines the impact of government expenditure on Agribusiness Development in Cameroon using time series data from 1984 to 2021. The study employs Augmented Dickey–Fuller unit root test, the Autoregressive and distributed lag estimation technique after controlling for unit roots and cointegration through the error correction mechanism. Agricultural development is measured through the agricultural value added, agricultural exports and agricultural productivity, while government spending is measured through Government expenditure on Agriculture and government expenditure on livestock. The findings indicate that government spending in the Cameroon livestock sector has no statistically significant relationship with agribusiness Development. Similarly, the results indicate that in the long-run, government spending in the agricultural and livestock sectors has a positive statically insignificant relationship on agribusiness. Thus, the government should implement some strategic policies that will enable the agribusiness sector to develop and consistently impact national productivity growth.

Keywords: Agribusiness Development; Government Expenditure; ECM; ARDL; Cameroon

Cite this article as: Sefola Harret, N. and Bime Egwu, M.J. (2023), "Impact of government expenditure on agribusiness development in Cameroon", *International Journal of Development and Sustainability*, Vol. 12 No. 5, pp. 144-164.

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1. Introduction

The agribusiness sector which englobes the business activities carried out from the farm to the consumer's dining table is now considered a significant generator of employment and income worldwide (Mohsin, 2015). The global population is expected to increase from 7 billion in 2012 to 9.1 billion in 2050, a 30 per cent increase which indicates that the demand for food production and agricultural products will also increase even faster, by approximately 70 per cent over the same period (Rutten, 2012). This unchecked rapid population growth has among others contributed to increase poverty and malnutrition ineffective industrial and agricultural practises, with African countries, despite having a plethora of natural resources suffering most (Adeyeye et al., 2023). Investments must be significantly increased if the Sustainable Development Goals (SDGs) are to be achieved, especially the goal on ensuring sustainable food production systems for all (Abdelhedi and Zouari, 2020). According to the United Nations Conference on Trade and Development (UNCTAD), the yearly investment deficit for developing nations is over USD 2.5 trillion (UNCTAD, 2014). As per the recently available data, more than 730 million people live in extreme poverty (Roser and Ortiz-Ospina, 2013; Gyeke-Dako et al., 2022), and 690 million are still affected by chronic hunger (Otekunrin et al., 2020). The COVID-19 pandemic and the related lockdown measures are likely to exacerbate further the hardship of those already suffering (Epifanio et al., 2021). Also, according to the World Bank (2020), an extra 71 to 100 million people would be severely impoverished, and the agro-food sector has an exceptionally high potential to reduce poverty and hunger.

Despite this potential, the agricultural sector suffers from significant underinvestment. Despite the sector's unquestionable importance to employment and GDP in low- and middle-income nations, the proportion of agriculture in commercial financing and foreign direct investment remains below 3 per cent, according to the Food and Agricultural Organisation (FAO) (Fiedler and Iafrate, 2016). In 2015, FAO identified an annual investment gap of USD 265 billion to achieve the first two SDGs by 2030. More than 50 per cent should target agriculture and rural development (UNCTAD, 2020).

The bulk of the investments needed to achieve the SDGs is expected to come from the private sector. Farmers and micro, small and medium enterprises (MSMEs), the largest investors in developing countries' agriculture (Pauw et al., 2018), are expected to play a crucial role. However, strategically targeted interventions from the public sector will be essential to steer sustainable private-sector-driven growth. Public investments, investment promotion strategies and an enabling environment are catalytic stimulators of private investments that should be aligned with national development strategies (Suri and Udry, 2022).

Agriculture is the leading sector of the economy of CEMAC countries and Cameroon in particular. This sector covers the subsistence and income needs of a large rural population employing about 64% of the living force of the area. It contributes 25% to the gross domestic product of the sub-region, although this varies significantly from one state to another (Yumkella et al., 2021). However, it only provides about 15% of export earnings due to the relatively high weight of oil exports produced in four CEMAC countries. The share of imports of agricultural products in total imports is of the order of 16%. Regarding food security, the CEMAC countries have failed in recent decades to ensure increased agriculture and food availability for their populations (Ngong et al., 2020).

Improving the performance of the Community's agricultural sector is vital for CEMAC's economic growth. In addition, national political leaders have repeatedly expressed the need to re-situate the agricultural sector

as a priority sector for the pursuit of the overall objectives of economic growth, improvement of the standard of living of rural and urban populations and of satisfying their food and nutritional needs (Achancho, 2013). Agriculture is amongst the main occupations for over 70% of Cameroonians and contributes enormously to the economy. Given the proportion of the labour force employed in the Agricultural sector, an estimated 45% of Cameroon's gross domestic product (GDP) depends on Agriculture (Abia et al., 2016). In addition, the Agricultural sector is responsible for providing food security to Cameroonian rural and urban populations via local production. Notwithstanding, with the rapidly expanding population growth, there is increased pressure on natural resources. According to Molua (2010), low levels of input and equally low levels of government subsidies (for example, quality seeds, fertilisers, and herbicides) per capita, as well as a result of population growth, are responsible for the food production decline from 22.9% to 12.8%. This situation may further be frustrated by the expected adverse impact of climate change on agriculture now and in the future (Molua, 2007).

The Government of Cameroon recognises that to stimulate rural areas' development effectively, it must invest in agriculture (Chenaa and Kimengsi, 2016). For this reason, it has decentralised its decision-making and empowered the policy and decision-makers at district levels and local municipalities with the necessary resources as a strategy to promote agricultural production, fight poverty and enhance economic growth (Tantoh and Simatele, 2018). One of the most successful ways to reduce poverty in developing countries such as Cameroun is to prioritise the agricultural sector and agribusiness development, effectively emphasising rural initiatives that promote productivity, marketing, and international trading possibilities (World bank, 2011). Surprisingly, no study has taken great interest in examining the effect of government spending on Agricultural development for Cameroon. This study therefore aims to investigate the effect of government spending on agribusiness development in Cameroon.

Several factors motivate the choice of Cameroon as a case study, including the signing of an Agreement on the 8th of September 2022 between the Cameroonian Minister of Agriculture and the general manager of the Commercial Bank of Cameroon for the establishment for the Agricultural development fund. The fund will be established as part of the implementation of the Agricultural Value Chain Development Project by the African Development Bank and the Cameroonian government. It will give Cameroonian microfinance organisations access to medium-term funding so that they can lend flexible medium-term loans (2–4 years) to businesses involved in the agricultural value chain. The Agricultural Value Chain Development Project has funding of €115.05 million, of which 77.6% comes from the African Development Bank Group, 21.5% from the State of Cameroon, and 0.9% from beneficiaries. Its goal is to increase the competitiveness of the oil palm, plantain, banana, and pineapple sectors—of which Cameroon is one of the major exporters in Central Africa—in order to foster shared wealth, jobs for young people, and promote food and nutritional security (AfDB, 2022). The study therefore seeks to answer the following question: Does government spending enhance agricultural output in Cameroon?

This study is therefore a good value-added to the scholarly literature on agricultural development financing, by evaluating the impact of public finance allocated to the agricultural sector on agribusiness. In this regard, it will be helpful for academic purposes to evaluate the actual effect of government spending on agribusiness development in Cameroon. This study further distinguish itself from other scholarly works on the subject by approaching agricultural development through three different approaches: value added to the economy, exports, and productivity. This is important given that the development of agriculture is perceived here

through its contribution to the national income of the country, the ability of agricultural products to compete internationally and finally the outputs obtained. Hence, this paper is structured into five sections following the introduction; section II presents the literature review, section III is the study's methodology, section IV depicts the analysis and interpretation of the result, and section V concludes the paper.

2. Literature review

The term Agribusiness regroups two keywords, notably agriculture and business. Agriculture is the set of activities that use land and other natural resources to produce food, fibre and animal products that can be used for direct consumption (self-consumption) or sale, either as food or as input to the manufacturing industry. Forestry, fishing and hunting are usually included in the agricultural sector (Ullah et al., 2021). On the other hand, the business represents an organised and systematised human activity that involves the manufacturing of goods and provision of services buying and selling, aiming to earn profits or benefits (Tijani et al., 2017). Development is considered a state in which things are improving; the act of improving by expanding, enlarging or refining, making some area of land or water more profitable or productive or valuable (Uphoff, 2013). Agricultural/agribusiness development, therefore, is a policy intervention strategy put forward by the government to spur the growth of agriculture and agribusiness to enhance a nation's economy.

Public expenditure is the aggregate spending of government in different sectors of the economy to ensure economic growth and achieve macroeconomic policy objectives (Abubakar et al., 2020). This expenditure can be from national, regional and local government levels (s). Public expenditure (recurrent or capital expenditure), notably on social and economic infrastructure, can be growth-enhancing (Taiwo and Abayomi, 2011).

2.1. Theoretical considerations

Wagner (1876) found that governmental expenditure stimulates the economy rather than causing growth. He also claimed that during economic development, public expenditure rises faster than economic growth and that economic expansion causes public expenditure, not vice versa, as Keynesian theory suggests. This article agrees with Lencucha et al. (2020) that increasing the agriculture sector and its contribution to economic growth requires fiscal policy measures like government expenditure. Government spending in key areas like agriculture boosts economic growth and employment development (Ernawati et al., 2021).

Keynesians argue that increasing government expenditure boosts the economy (Dynan and Sheiner, 2018). Keynesians believe government spending boosts domestic economic activity (Babatunde, 2018). Government spending drives economic growth (Keynes, 1936), which helps address economic stagnation. Keynesians view government expenditure as an exogenous weapon governments employ to regulate economic development, unlike Wagner (Selvanathan et al., 2021). Keynes (1936) argues that government expenditure stimulates corporate activity in an economy, whereas Moreno-Dodson (2008) claims it is unproductive. The Maputo statement on African agriculture suggests that nations dedicate up to 10% of their budgets to agriculture (Sers and Mughal, 2019). For the case of Cameroon, the total budget allocated for the agricultural sector increased by 259.5% between the year 2000 and 2019 and Agricultural exports increased from 9% of GDP to 20% of GDP within the same period. Makin (2015) confirms Keynes's argument that rising government expenditure

raises national output value, which this article tests sectorally by examining the link between government expenditure and agricultural production. Government spending on agriculture includes research, technology, livestock, crop gene banks, and extension service (Atayi et al., 2020).

This paper examines the relationship between government expenditures in agriculture and agricultural production value using a six-variable autoregressive model described in Section 3.

2.2. Empirical literature

Previous studies have employed various methods to analyse the variables of interest. These include the Error Vector Correction model (ECM), vector error correction models (VECM), multiple regression and correlation analyses, the Ordinary Least Square (OLS), and autoregressive-distributed lag models (ARDL).

The first strand of authors uses the ARDL regression techniques to establish the determinists of agricultural productivity. These include, Kadir and Tunggal (2015) examined the impact of macroeconomic factors on agricultural productivity in Malaysia using time-series data for the period 1980 to 2014. The study's findings revealed that increasing government expenditure, exports, and money supply leads to improved agricultural productivity, while the exchange rate and inflation reduce agricultural productivity. Also, the impacts of macroeconomic factors on agricultural output in South Africa were investigated by Setshedi and Mosikari (2019). The results indicated that higher government spending on agriculture might boost agricultural output. Additionally, the results demonstrated that rising food prices had a negative impact on agricultural output.

Other group of authors use the error correction mechanism to establish the relationship between their underlined variables under investigation. In this regard, Okezie et al., (2013) after verifying for the presence of a long-run relationship through the Engle-Granger modelling (EGM) of cointegration and causality through the Granger Causality tests investigate Nigerian agricultural expenditure and its connection with agricultural production between 1980 and 2011. The findings indicate a long-run relationship between agricultural contribution and government expenditure. While the causality test findings show that there is weak causation between the two important variables in the research. As a result, the paper contends that any decrease in agricultural funding will significantly negatively influence Nigeria's economic growth. Also, Ewubare and Udo (2017) investigated the impact of public sector financing on agricultural output in Nigeria between 1980 and 2014 after verifying the presence of a cointegration relationship through the Johansen cointegration and error correction model techniques. The results of their findings demonstrate that public sector financing has a significant impact on agricultural output in Nigeria during the study period. As a result, the report proposes that the government boost its agricultural sector expenditure to achieve long-term economic growth.

Also, Igwe and Esonwune (2011) approached the subject through multiple regressional analysis for the Nigerian economy between the 1994 to 2007 periods. According to the study's results, the influence of government spending on agriculture has yet to increase agricultural productivity. Nonetheless, the research demonstrated that total population, yearly rainfall, and planted area are vital predictors of agricultural productivity. On their part, Enu and Attah-Obeng (2013) conducted a study intending to identify macroeconomic factors that influence agricultural production in Ghana through the OLS methodology. The study's findings confirmed that major macroeconomic factors influencing agricultural production are real GDP per capita, real exchange rate, and labour force. Furthermore, the findings suggested that increasing the labour force increases agricultural production.

Looking at studies conducted in Cameroon, Forgha and Mbella (2013), used the ARDL and argue that public spending does not crowd-out private investment in Cameroon. They recommended that the government of Cameroon should prioritise investment in key economic sectors rather than irrational spending that is politically motivated and has no economic value, as strategies of the public and private sectors in development. Fani et al. (2020) through the System dynamic modelling approach concluded that the greatest option for ensuring the sustainability of agricultural expansion for Cameroon is to boost foreign direct investment and reduce public spending. On their part, Ngouhouo and Nguepi (2022), through the computable general equilibrium model argue that a 20% increase in public spending in Cameroon would raise the standard of living for capitalist households and salaried households by, respectively, 883.58 billion and 5.47 billion CFAF. Tambi (2019) used the control function model and the 2SLS to estimate and argue that trainings on agriculture for household increases agricultural productivity and recommended public investments into agricultural schools for sustainable agriculture in Cameroon. Gbetnkom and Khan (2020), through the OLS techniques examined the determinants of agricultural exports in Cameroon. Their results show that Credit to crop exporters significantly and favourably affects the supply of all crops for export. Rainfall also has a positive impact on the development of the agricultural commodities, but only for cocoa and coffee. Finally, structural adjustment dummies demonstrate that implemented measures have a favourable impact on the export supply of crops. Belek and Jean-Marie (2020), argue that microfinance services in Cameroon are essential for closing the agricultural productivity gap.

The highlighted literature fails to integrate public spending as a determinant of agricultural development in Cameroon. Besides, the few studies that have touched public spending did not use the public expenditure destined for the agricultural sector. Also, none of the studies measures agricultural development by considering its impact on the national revenue, international competiveness and ability to meet the demand in agricultural goods. This study fills these research gaps through the ARDL methodology.

3. Methodology of the article

This study uses an ex-post factor causal research design to determine the impact of Government expenditure on Agribusiness development in Cameroon. In order to test our hypotheses, data from the World Development Indicators, BEAC, CEPII database, MINADER, MINFI and MINEPAT were analysed using the Co-integration and Error Correction estimation techniques, taking into consideration the specificities of the data over the period 1984 to 2022.

3.1. Unit root testing

The augmented Dickey–Fuller (ADF) test was used to test for unit root existence as a mandatory step for time-series data. The study adopted the regression equation given by Dickey and Fuller (1979), which is expressed as follows:

$$\Delta Y_t = \propto + \beta_t + \vartheta Y_{t-1} + \sum_{i-1}^{k} \lambda \Delta \times Y_{t-1} + \mu_t \qquad (1)$$

where ΔY_t is the first difference of the series Y; μt is a stochastic error term, in which ΔYt−1 = (Yt−1 − Yt−2), ΔYt−2 = (Yt−2 − Yt−3); α is a constant; t is the time; and β and ϑ are parameters.

Unit root testing aims to examine the stationarity of time-series data. Unit root testing is critical for time-series analysis, as conclusions derived from non-stationary data can only be applied to a specific period and cannot be used to forecast future values. The advantage of ADF test over some other unit root tests is that it can be used even in the present of serial correlation, unlike the Phillip Peron test that ignores serial correlation. The null hypothesis of the ADF test is that the time series contains a unit root and is non-stationary, while the alternative hypothesis is that the time series is stationary.

3.2. Model specification

The model starts with a theoretical relationship between agricultural development and public spending based on the study of Gollin et al. (2014) as follows:

$$AVA = f\,(GEA, AGE, TD, FD, PD, GEL, CP, PR) \quad (2)$$

where AVA is the agricultural value added measured as a % of GDP, which is a proxy for Agribusiness development, GEA represents Government expenditure on Agriculture, AGE agricultural Exports, TD stands for trade openness, FD is Financial Development indicator, PD is Population Density, GEL represents government expenditure on livestock, CP is Crop Production, and PR represents Precipitation.

To accommodate economic reforms in the modelling, a dummy variable (DO1) is added in equation (2) above, and the new equation is specified as follows:

$$AVA = f\,(GEA, AGE, TD, FD, PD, GEL, CP, PR, DO1) \quad (3)$$

Taking the logarithm of both sides, the stochastic linear model is expressed as follows:

$$L\,AVA_t = \beta_0 + \beta_1 LGEA_t + \beta_2 LAGE_t + \beta_3 LTD_t + \beta_4\, LFD_t + \beta_5 LPD_t + \beta_6 LGEL_t + \beta_7 LCP_t + \beta_8 LPR_t + \beta_9 DO1_t + \mu_t \quad (4)$$

where: L is the natural log operator, β_0= Constant, β_1, β_2, β_3, β_4: β_5: β_6: β_7: β_8: β_9: are the relative slope coefficients and partial elasticity of the parameters, μt = stochastic error term A priori expectations:

$$f^1\beta_1 > 0,\ f^1\beta_2 > 0,\ f^1\beta_3 > 0,\ f^1\beta_4 > 0,\ f^1\beta_5 > 0,\ f^1\beta_6 > 0,\ f^1\beta_7 > 0,\ f^1\beta_8 > 0\ f^1\beta_9 < 0,$$

3.3. Dependent variable

The dependent variable (Agricultural development) is proxied at first place through agricultural value added (%GDP), and then agricultural exports (%total exports) and crop production index are used based for robustness purposes in line with the extant literature on agricultural productivity (Gollin et al., 2014; Chen et al., 2022).

3.4. Independent variables of interest

The independent variables of interest include Government expenditure on Agriculture (GEA), government expenditure on forestry (GEF) and government expenditure on livestock (GEL). The variables are all measures

in per billion Franc CFA. These variables are expected to show positive effects with agribusiness. In essence, Gong (2018) and Baldos et al. (2019) recently establish a positive relationship between the underscored variables for the Chinese economy and USA economies respectively.

3.5. Control variables

Several control variables are included in our model to correct for possible omission bias based on recent literature on the determinants of agriculture productivity (Gong, 2018; Baldos et al., 2019). In this respect, the first control variable is trade openness (%GDP), with this proxy employed in accordance to the work of Ngouhouo and Nchofoung (2021) for the Cameroonian economy. Also, financial development is next control variable and is proxied by the domestic credit to private sector (%GDP) in accordance with the study of Nkemgha et al. (2023). Belek and Jean-Marie (2020) recently argued that financial development is essential for closing the agricultural productivity gap in Cameroon, a positive relationship is thus expected for this variable. The next control variable population which a negative sign is equally expected in line with the study of Josephson et al. (2014) for Ethiopia. The last but not the least variable is precipitation as a proxy for environmental quality. A negative sign is expected in accordance with the work of Molua (2022) for Cameroon.

4. Presentation and discussion of results

This section comprises four subsections in which Section 4.1 discusses the empirical results of the augmented Dickey-Fuller test results (Table 1), correlation analysis (Table 2), and VIF test results (Table 3). Section 4.2 discusses the results of the short-run dynamism, the test for Cointegration (ECM Form), the long-run dynamism and the Post estimation results.

4.1. Empirical results

4.1.1. Unit root test

Before estimating the model, it is essential to study the variables' statistical characteristics since they are time series. One of the most important pre-tests in the case of time series analysis is the unit roots because analysing non-stationary variables may lead to spurious regression and render the results non-reliable and invalid. Results of the Augmented Dickey-Fuller tests are presented in Table 1. The null hypothesis of the ADF test is that the time series contains a unit root and is non-stationary, while the alternative hypothesis is that the time series is stationary. This is particularly important for time series data because variables that do not show a long-run relationship would lead to a spurious regression.

The unit root test shows that are model contains variables that are stationary at level and some at first difference. This makes the Autoregressive Distributed Lag (ARDL) model ARDL model the most appropriate in this case.

Table 1. Augmented Dickey–Fuller (ADF) unit root test results

Variable	ADF P-Value at level	ADF P-value at first difference	Decision on stationarity
AVA	0.4246	0.0000	I(1)
AGE	0.0080		I(0)
CP	0.0126		
GEA	0.8316	0.0000	I(1)
GEL	0.9741	0.0000	I(1)
FD	0.5746	0.0001	I(1)
PR	0.0000		I(0)
PD	0.9882	0.0013	I(1)
TD	0.0070		I(0)

4.2. Correlation analysis

Correlation analysis is fundamental when dealing with time series as it permits the researcher to detect a possible problem of multicollinearity among the independent variables. Table 2 presents summary of the pairwise correlation coefficients among the independent variables.

Table 2. Pairwise correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) ava	1.000									
(2) crop production	-0.552	1.000								
	(0.000)									
(3) Agriculture exports	-0.438	0.479	1.000							
	(0.007)	(0.003)								
(4) GEA	-0.510	0.708	0.249	1.000						
	(0.001)	(0.000)	(0.137)							
(5) GEL	-0.447	0.576	0.166	0.953	1.000					
	(0.006)	(0.000)	(0.326)	(0.000)						
(6) GEF	-0.693	0.753	0.397	0.908	0.851	1.000				
	(0.000)	(0.000)	(0.015)	(0.000)	(0.000)					
(7) trade	-0.367	0.332	0.383	0.057	-0.014	0.215	1.000			
	(0.025)	(0.044)	(0.019)	(0.738)	(0.935)	(0.201)				
(8) PD	-0.775	0.621	0.284	0.845	0.832	0.910	0.127	1.000		
	(0.000)	(0.000)	(0.089)	(0.000)	(0.000)	(0.000)	(0.455)			
(9) precipitation	-0.180	-0.126	-0.113	-0.123	-0.033	-0.098	0.105	0.051	1.000	
	(0.286)	(0.457)	(0.505)	(0.468)	(0.847)	(0.566)	(0.537)	(0.765)		
(10) FD	0.671	-0.048	-0.058	-0.159	-0.167	-0.305	-0.030	-0.564	-0.349	1.000
	(0.000)	(0.776)	(0.735)	(0.347)	(0.324)	(0.066)	(0.860)	(0.000)	(0.034)	

NB: significance level in parentheses

As expected, there were positive and negative correlations among the variables. Most of the correlation coefficients were above 0.6, indicating strong correlations among the variables, which may presume the possible multicollinearity problem. However, in some cases, such as between the total budget allocated to agriculture and Crop production, total loans to the economy and population density, Remittances and crop production, the correlation coefficients were above 0.6, which indicates a robust correlation among the listed pairs of variables. Therefore, solid and significant correlations among the independent variables call for a formal multicollinearity test to ascertain a severe problem or if the high correlation was simply a coincidence. Consequently, the study further uses the Variance Inflation Factors (VIF) to test for multicollinearity, and the results are presented in Table 3.

Table 3. VIF test results

Model	Dependent variable: AVA
	Mean of VIF
GEA	3.8
GEL	3.6
GEF	2.4

From the VIF test, it can be seen that there is no major problem of multicollinearity in the model, given that no individual VIF exceeded 10. There is multicollinearity and you cannot perform a regression analysis if VIF>10. There is no collinearity, and it is okay if it is less than 10. A score less than 10 is considered informative, while values positive values less than 4 3.5 are preferred (Wooldridge, 2010).

4.3. Empirical finding

This section is devoted to interpreting empirical findings of the effect of Government expenditure on agribusiness development in Cameroon. Results of the short-run dynamics on the effect of government spending on agribusiness development in Cameroon are presented in Table 4. The paper used the Error Correction Model (ECM) Form to capture the cointegration test, which results are reported in Table 5. The long-run dynamics in the relationship between government spending in the agricultural sector and agribusiness development were later on presented in Table 6, with our Post Estimation results presented in Table 7.

4.3.1. Short-run dynamism

The findings presented in the Table 4 are those of the short-run dynamics on the effect of government spending on agribusiness development in Cameroon.

Table 4. Short-run results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable								
VARIABLES	Agricultural value added			agricultural exports			Crop production		
LnAVA	0.193	0.156	0.123						
	(0.195)	(0.195)	(0.190)						
PR	-0.00355*	-0.00326***	-0.00425***	0.00303	-0.00647*	-0.00551*	-0.0195**	-0.0282**	-0.00567*
	(0.00383)	(0.00371)	(0.00364)	(0.0254)	(0.0259)	(0.0249)	(0.0462)	(0.0457)	(0.0402)
FD	-0.0266	-0.0649	-0.0184	0.605	0.606	0.874*	0.356	0.763	0.459
	(0.0726)	(0.0739)	(0.0675)	(0.497)	(0.530)	(0.487)	(0.924)	(0.951)	(0.780)
lnFD	0.208**	0.186**	0.231***	-0.950*	-0.846*	-0.849*	1.581	1.891*	1.935**
	(0.0766)	(0.0731)	(0.0728)	(0.478)	(0.477)	(0.466)	(0.931)	(0.941)	(0.796)
TD	-0.0159	0.00206	-0.0154	0.735***	0.750**	0.611**	1.546***	1.305**	1.143***
	(0.0511)	(0.0508)	(0.0479)	(0.261)	(0.280)	(0.244)	(0.444)	(0.479)	(0.383)
lnTD	-0.0659*	-0.0628*	-0.0543						
	(0.0357)	(0.0352)	(0.0346)						
PD	-2.577	-6.810**	0.0834	-23.47	-16.13	-3,247	-9,044**	-8,985*	-13,840***
	(2.915)	(3.005)	(2.646)	(19.27)	(20.83)	(2,553)	(4,320)	(4,375)	(4,078)
GEL		5.20e-05			0.000342			-0.000357	
		(4.88e-05)			(0.000366)			(0.00621)	
GEA	-9.96e-06			0.000184			0.000224		
	(1.87e-05)			(0.000129)			(0.000231)		
			(8.63e-05)			(0.000622)			(0.00101)
lnAGE				0.245	0.274	0.0713			
				(0.164)	(0.178)	(0.162)			
lnPR						-0.0311	-0.0732	-0.0873*	-0.0692*
						(0.0228)	(0.0431)	(0.0433)	(0.0370)
lnPD						3,197	9,015**	9,005**	13,749***
						(2,540)	(4,311)	(4,363)	(4,059)
lnCP							0.540***	0.536***	0.456***
							(0.165)	(0.171)	(0.147)
Constant	31.90**	45.93***	24.78**	54.25	44.37	284.7*	427.8*	307.3	755.4***
	(12.48)	(13.73)	(11.48)	(75.22)	(88.90)	(143.2)	(226.7)	(246.1)	(229.0)
Observations	37	37	37	37	37	37	37	37	37
R-squared	0.858	0.863	0.871	0.463	0.441	0.566	0.811	0.807	0.856
Fisher	20.45***	21.19***	22.88***	3.444***	3.157***	3.771***	12.42***	12.08***	17.18***

*Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.*

The findings indicate that government spending in the Cameroon livestock sector has an insignificant effect on agricultural value added measured as a % of GDP. Similarly, the findings indicate that the budget attributed to this sector has a positive relationship with agricultural export but remained insignificant in its contribution to the total export of agricultural products and crop production in the short run. This is justifiable as the government spends less on livestock than crop production. The Cameroon livestock contributes to the country's GDP through export accredited to the private sector's investment initiative programs. The government needs to put more effort into their subvention programs, which are insufficient to develop the livestock sector for long-run sustainability to ensure growth in agribusiness. Also, the findings indicate that the budget attributed by the government to the livestock sector does not influence crop production, particularly in the short run. The livestock and crop production formed the Cameroon agricultural cycle, where the two sectors are slightly independent to a certain degree. Food crop production relies on the livestock sector regarding manure production. However, given that the government spend less on this sector and focuses more on cash crop production such as coffee, cotton and cocoa, we expected their spending in both sectors to have little influence on agribusiness as private sector investments dominate it. The study's findings align with those of Jablanovic (2013), who argued that government spending would continue to be insignificant to agribusiness if it is dominated by private-sector investment. The results also conform with those of Onwumere and Adigwe (2017), who noticed the inadequate allocation of government spending to the agricultural sector to raise production levels to curb hunger and food insecurity. The findings support that the government should spend more on the agricultural and livestock sectors, which are continuously neglected but proved to be very important for the livelihood sustainability of millions of individuals in Africa, which is partly achieved if there is growth in agribusiness.

Controlling for the determinants of agribusiness, the results uncovered in the short-term dynamics table show that precipitation has a significant negative effect on all indicators of agribusiness in the short run. The resulting rainfall depends on the rain volume and the crop life cycle stage. Studies indicate that precipitation with untimely heavy rain in the early stages of food crops destroys the shoots, leaves and stems, which results in low yields. In effect, the negative effect of precipitation on agricultural value and crop production indicates that the rainfall patterns were not timely, which damages the crops and thus negatively affects agribusiness in the short run. Considering financial development as an agribusiness determinant, we discovered that it positively promotes agricultural exports and significantly affects crop production yield in the short run. This is supported by funds acquired by farmers from microfinance institutions and loans taken from banks to finance agricultural activities. The findings present an insignificant effect on agricultural value added, questioning the Cameroon banking sector's limited contributions to agribusiness development. The findings of the short-run dynamics indicate that trade openness is the factor that contributes to enhancing agribusiness in Cameroon. International trade openness has a statistically significant effect on agricultural exports and crop production. The contribution of trade in agribusiness is well documented in the literature, as documented by Djokoto (2013) and Valdes et al. (2016), that trade raises the level of technical efficiency in the agricultural sector, which boosts production efficiency. The findings indicate a short-term negative effect between population density and agribusiness in Cameroon. This is justifiable as higher rural densities are associated with smaller agricultural farms and lower farm wages. It is also justifiable when the population is increasing faster than the growth in agricultural output. The findings also support Thomas Malthus's prediction that population growth will outpace growth in food production.

4.3.2. Test of cointegration (ECM form)

Table 5. Error correction mechanism

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable								
Model	AVA			AGE			CP		
GEA	-			-			-		
	0.7014892***			0.798522**			0.09127**		
GEL		-			-			-	
		0.13472**			0.190006**			0.28168**	
GEF			-			-			-
			0.81764***			0.09501***			0.71570**

The ECM indicates the long-run relationship (Table 5). A negative and significant value indicates the presence of cointegration. The error correction model (ECM) is a time series regression model based on the behavioural assumption that two or more time series exhibit an equilibrium relationship that determines short- and long-run behaviour. The negative value is the coefficient of correction. For the case of equation 1, a deviation of the agricultural value added in a period from its equilibrium will return to equilibrium by a speed of 0.7014892.

4.3.3. Long run results

Table 6 presents the findings of the long-run dynamics in the relationship between government spending in the agricultural sector and agribusiness proxied by agricultural value added, agricultural export and crop production in Cameroon between 1985 and 2020. Evidence from the long-term dynamics results shows that between 1985 and 2020, there were several budgetary allocations to the agricultural sector by the Cameroon government but still needs to be more to affect the agricultural value added, crop production and agricultural exports. The findings in its first estimates indicate that government spending in the agricultural and livestock sectors has a long-term positive insignificant effect on agribusiness, which contradicts the findings of Onwumere and Adigwe (2017). The findings signify that government spending needs to be increased for productive agricultural investments such as agricultural technology to boost agri-technical efficiency. Cameroon enjoyed food sovereignty before to the 1980s; but, in the 1980s, most West African countries joined the World Trade Organization and were forced to change their trade policies to fit with multilateral laws, or rather the interests of the economic powers of the Global North. With market liberalisation came the end of protectionist policies and Cameroon's self-sufficiency. Theoretically, Cameroon has made a commitment to expanding its agriculture industry. In 2003, national leaders ratified and signed the CAADP agreement, pledging to dedicate 10% of their budgets to agriculture (Ball, 2016). However just 3% to 4% of the country's budget is now allocated to agriculture. This shows that a lot is still to be as far as public spending is concerned for a significant impact to be felt by the agricultural sector.

Table 6. Long run results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable								
VARIABLES	Agricultural value added			agricultural_exports			Crop production		
GEA	9.79e-06			-3.50e-05			0.000378		
	(2.02e-05)			(0.000133)			(0.000267)		
PR	0.000206	-0.00143	-0.000870	-0.0227	-0.0166	-0.0150	-0.0211	-0.0117	-0.00125
	(0.00409)	(0.00404)	(0.00407)	(0.0269)	(0.0273)	(0.0265)	(0.0541)	(0.0568)	(0.0533)
FD	0.122*	0.0701	0.181***	0.163	0.363	-0.191	0.810	2.160**	0.834
	(0.0634)	(0.0618)	(0.0533)	(0.417)	(0.418)	(0.347)	(0.840)	(0.869)	(0.697)
TD	-0.109***	-0.0903**	-0.0988***	0.505**	0.434*	0.418*	1.098**	0.821	0.694
	(0.0351)	(0.0356)	(0.0353)	(0.231)	(0.241)	(0.230)	(0.465)	(0.501)	(0.461)
PD	-6.601**	-9.466***	-1.593	14.72	25.73	-17.30	33.76	113.2***	4.459
	(2.864)	(2.677)	(3.060)	(18.84)	(18.09)	(19.93)	(37.95)	(37.64)	(40.03)
GEL		8.48e-05			-0.000319			-0.000608	
		(5.04e-05)			(0.000341)			(0.000709)	
GEF			-0.000130			0.000955			0.00275**
			(0.000100)			(0.000651)			(0.00131)
Constant	44.93***	56.88***	29.15**	-25.14	-70.84	75.13	-105.9	-384.4**	-23.13
	(12.18)	(12.63)	(12.22)	(80.09)	(85.35)	(79.58)	(161.3)	(177.6)	(159.8)
Observations	37	37	37	37	37	37	37	37	37
R-squared	0.764	0.782	0.774	0.233	0.253	0.281	0.604	0.588	0.631
Fisher	20.05***	22.24***	21.26***	1.884***	2.095***	2.426***	9.461***	8.860***	10.61***

*Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

The findings also indicate that government spending in the forestry sector could boost crop production for agribusiness enhancement in the long run. Similarly, the findings indicate that the spending in the forestry sector also has a positive relationship with agricultural exports but remains insignificant to validate the hypothesis of the insignificant effect of government spending on agribusiness in Cameroon. This signifies that both the short and the long-run effects remain the same and led us to suggest the government invest in productive agricultural investments to boost agribusiness. The findings are partly in conformity with those of Fani et al. (2020) and Saghaian et al. (2022), who argued that the neglect of the agricultural and livestock sectors by the governments continues to grow in developing countries and affect agribusiness negatively.

Financial development still presents a significant positive effect on agribusiness. It is justified that financial development alleviates the financing constraints by raising bank credit and investment activities in the agriculture sector, and hence the agriculture output increases for agribusiness investments (Petrick et al.,

2017). In the long run, trade openness appeared to have a significant positive effect on agricultural export and crop production but insignificantly affected agricultural value added. It signifies that trade openness facilitates exchange in the international food market and thus enhances agribusiness in the long run. The long-run dynamics results still indicate that population density in Cameroon is negatively related to agribusiness. This negative effect of population density growth on agribusiness is well justified in developing countries where the population growth rate is more than labour productivity and conforms to the findings of Ishak et al. (2020).

4.3.4. Post estimation tests

The results of Table 7 show that the variables are independently and identically; distributed, which is the characteristic of a Best Linear Unbiased Estimator (BLUE) estimator in an econometric regression. Otherwise, they are linear and unbiased and have the least variance among all linear and unbiased estimators. In fact, the Jarque-Bera probability value above 10% shows that the data follows the normal distribution law. In contrast, the P-value of F Statistics has to be less than 10% for heteroscedasticity and serial correlation to be absent.

Table 7. Post estimation tests

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable								
Model	Agricultural value added			agricultural exports			Crop production		
Test of Normality (Jarque-Bera probability value)									
GEA	0.5096			0.4982			0.4957		
GEL		0.4648			0.5871			0.1911	
GEF			0.1111			0.2932			0.5716
Heteroscedasticity Test: Breusch-Pagan-Godfrey (P-value of F statistics)									
GEA	0.0001			0.0000			0.0000		
GEL		0.0021			0.0610			0.0086	
GEF			0.0000			0.0000			0.0000
Breusch-Godfrey Serial Correlation LM Test (P-value of F Statistics)									
GEA	0.0005			0.0111			0.0000		
GEL		0.0084			0.0001			0.0011	
GEF			0.0000			0.0000			0.0000

5. Conclusion and policy implication

The study examined the impact of government expenditure on agribusiness development in Cameroon between 1984 and 2021, employing various econometric analysis techniques. The variables studied are agricultural value added (AVA) measured as a % of GDP, which is a proxy for Agribusiness development,

Government expenditure on Agriculture (GEa,) agricultural Exports (AGE), trade openness (TD), Financial development indicator (fd), (pd,) government expenditure on livestock (gel), crop production (cp,) and precipitation (PR).

Results from the Co-integration through the Error Correction estimation techniques and the ARDL model revealed that Government Expenditure within the agribusiness sector has an insignificant effect on agricultural value added measured as a % of GDP. Similarly, the findings indicate that the budget attributed to this sector has a positive relationship with agricultural export but remained insignificant in its contribution to the total export of agricultural products and crop production in the short run. Meanwhile, in the long run, the findings indicate that government spending in the agricultural and livestock sectors has a long-term positive insignificant effect on agribusiness. Also, the findings indicate that the budget attributed by the government to the livestock sector does not influence crop production, particularly in the short run; meanwhile, government spending in the forestry sector could boost crop production for agribusiness enhancement in the long run. The result of the empirical analysis revealed a long-run relationship among the variables considered in the study. The study revealed a speed of adjustment of over 22 per cent, precisely 22.7958%, with which the contribution of government expenditure on agriculture, the interest rate on agriculture loans, deposit bank loans to agriculture and agricultural credit guarantee scheme fund will aid the convergence of agricultural output to equilibrium in the long run. Hence, we conclude that increased government expenditure on agriculture, reduction in the interest rate on agriculture loans, increased deposit bank loans to agriculture and agricultural credit guarantee scheme will significantly increase the level of productivity in the agricultural sector in Cameroon. Therefore, it was recommended that the government provide an adequate information system to sensitise the farmers on the various forms of credits available to them and ensure effective policies that will curb the diversion of credits meant for agricultural development.

Based on the results of this paper, priorities by the government of Cameroon should be on increasing government expenditure in agriculture while considering allocating the expenditure adequately. Increasing government expenditure in agriculture will ensure that the sector produces sufficient research and enhances modern technologies for better production. Announced several years ago, the project of an agricultural bank is eagerly awaited by farmers in Cameroon. High expectations related to the fact that Cameroon, a big agricultural country in the region, has yet to find a new sustainable financing system adapted to the agricultural sector since the bankruptcy of dedicated institutions during the recession of the 80s. In essence, there is necessity for putting in place a special loan scheme for farmers with the interest of such loans subsidized through public spending. Equally, key agricultural crops should be identified, and the government should set up training programs on how to increase the productivity of such crops. Such initiative would eventually enhance agricultural productivity in the country.

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