Djomo et al.: Nigerian Journal of Agricultural Economics (NJAE). Volume 7(1), 2017: Pages 16- 24

FOREIGN DIRECT INVESTMENT AND EXCHANGE RATE MOVEMENT EFFECTS ON AGRICULTURAL GROWTH: EVIDENCE FROM CAMEROON (1978-2014)

[1]Djomo, R. F., [2]Ukpe, U. H., [1]Nwalem, M. P., [2]Egbeadumah, M. O., [3]Innocent-Ene, E. O. and [1]Ewung, B. F.

[1]Department of Agricultural Economics, Federal University of Agriculture Makurdi, Benue State, Nigeria

[2]Department of Agricultural Economics and Extension, Federal University, Wukari-Taraba State, Nigeria

[3]Federal College of Education, Okene, Kogi State, Nigeria

Corresponding Author: *raoulfani@gmail.com*

Abstract

This study analysed the effects of foreign direct investment (FDI) and exchange rate movement on agricultural growth in Cameroon (1978-2014). The results revealed that in the long run, a unit increase in foreign direct investment (FDI) in the previous year led to increase in agricultural growth by 0.15 while a unit increase of exchange rate in the previous year led to decrease in agricultural growth by 1.18. There was bidirectional causality between exchange rate and agricultural growth. The results further revealed that exchange rate (EX) accounted for more 10.06% in the short run, to agricultural growth while foreign direct investment (FDI) accounted the more 24.71% in the long run to agricultural growth. The results also revealed that a unit shock of foreign direct investment (FDI) accounted for a negative response of agricultural growth (AGR) (-0.023) and (-0.025) in the short and long run respectively while a unit shock of exchange rate (EX) accounted for a positive response of agricultural growth (AGR) (0.025) and (0.023) in the short and long run respectively. It was recommended that policy should be directed towards the implementation of a favourable exchange rate that will attract foreign investors in order to sustain the growth of agriculture.

Keywords: Agricultural growth, Foreign direct investment, Exchange rate, Cameroon

Introduction

Cameroon's economy is predominantly based on agriculture and crude oil resources. The agricultural sector employs over 60 percent of the active population, ensures a large share of the country's food security, generates foreign exchange receipts (up to 55 percent of export receipts) and contributes up to 20 percent of gross domestic product (GDP) (Amadou, 2007; Dontsop, 2009; Gama, 2013; Djomo, 2015). Moreover, agricultural activity induces most of the spread effects on other sectors of the economy; thus contributing to export diversification; job creation and poverty reduction (INS, 2005; Dontsop *et al.* 2009; Djomo, 2015). In Cameroon private investment has been shown to have a "large, statistically significant, and robust" effect on economic growth

(Ghura, 1997; Khan, 2011). This explains why the structural adjustment programme adopted in 1988, privileged the creation of an appropriate incentive structure for private sector investment. The aim was to stimulate domestic investment and to attract foreign investment. Gross fixed capital formation in Cameroon has actually declined steadily over the years, falling from 25% of GDP in the early 1980s to 14.30% in 1992 and 16.45% in 2000. The trend of foreign direct investment (FDI) to Cameroon has not been much different. FDI declined from a peak of US$290 million in 1989 to only US$110 million in 2000. Even the 1994 devaluation had only a timid impact on capital formation (Khan, 2011). UNECA (2001) and Khan (2014) reported a similar trend for Africa, whose FDI share decreased from 2.0% to 1.3% of global FDI between 1997 and 1998. As a share of FDI to the developing world, sub-Saharan Africa received only 4.3% in 1999, down from 10.5% in the 1981-1989 period (Ndikumana, 2003; Khan, 2011). After almost a decade and half of reforms in the Cameroon's agricultural sector, its growth is still far below expectations. Therefore, this study analysed foreign direct investment and exchange rate movement effects on agricultural growth in Cameroon.

Methodology

The Study Area**:**

The study area is Cameroon which has ten regions, namely: Centre, Littoral, Adamawa, Far-North, North, South, East, West, North-West and South-West. The country covers a total land area of 475,442 sq. km and is located in the Central part of Africa within latitudes 2° and 13° North and longitude 9° and 16° East of the equator (United Nations, 2004). Cameroon's natural resources are very well suited to agriculture and arboriculture. An estimated 70 percent of the population farms and agriculture comprised estimated 19.8 percent of GDP in 2009 (Delancy and Delancy, 2010). The agricultural sector is dominated by small scale farmers who use manual tools. They sell their surplus produce and some maintain separate fields for commercial use. Urban areas are particularly reliant on small scale producers for their foodstuffs. Soils and climate on the coast encourage extensive commercial cultivation of bananas, cocoa, oil palms, rubber and tea. Inland on the South Cameroon plateau, cash crops include coffee, sugar and tobacco (Delancy and Delancy, 2010). Coffee is a major cash crop in the western highlands and in the north, natural conditions favour crops such as cotton, groundnuts and rice. Reliance on agricultural exports makes Cameroon vulnerable to shifts in their prices (Delancy and Delancy, 2010). Livestock are raised throughout the country and fishing employs about 5,000 people and provides over 100,000 tons of seafood each year (Som, 2013).

Method and Sources of Data Collection:

Secondary data consisting of annual time series covering a period of 37 years (1978-2014) were used for the study. Particularly, data on the values of agricultural growth; foreign direct investment and exchange rate were obtained from World Bank development indicators data base.

Data Analysis and Model Specification:

In order to assess the time-series properties of the data, two tests were conducted. These were the Unit Root Test using Augmented Dickey Fuller Test (ADF) and Johansen Co-integration Test. Augmented Dickey Fuller test (ADF) was used for stationary test of variables. Johansen Co integration test was used to test the existence of the long run relationship, vector error correction model (VECM) model was used to analyse long and short run effects of foreign direct investment

and exchange rate on agricultural growth, Granger causality was used to examine causality between the variables of interest. Variance decomposition was used to examine contribution of foreign direct investment (FDI) and exchange rate (EX) to agricultural growth and impulse response was used to examine the response of agricultural growth (AGR) to unit shock of foreign direct investment (FDI) and exchange rate (EX).

Augmented Dickey Fuller test (ADF): Following Oyinbo and Rekwot (2014) the Augmented Dickey Fuller (ADF) model with the constant term and trend can be specified as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \beta Y_{t-1} + \sum_{i=1}^{p} \delta_i \, \Delta Y_{t-i} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(1)}$$

Where Y is the value of the variable of interest (agricultural growth, public expenditure or private investment), α_0 is the constant, α_1 is the coefficient of the trend series, p is the lag order of the autoregressive process, Y_{t-1} is lagged value of order one of Y_{t-1} and ε_t is the error term.

Johansen Co integration test: A linear combination of two or more $I(1)$ series may be stationary or $I(0)$, in which case the series are co-integrated. The null hypothesis for the Johansen Co-integration test ($H!$:r = 0) implies that co-integration does not exist, while the alternative hypothesis ($H!$: r> 0) implies that it does. If the null for non-co-integration is rejected, the lagged residual from the co-integrating regression is imposed as the error correction term in a Vector Error Correction Model (VECM) given below as:

$$\nabla Y_t = \prod Y_{t-1} + \sum_{i=1}^{k-1} \tau_i \, \nabla Y_{t-1} + u + \varepsilon_t \text{ --- (2)}$$

Where:
$\nabla Y_t =$ First difference of a $(n \times i)$ vector of the n variables of interest
$\prod = (n \times n)$ Coefficient matrix associated with lagged values of the endogenous dependent variables
Y_{t-1} = Lagged values of Y_t
$\tau = (n \times (k-1))$ Matrix of short term coefficients
$u = (n \times 1)$ Vector of constant
$\varepsilon_t = (n \times 1)$ Vector of White Noise Residuals

Equation for Long-Run Relationship: The model for the long-term effect of foreign direct investment and exchange rate is given explicitly as:

$$lnAGR_t = a_0 + a_1 lnFDI_t + a_2 lnEX_t + u_t \text{ --- (3)}$$

Where:

AGR_t = Agricultural growth (percentage contribution of agriculture to GDP)
FDI_t = foreign direct investment (in millions US Dollar)
EX_t = (Parity between FCFA to US Dollar)

Ln = Natural Logarithm
∇ = difference operator

A priori expectation: The coefficients of foreign direct investment (FDI_t) and exchange rate (EX_t) are expected to be positive.

Equation for Short-Run Relationship: The model for the short-term effect of infrastructure on R&D will be given explicitly as:

$$\nabla lnAGR_t = a_0 + \sum_{i=1}^{p} a_1 \nabla\, lnFDI_{t-i} + \sum_{i=1}^{p} a_2 \nabla\, lnEX_{t-i} + ECM_t + \varepsilon_t \quad \text{---------- (4)}$$

Where:

AGR_t = Agricultural growth (percentage contribution of agriculture to GDP)
FDI_t = foreign direct investment (in millions US Dollar)
EX_t = (Parity between FCFA to US Dollar)
Ln = Natural Logarithm
∇ = difference operator
$\mathrm{ECM_t} = \text{Error Correction Term}$

A priori expectation: The coefficients of foreign direct investment (FDI_t) and exchange rate (EX_t) are expected to be positive.

Causality between agricultural growth (AGR_t) and exchange rate (EX_t) was given as:

$$AGR_t = \alpha o + \sum_{i=l}^{p} \alpha_i AGR_{t-i} + \sum_{i=l}^{p} \theta_i EX_{t-i} + \varepsilon_{1t} \quad \text{---------- (5)}$$

$$EX_t = \beta o + \sum_{i=l}^{p} \beta_i EX_{t-i} + \sum_{i=l}^{p} \varphi_i AGR_{t-i} + \varepsilon_{2t} \quad \text{---------- (6)}$$

Causality between agricultural growth (AGR_t) and foreign direct investment (FDI_t) was given as:

$$AGR_t = \alpha o + \sum_{i=l}^{p} \lambda_i AGR_{t-i} + \sum_{i=l}^{p} \mu_i FDI_{t-i} + u_{1t} \quad \text{----------(7)}$$

$$FDI_t = \beta o + \sum_{i=l}^{p} \delta_i FDI_{t-i} + \sum_{i=l}^{p} \gamma_i AGR_{t-i} + u_{2t} \quad \text{---------- (8)}$$

where the variables are as defined previously. For the purpose of illustration, assume that AGR_t and EX_t are to be tested for causality. In this VAR, if the θ_i in equation (5) is significant and φ_i in equation (6) is not significant; then there exists a unidirectional causality running from EX_t to AGR_t. The opposite is true when φ_i is significant in equation (6) with insignificant θ_i in equation (5), that is there is unidirectional causality running from AGR_t to EX_t. In case both φ_i and θ_i in equations (6) and (5) are significant then there exists a bi-directional causation. However if the two coefficients in the two equations are insignificant then existence of any causation between the two variables is rejected.

Results and Discussion

The results in Table 1 are the summary of unit root tests conducted under the ADF at level and first difference. The results indicate that all the variables under study were not stationary at level but were stationary at first difference at 1% level of significant. This means that all the variables are stationary at first difference and are therefore characterized as I(1) process.

The unrestricted co integration test is based on the trace statistics at 5% level of significance. Table 2 shows that trace statistic value (40.72) is greater than the critical value (40.17) implying the presence of co integration which indicates the long run relationship among variables. But in the subsequent co integration equation, critical values are greater than the trace statistics implying the rejection of the null hypothesis that there is co- integration. Trace test indicates one (1) co integrating equations at 5% level of significance.

Effects of Foreign Direct Investment and Exchange Rate Movement on Agricultural Growth:

Table 3 shows the long run effect of foreign direct investment (FDI) and exchange rate (EX) on agricultural growth (AGR). Foreign direct investment (FDI) and exchange rate (EX) are shown to have significant effects on agricultural growth (AGR) in the long run. Specifically, the coefficient of foreign direct investment is positive and significant at 10 percent level of probability. This result is in line with *a priori* expectation. The result implies that a unit increase in foreign direct investment (FDI) led to increase in agricultural growth (AGR) by 0.15% in the long run. The result may be attributed to the incentives put in place to attract foreign investors. This result is in line with Siraj (2014) study, which reported that private investment has positive and significant effect on economic growth in Ethiopia. In contrast, the coefficient of exchange rate (EX) is negative and significant at 1 percent level of probability. This result is against the *a priori* expectation implying that a unit increase in exchange rate (EX) led to decrease in agricultural growth (AGR) by 1.18% in the long run in Cameroon. This result suggests that revaluation of the national currency reduces growth and this result disagrees with the findings of Gyon (2014), that exchange rate has positive and significant effect on economic growth in the long run in Nigeria.

Table 4 shows the short run effect of foreign direct investment (FDI) and exchange rate (EX) on agricultural growth (AGR). As presented in the table, the adjusted square (R^2) is 0.294 implying that 29.4 % of the variation in agricultural output is explained by foreign direct investment (FDI) and exchange rate (EX). The result also reveals that foreign direct investment (FDI) in the previous year significantly affected agricultural growth (AGR) in the short run. Specifically, the coefficient of foreign direct investment (FDI) is positive and significant at 1 percent level of probability. This result is in line with *a priori* expectation. It implies that a unit increase in foreign direct investment (FDI) led to increase of agricultural growth by 0.022. This result is similar to findings by Fambon (2013), who found that foreign direct investment (FDI) has positive and significant effect on Cameroon's economic growth in the long and short run. However, the coefficients of agricultural growth in the previous year (AGR(-1)), agricultural growth two years ago (AGR(-2), foreign direct investment two years ago (FDI(-2)), exchange rate in the previous year (EX(-1) and exchange rate two years ago (EX(-2) are not significant implying that they had no significant effect on agricultural growth in the long run.

With the existence of co integration among variables, the granger causality tests are used. From the above table, it is concluded that there is bidirectional causality between exchange (EX) and agricultural growth (AGR) implying that past values of agricultural growth (AGR) had a predictive effect on the future values of exchange rate (EX). The past values of exchange rate (EX) also had a predictive effect on the future values of agricultural growth (AGR).

The variance decomposition of agricultural growth (AGR) shows that in Cameroon, AGR contributed to itself about 76.01% in the short run and about 52.49% in the long run period. Foreign direct investment (FDI) and exchange rate (EX) accounted for 10.06% and 13.91% in the short run respectively to agricultural growth. In the long run foreign direct investment (FDI) and exchange rate (EX) accounted for 24.71% and 22.78% in the long run respectively to agricultural growth. This implies that among the variables used, foreign direct investment was the most contributing factor to agricultural growth in both long and short run.

The response of agricultural growth (AGR) to itself and other variables in the table shows that, one-unit shock of itself accounted for a positive response throughout the two periods and a unit shock of foreign direct investment (FDI) accounted for a negative response of agricultural growth (AGR) in the short and long run. While a unit shock of exchange rate (EX) accounted for a positive response of agricultural growth (AGR) in the short and long run.

Conclusion and Recommendations

This study analysed foreign direct investment (FDI) and exchange rate (EX) effects on agricultural growth (AGR) in Cameroon. It was found that foreign direct investment (FDI) positively and significantly affected agricultural growth (AGR) in both long and short run while exchange rate (EX) affected negatively and significantly agricultural growth in the short run. It is therefore recommended that policy should be directed towards the implementation of a favourable exchange rate that will attract foreign investors in order to sustain the growth of agriculture. Similarly, since foreign direct investment (FDI) positively and significantly affects agricultural growth, incentives to attract FDI to the agricultural sector should be put in place. This could include tax reduction and infrastructural development (social, physical and institutional) in order to further the growth of agricultural sector in Cameroon.

References

Amadou, N. (2007). Analysis of factors affecting the technical efficiency of arabica coffee producers in Cameroon. *AERC Research paper 163*. African Economic Research Consortium, Nairobi, January 2007. Pp. 1-51.

Delancy, M.W., and Delancy, M.D. (2000). *Historical dictionary of the republic of Cameroon* (3rd edition) Lanham, Maryland: The Scarecrow press, 400pp.

Djomo, C.R.F. (2015). Analysis of technical efficiency and profitability in small scale rice production in the west region of Cameroon. Unpublished M.Sc. Thesis, Department of Agricultural Economics. University of Agriculture Makurdi, Benue State, Nigeria.pp70

Dontsop, N.P., Rhaji, A.Y., and Adelakun, O.J. (2009). Determinants of technical efficiency of cocoa farmers in Cameroon: The case study of Central province. *Journal of Economics and Social Studies 6:* 32-53.

Fambon, S. (2013). Foreign capital inflow and economic growth in Cameroon. *Wider Working Paper No 124:1-22*

Gama, E. (2013). Analysis of productivity and economic efficiency of cocoa farmers in the south-west region of Cameroon. Unpublished PhD thesis, Department of Agricultural Economics and Rural Sociology, Faculty of Agriculture, Ahmadu Bello University, Zaria, Nigeria. pp145 .

Ghura, D. (1997). "Private investment and endogenous growth: Evidence from Cameroon". *IMF Staff Working Pape*r No. 165. International Monetary Fund, Washington, D.C.

Gyon, Y. E. (2014). Impact of External Debt on Economic growth in Nigeria (1980-2011). *Yobe Journal of Economics 1 (1): 96-113*

Institut National de la Statistique (INS). (2005). *Les comptes Nationaux du Cameroun.* Yaoundé.Pp 200.

Khan, S. A. (2011). Volatility of resource inflows and domestic investment in Cameroon. *AERC Research Paper* 221. African Economic Research Consortium, Nairobi.

Ndikumana, L. (2003). "Capital flows, capital account regimes, and foreign exchange rate regimes in Africa." In: UNCTAD Secretariat, *Management of Capital Flows: Comparative Experiences and Implications for Africa*, Pp. 31384. Geneva: United Nations Conference on Trade and Development.

Oyinbo, O and Rekwot, G. Z. (2014). The relationships of inflationary trend, agricultural productivity and economic growth in Nigeria. *CBN Journal of Applied Statistics 5(1):35-47*

Siraj, M. (2014). Private Investment and economic growth evidence from Ethiopia. A Master thesis submitted to the Department of Economics. Mekelle University. pp120.

Som, J. (2013). Women's role in Cameroon fishing communities. www.fao.org Retrieved on 21/08/2017

UNECA (2001). *Transforming Africa: Overview. Addis Ababa:* United Nations Economic Commission for Africa.

UN (2004). *Demographic year book*, Statistics Division. Pp 500 United Nations

Table 1: Unit root test (ADF TEST)

	ADF Results				
	At level		At First difference		Decision
Variables	**t-statistic**	**Probability**	**t-statistic**	**Probability**	**I(1)**
Log (AGR)	-0.4260	0.8939	-5.9906	0.000***	I(1)
Log (FDI)	-1.9937	0.2880	-11.7985	0.000***	I(1)
Log (EX)	-1.0763	0.7145	-5.1670	0.000***	I(1)

*** indicate stationary at 1% level of significance

Table 2: Co integration rank test based on trace statistics

Hypothesised No. of CE(s)	**Eigenvalue**	**Trace Statistics**	**0. 05 Critical Value**	**Prob****
None *	0.476921	40.72422	40.17493	0.0440
At most 1	0.298549	18.04340	24.27596	0.2491
At most 2	0.082935	5.632231	12.32090	0.4823
At most 3	0.071648	2.602038	4.129906	0.1261

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* Denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 3: Estimated long run coefficients

Variables	**Coefficient**	**t-statistics**
Ln (FDI(-1))	0.15	1.88*
Ln (EX(-1))	-1.18	-5.56***
C	-23.18	4.66***

*** and * are significant at 1% and 10% respectively

Table 4: Estimated short run coefficients

Error Correction:	**D(LNAGR)**	**t-statistics**
D(LNAGR(-1))	-0.105	-0.594
D(LNAGR(-2))	0.003	0.013
D(LNFDI(-1))	0.022	2.808***
D(LNFDI(-2))	0.012	1.556
D(LNEX(-1))	-0.023	-0.326
D(LNEX(-2))	-0.066	-1.179
C	0.039	2.675***
R-squared	0.294	
Adj. R-squared	0.104	
Sum sq. Resids	0.062	

S.E. equation	0.048
F-statistic	1.547
Log likelihood	58.882
Akaike AIC	-2.993
Schwarz SC	-2.633
Mean dependent	0.003
S.D. dependent	0.051
Determinant resid covariance (dof adj.)	5.28E-05
Determinant resid covariance	2.36E-05
Log likelihood	36.36907
Akaike information criterion	-0.5511
Schwarz criterion	0.660

*** is significant at 1%

Table 5: Pairwise Granger causality test

Null Hypothesis	**Obs**	**F-statistic**	**Prob**
Ln (EX) does not Granger cause Ln (AGR)	35	3.21	0.005
Ln (AGR) does not Granger cause Ln (EX)		10.72	0.003
Ln (FDI) does not Granger cause Ln (AGR)	35	1.16	0.32
Ln (AGR) does not Granger cause Ln (FDI)		0.26	0.76
Ln (EX) does not Granger cause Ln (FDI)	35	0.50	0.60
Ln (FDI) does not Granger cause Ln (EX)		0.15	0.85

Table 6: Variance decomposition analysis

Period	**Log (AGR)**	**Log (FDI)**	**Log (EX)**
5 years	76.01	10.06	13.91
10 years	52.49	24.71	22.78

Table 7: Impulse response results

Period	**Log (AGR)**	**Log (FDI)**	**Log (EX)**
5 years	0.027	-0.023	0.025
10 years	0.029	-0.025	0.023