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The agricultural Production and Economic Growth: Their effects in reducing poverty in Cote d'Ivoire

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Abstract— *The main objective of this study is to empirically examine the link between agricultural production and economic growth in Cote d'Ivoire based on poverty alleviation. The results demonstrate that government investment in agricultural sector play a significant and important role in the economic development both in short and long term, hence promoting living standard in Cote d'Ivoire. The paper also reveals that socio-economic and natural factors influence national agriculture production level in long run. As recommendation the study suggests that government and the private sector must combine their investment efforts on agricultural product transformation in order to boost national gross production by the sector mechanization. This reform could help to avoid agricultural sector dependency to natural phenomena like rain and drought.*

Keywords*— *agricultural, economic growth, development, poverty, cointegration.

JEL Classification: O11, O13, O47, Q13, Q18

I. INTRODUCTION

The economic development of a country involves a fundamental change in economic structures, including the transition from an agricultural economy to an industrial economy and services. Among the key factors in the development process, we favor the interaction between the agricultural sector and the industrial sector. In principle, economists share the same point of view considering that agriculture and industry lead each other through the surpluses generated by the agricultural sector as a prerequisite for economic startup.

Development analysts emphasize the role of the motor industries, the propensity to invest and innovation (F. Perroux), the role of international trade and the development of the public sector (A. Cotta), demographic evolution (A. Sauvy), on the various forms of technical progress (J. Fourastié, L. Storelu).

In the growth processes implemented by several countries in sub-Saharan Africa, the growth of agricultural production is an important factor in the dynamism of several industrial branches, either as a supplier or a customer, but also as a sector of distribution. The agricultural sector produces raw materials needed by the industry. Although the relative contribution of agriculture to economic growth decreases as economic development progresses, agricultural development provides a crucial basis for this growth in both the agricultural and non-agricultural sectors. Such economic dominance of the agricultural sector demonstrates the importance of agricultural development for economic growth in developing countries. The agricultural sector is at the heart of the economy of the Least Developed Countries (LDCs). It accounts for a large share of the gross domestic product (GDP) (about 30 to 60% of the GDP in about two-thirds of them), employs a significant proportion of the working population (40 to 90% in most cases). The sector is an important source of foreign exchange (25-95% in three-quarters of LDCs), produces the bulk of staple foods and is the only source of livelihood and income for more than half of the population of these countries. Strong upstream and downstream linkages within the rural sector and with other sectors of the economy also have a stimulating effect on growth and income generation (NADP, 2015). As a result, most of these countries will not be able to make much progress towards economic expansion, poverty

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reduction and greater food security if they do not value the human resources and potential productive capacities of the agricultural sector to increase its contribution to economic and social development in general. A strong and dynamic food production and agricultural system are therefore one of the main pillars of the country's strategy for economic growth and development. Agriculture in the LDCs cannot continue to be considered as a residual factor, not to receive more attention from governments and to be neglected in investment.

For Côte d'Ivoire, the analysis of the effects of agricultural growth on other sectors of the economy shows that the contribution of agricultural growth to the reduction of poverty would be much higher than that due to non-agricultural growth. Thus, the statistics show that a reduction of poverty of 1% at rural and national level can be attributed to 73% for the growth of the agricultural sector and only to 27% for the growth of non-agricultural sectors. These results can be explained by the fact that a significant portion of the population depends directly or indirectly on agricultural activities and that poverty is highly rural. As a result, the effects of agricultural growth would be best shared compared to those for other sectors (Minagri / Ifpri, 2010). The purpose of this article is to define development actions that are essential for reducing the incidence of poverty at the national and rural levels, based on economic growth analysis in general, and of the agricultural sector in particular. The rest of paper is divided as follow. Section two highlights the literature review, the model specification and data sources are explore in part three. The section four deals with the empirical results and interpretation, then the last section concludes.

II. LITERATURE REVIEW

The pace of structural changes and its impact on the growth and the development of economies appear to vary across countries. The overall general movement is then challenged and the ideology that agriculture is the engine of development is disputed. Yet it seems that it is from this agricultural transition that the development of many developing countries depends. For a long time, agriculture has suffered from a tenacious negative assumption, but quite understandable, because it is based on the "natural slope" of historical facts. Indeed, the decline of the share of agriculture in growth, for the benefit of industry and the tertiary sector, is an observation of a rare regularity in the history of development.

The perception of an economic singularity of agriculture, with regard to other productive or commercial activities, goes as far back as the first economic theories. The Francois Quesnay' vision from whom agriculture was the only activity really producing wealth and "made the virtue of people and the strength of states" (Weulersse, 2003). The pioneers of development economics, particularly Arthur Lewis (1954), and some of his heirs to the dualism school, will give to agriculture a central role that of a traditional activity concealing mass unemployment in a subsistence economy. Lewis deduces zero productivity and the opportunity to use disguised unemployment, the "surplus" of labor, in capitalist sectors with positive marginal productivity. This theory of a fundamental duality between the traditional and capitalist sectors will gradually slide towards a dualism of "subsistence agriculture" versus "industrial activities". The latter will have a decisive influence on the first development policies through industrialization, put in place at the time of decolonization. However, the foundations of Arthur Lewis' approach, especially the postulate of zero labor productivity in the informal domain, will be criticized very early, in particular by Theodore Schultz (1964) who, paradoxically, will share with Lewis the Nobel Prize of economics in 1979. Several studies have also underlined early on the potential growth of agriculture (Hayami and Ruttan, 1971). However, despite these academic reservations and some examples of countries those have managed to base their growth on agriculture, such as New Zealand, which has long perplexed the theorists of industrialization (Parent, 1957). Several economic studies have established a relationship between agricultural development and economic growth (Awokuse, 2009). Investment in agriculture has positive effects on economic growth in several countries. As noted by Timmer (2005), the role of agriculture in the economy can explain economic structural transformation. Is it possible to say that economic development is linked to agricultural growth?

Some countries in sub-Saharan Africa have been experiencing growth in agricultural production in recent years. But it must be noted that this growth in agricultural production has not solved the problem of poverty. In our study, Côte d'Ivoire can be considered as an example. Our study will show the link between the agricultural sector and economic development in Côte d'Ivoire on the one hand and the reduction of poverty on the other hand. For this demonstration, we will test the following hypotheses.

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III. MODEL SPECIFICATION AND DATA SOURCE

3.1. Model specification

Focus on the theoretical framework, our empirical investigation is based on two models. The first one illustrates the linkage between agricultural sector and economic development in Cote d'Ivoire. This model is the main objective of our research. We refer to the life expectancy of the rural population as an explanatory variable in the model for assessing Ivorian economic development. We call this model 1 specified by equation (1) as follow:

$$Dinv = \alpha_0 + \alpha_1 Lev + \alpha_2 Gdp + \alpha_3 Pagr + \alpha_4 Pind + \mu_t \quad (1)$$

Where Lev represents life expectancy, the domestic investment expenditure in agricultural sector is depicted by $Dinv$, Gdp represents the real product growth, the national agricultural production is illustrated by $Pagr$, $Pind$ is industrial production index and μ_t the stochastic error term. If we expect elasticities, the log factor is incorporated and the following equation is obtained.

$$LnDinv = \alpha_0 + \alpha_1 LnLev + \alpha_2 LnGdp + \alpha_3 LnPagr + \alpha_4 LnPind + \mu_t \quad (1a)$$

In so doing, we also specify the model (2) by taking into account the socio-economic factors such as rain fall, agricultural product price level for instance. Therefore the equation 2 is written bellow.

$$Pagr = \beta_0 + \beta_1 \mathrm{Pr}ice + \beta_2 Pind + \beta_3 Rain + \beta_4 Cab + \varepsilon_t \quad (2)$$

Where $Pagr$ depicts the agricultural production, the agricultural products price level highlighted by $\mathrm{Pr}ice$, $Pind$ is industrial production index, then the rain fall is represented by $Rain$ and Carbone emission is illustrated by Cab. So if add log factor to equation 2 above we obtain equation (2a) written as.

$$LnPagr = \beta_0 + \beta_1 Ln\,\mathrm{Pr}ice + \beta_2 LnPind + \beta_3 LnRain + \beta_4 LnCab + \varepsilon_t \quad (2a)$$

Hence, the assumptions on which our analysis is based are enumerated as:

1- H_0: Investments in the agricultural sector have significant effects on the development of agriculture in Côte d'Ivoire.

H_1: Investments in the agricultural sector do not have significant effects on agriculture development in Côte d'Ivoire.

2- H_0: Socio-economic factors (price policy and industrial production), natural factors (quantity of rainfall fall) and human factors (carbon emissions) have significant effects on the agricultural production in Côte d'Ivoire.

H_1: Socio-economic factors (price policy and industrial production), natural factors

(quantity of rainfall fall) and human factors (carbon emission) have no significant effects on agricultural production in Côte d'Ivoire.

The above hypotheses will be tested at the 0.05 level of significance. The null hypothesis will be rejected if the probability at which the t-value is significant is less than the conventional level, otherwise, the null hypothesis will be accepted.

3.2. Data sources

We use annual data covering the period from 1990 to 2015 for the empirical analysis. The databases are selected from World Development Indicators statistic sheet and Cote d'Ivoire' Ministry of agriculture and rural development. The variables utilized for model 1 are life expectancy, the domestic investment expenditure in agricultural sector, the real product growth, the national agricultural production is illustrated, and industrial production index. Following the same methodology, the variables used for model 2 are agricultural production, the agricultural products price level, industrial production index, the rain fall and Carbone emission.

IV. RESULTS AND INTERPRETATIONS

In this section, we first analyze the summary of the descriptive statistics of the different variables presented in Tables 1 and 2 bellow. Jacque-Bera statistic, Sample means, skewness, standard deviation, p-value have and Lnt Cab are reported. The low standard deviation of all variables (sample 1and 2) with respect to the mean is an indication of low volatility in all simple variables. As we see, we accept to reject the null hypothesis that all variables (sample 1and 2) are normally distributed from the p-values observed.

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Table 1: Summary of the descriptive statistic of the data (model 1)

	LnDinv	*LnLev*	*LnPagr*	*LnGdp*	*LnPind*
Mean	2.443315	3.890747	28.27954	29.66167	3.119271
Median	2.516729	3.892484	28.35520	29.78344	3.109430
Maximum	2.951938	3.962886	28.96292	30.46043	3.268321
Minimum	1.548299	3.834561	27.50602	28.70920	3.016434
Std. Dev.	0.332847	0.039517	0.418023	0.513048	0.066737
Skewness	-0.824467	0.098061	-0.354891	-0.633517	0.387295
Kurtosis	3.380519	1.858691	2.203451	2.545642	2.261578
Jarque-Bera	3.102424	1.452804	1.185708	1.887308	1.192974
Probability	0.211991	0.483646	0.552748	0.389203	0.550743
Sum	63.52619	101.1594	706.9885	741.5417	77.98177
Sum Sq. Dev.	2.769684	0.039040	4.193837	6.317248	0.106893
Observations	26	26	25	25	25

Source: Computed by the authors

Table 2: Summary of the descriptive statistic of the data (model 2)

	LnCab	*LnPagr*	*LnPind*	*LnRain*	*LnPrice*
Mean	8.329833	3.218606	3.116571	1.758008	4.341683
Median	8.320356	3.192638	3.107962	1.760789	4.405113
Maximum	8.857369	3.526645	3.268321	1.905358	4.696085
Minimum	7.903318	3.054011	3.016434	1.606943	3.729279
Std. Dev.	0.265165	0.131662	0.066823	0.068079	0.305297
Skewness	0.306765	1.077204	0.446471	0.034555	-0.778732
Kurtosis	2.166886	3.215601	2.270658	3.391334	2.546516
Jarque-Bera	1.159705	5.078625	1.440058	0.171078	2.850620
Probability	0.559981	0.078921	0.486738	0.918017	0.240434
Sum	216.5757	83.68376	81.03083	45.70821	112.8838
Sum Sq. Dev.	1.757810	0.433373	0.111632	0.115869	2.330159
Observations	26	26	26	26	26

Source: Computed by the authors

Second, we perform the univariate augmented Dickey-Fuller (ADF) and Phillip-Peron (PP) unit root tests following the methodology of (Dickey & Fuller, 1979) and (Phillips–Perron, 1988). The outcomes are illustrated in table 3 and 4. Globally, all variables are stationary at first difference. Hence, we partially conclude that all variables follow the I(1) process.

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Table 3: Unit root test model 1

	variables	ADF test		PP test	
		Trend	No trend	Trend	No Trend
Level	*LnDinv*	-3.654	0.467	-3.654	0.790***
	LnLev	-3.993 **	-1.663**	-1.610	0.620***
	LnPagr	-2.050	2.721***	-2.104	2.823
	LnGdp	-2.413	4.197***	-1.670	3.675
	LnPind	-2.881	-0.843	-2.862	-0.920
First difference	$\Delta LnDinv$	-6.927***	-7.127***	-8.003***	-7.929***
	$\Delta LnLev$	4.706	-3.054***	0.274	-0.892***
	$\Delta LnPagr$	-4.792***	-3.831***	-4.796***	-3.816***
	$\Delta LnGdp$	-3.465***	-2.231***	-3.418***	-2.231**
	$\Delta LnPind$	-5.419***	-5.600***	-5.412***	-5.596*

Source: Computed by the authors. The Δ denotes first-difference derivation. The asterisks *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. McKinnon (1980) critical values are used for rejection of the null unit root.

Table 4: Unit root test model 2

	Test variables	ADF test		PP test	
		Trend	No trend	Trend	No Trend
Level	*LnPagr*	-2.456	-0.983	-2.356*10%	-1.169 *10%
	LnPrice	-1.330	-3.773	-1.348	3.289
	LnPind	-2.855	0.844	-2.842	0.925
	LnRain	-6.133***	0.041	-5.331***	0.088
	LnCab	-3.274	-0.575	-3.497	-2.113*5%*10%
First difference	$\Delta LnPagr$	-4.722***	-4.611***	-4.802***	-4.603***
	$\Delta LnPrice$	-4.142	-1.972 *10%	-4.233	-2.380*
	$\Delta LnPind$	-5.654***	-5.803***	-5.644***	-5.798***
	$\Delta LnRain$	-3.185	-6.480***	-8.832***	-9.336***
	$\Delta LnCab$	-4.825***	-4.991***	-9.068***	-7.585***

Source: Computed by the authors. The Δ denotes first-difference derivation. The asterisks *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. McKinnon (1980) critical values are used for rejection of the null unit root.

Our next step consists to perform the co-integration test by using the method carry out by (Johansen S., 1988) and (Juselius K., 1990). We note that there are at least three cointegrating vectors (table 5) and also three cointegration

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vectors in table 6. According both trace statistics (λtrace) and maximum eigen value (λmax), we accept to reject the null hypothesis at 5% significance level. Thus we deduce that there is long run relationship between our dependents variables and the independents variables see equations 1 and 2 above.

Table 5: Johansen cointegration test (sample 1990-2015) model 1

Null Hypothesis	Alternative Hypothesis	Eigen Value	LR/Trace Statistics (λtrace)	Critical value 5% level (C.V.)	Maxi-Eigen Statistics (λmax)	Critical value 5% level (C.V.)
r =0	r =1	0.788871	92.51565	69.81889	37.32687	33.87687
r ≤ 1	r =2	0.640362	55.18879	47.85613	24.54375	27.58434
r ≤ 2	r =3	0.514436	30.64504	29.79707	17.33867	21.13162
r ≤ 3	r =4	0.324495	13.30637	15.49471	9.415088	14.26460
r ≤ 4	r =5	0.149675	3.891280	3.841466	3.891280	3.841466

Source: Computed by the authors. The λ-max and λ-trace (L.R) are Johansen's maximum eigenvalue and trace eigenvalue statistics for testing cointegration. Critical values (C.V.) denote rejection of the hypothesis at 5 %.

Table 6: Johansen cointegration test (sample 1990 2015) model 2

Null Hypothesis	Alternative Hypothesis	Eigen Value	LR/Trace Statistics (λ trace)	Critical value 5% level (C.V.)	Maxi-Eigen Statistics (λmax)	Critical value 5% level (C.V.)
r =0	r =1	0.735264	94.29688	69.81889	31.89654	33.87687
r ≤ 1	r =2	0.696793	62.40034	47.85613	28.64015	27.58434
r ≤ 2	r =3	0.534803	33.76019	29.79707	18.36704	21.13162
r ≤ 3	r =4	0.365567	15.39315	15.49471	10.92056	14.26460
r ≤ 4	r =5	0.170023	4.472589	3.841466	4.472589	3.841466

Source: Computed by the authors. The λ-max and λ-trace (L.R) are Johansen's maximum eigenvalue and trace eigenvalue statistics for testing cointegration. Critical values (C.V.) denote rejection of the hypothesis at 5 %.

Turning to the long run analysis, the model 1 shows the link between the domestic investment expenditure in agricultural sector ($Dinv$) and economic development of Côte d'Ivoire by considering variable of life expectancy (Lev), real growth (Gdp), agricultural production ($Pagr$) and industrial production ($Pind$). The empirical results are illustrated in table 7. From table 7 the obtained R^2 in model 1 of 0.73 means that the explanatory variables incorporated in the model explain more 73% of all variations in domestic investment in agricultural sector. The Probability of rejecting the model specification given by Prob (F-statistics) of 0.000008 shows that the model is well specified at conventional level 1%, 5% and 10%. In case of adjustment, the adjusted $\overline{R}^2$ will be decreased about 68%. Hence, we accept the null hypothesis that domestic expenditure in agricultural sector is well explained by it determinants. The coefficient results of long term estimated in table 7 indicates that the expense of the agricultural production has a positive and significant influence on the economic growth to the probability level of 5%. We note that all variables are statistically signifiants at the conventional level with different effects.

In fact, we notice that life expectancy ($\ln Lev$) and real growth ($LnGdp$) have a positive effect on domestic investment in agricultural sector respectively. For example, one percent increase of life expectancy and real growth leads to augment domestic investment by 2.58 and 2.25 points respectively. The possible explanation is that more

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rural population life expectancy improuve more the domestic production capacity is enough. In another words, the more life expectancy of farmer is longer, more production capacity is enough. Thus the real growth also increases significantly. Moreover, the industrial production displaces domestic investment in agricultural sector. For instance, 1 percent increases in industrial production index reduced domestic investment by 2.04 percent. This result signifies that, agro-industry sector is very week in Cote d'Ivoire. In fact, the agricultural productions are almost exporting in international market, also the country' weak technology level doesn't help in creating added value in this sector.

Table 7: Estimated regression model in long run (model 1)

Dependent Variable: $LnDinv$				
Variables	Coefficients	Std.Errors	t-Statitics	Prob.
C	0.180368	5.306892	0.033988	0.9732
$LnLev$	2.583910***	1.101513	2.345782	0.0289
$LnPagr$	-2.406185***	0.468747	-5.133226	0.0000
$LnGdp$	2.245256***	0.389603	5.762930	0.0000
$LnPind$	-2.036972***	0.633519	-3.215326	0.0042

Source: Computed by the authors. Note: R^2 = 0.73 imply that the model is good fit. F-test result indicates an overall significance of the model. The asterisks ***, ** and * implies statistically significant at 1%, 5% and at 10% level respectively.

The model 2 viewed in table 8 bellow establishes the relation between agricultural production ($Pagr$) and rural area socio-economic such as rain fall ($LnRain$), carbon emission ($LnCab$), the agricultural production price level ($Ln\,\mathrm{Pr}ice$) and the industrial production index ($LnPind$). The estimation results are explored in table 8 bellow. From table 8 the obtained R^2 in model 2 of 0.66 means that the explanatory variables incorporated in the model explain more 66% of all variations in agricultural production level. The Probability of rejecting the model specification given by Prob (F-statistics) of 0.0001 shows that the model is well specified at conventional level 1%, 5% and 10%. In case of adjustment, the adjusted $\overline{R}^2$ will be decreased about 59%. Hence, we accept the null hypothesis that agricultural production is well explained by it determinants.

We notice that carbon emissions, industrial production, rainfall and agricultural product price negatively react with agricultural production. Only carbon emissions and price level coefficients is statistically robust at the conventional level. For example, if carbon emissions and price level augment by 1point, citerus paribus agricultural production displaces by 1.06 and 1.01 respectively.

Hence, this situation can be first explain it can be explained by the fact that we practice more extensive agriculture (more ground using) rather than the intensive one which consequence is forest destruction ,those trees would allow to reduce emissions by photosynthesis. In the other case, we can explain by the fact that the main crops of this study permit to reduce gas emissions in the sense that these crops (rubber, teak, cocoa, coffee…) are replacing food crops. The proliferation of these cash crops is also justified by the farm prices which are more and more in raise (crops price insertion). In this perspective, in order for farmers to make more money, they substitute some of their crops. This result is a bit contradictory as well as the the one of the industrial production. Some studies show that it contributes to carbon emissions. In our case, industrial production reduces gas emissions. This outcome can be explained by the fact that industrialization of Côte d'Ivoire is too weak and carbon emissions could be aspired by crops such as rubber, teak (trees) and cocoa.

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Table 8: Estimated regression model in long run (model 2)

Dependent Variable: $LnPagr$				
Variables	Coefficients	Std. Errors	T-Statitics	Prob.
C	18.63643	2.569927	7.251734	0.0000
$LnCab$	-1.056276***	0.428642	-2.464238	0.0224
$LnPind$	-0.764844	0.584725	-1.308042	0.2050
$LnRain$	-0.071243	0.688254	-0.103513	0.9185
$Ln\,\mathrm{Pr}\,ice$	-1.012954***	0.218448	-4.637051	0.0001

Source: Computed by the authors. Note: R^2 = 0.657343 imply that the model is good fit. F-test result indicates the overall significance of the model. The asterisks ***, ** and * implies statistically significant at 1%, 5% and at 10% level respectively.

The Dynamic coefficients of short term associated to long term are obtained through error correction model presented in tables (9 and 10) bellow. We found that only domestic investment in agricultural sector running by model 1 displays a correct sign (negative) and relatively small error correction coefficient (0.03). This implies that the adjustment process to an exogenous shock is rather slow. The error correction coefficient (-0.03) means that it would take 0.03 points of the year of domestic investment ($LnDinv$) to come to equilibrium if an econometric shock occurred in the exogenous on the right hand side. Moreover, cointegration among domestic investment in agricultural sector ($LnDinv$) and its determinants can also be confirmed by the significance of the lagged error–correction term at the conventional level 1% and 5%. This evidence from the empirical investigation shows that the domestic investment in agricultural sector is a very important variable for long-run cointegration estimation vector but produce also a strong significant short-run impact on trade ($LnDinv$) function. Also the short term sign and dynamic interactions are not coherent with those of long term agriculture production level (model 2). The estimation error correction term coefficient is positive 0.01 and statistically insignificant at the conventional level. This result signifies that there is no short run impact between agricultural production and its determinants see table 10 bellow.

Table 9: Short run (model 1)

Dependent Variable $\Delta LnDinv$			
Variables	Coefficients	Std Errors	T-Statistics
C	-0.001245	0.00108	-1.14828
$\Delta LnLev$	0.018031***	0.00386	4.67291
$\Delta LnPagr$	0.043098***	0.01314	3.27908
$\Delta LnGdp$	-0.036828***	0.01575	-2.33772
$\Delta LnPind$	0.024453	0.01576	1.55168
ECT_{t-1}	-0.030302	0.00545	-5.56186***

Source: Computed by the authors. Note. The asterisks ***, ** and * implies statistically significant at 1%, 5% and at 10% level respectively.

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Table 10: Short Run (model 2)

Dependent Variable $\Delta LnPagr$			
Variables	Coefficients	Std Error	T-Statistic
C	-0.008238	0.02633	0.31287
$\Delta LnCab$	-0.280118	0.42323	-0.66185
$\Delta LnPind$	-0.246604	0.38952	-0.63310
$\Delta LnRain$	0.110391	0.30871	0.35759
$\Delta Ln\,\mathrm{Pr}ice$	-0.021010	0.12780	-0.16440
ECT_{t-1}	0.014710	0.14002	0.10506

Source: Computed by the authors. The asterisks ***, ** and * implies statistically significant at 1%, 5% and at 10% level respectively.

Finally, we continued our study by evaluating the model 1 and 2 using diagnostic tests. The graph constructed in figure 1 point out CUSUM statistics which measures the structural stability mode. As we can notice the statistics remains in the interval of confidence, therefore we reject the null hypothesis of a structural changing over time. In addition, the second graph depicted by figure 2 which presents the CUSUM SQ test is also stable except the period of 1999 through which we notice a slight crossing of the confidence interval. However, this graph globally shows the coefficients stability of the model 2.

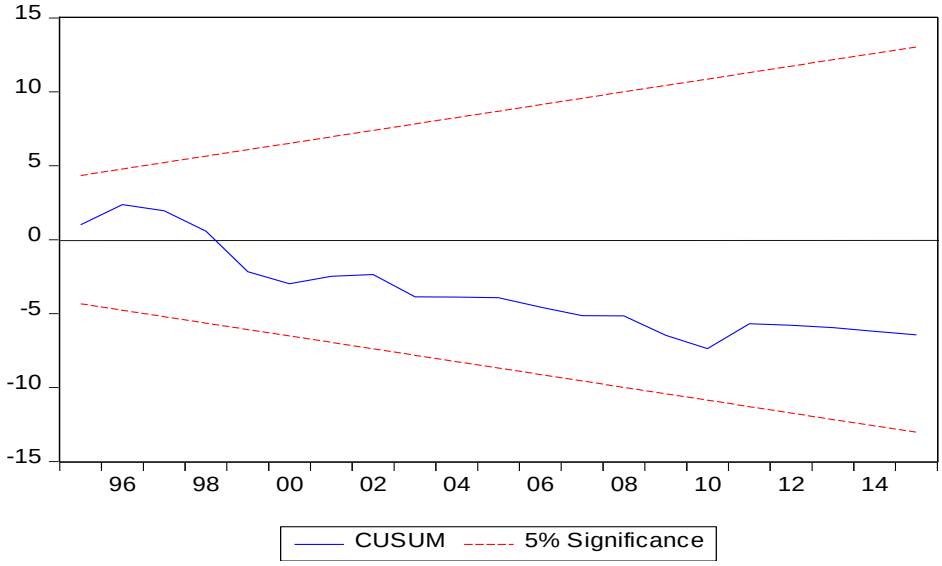

Fig.1. Test result for model 1 stability (CUSUM Test)

Source: Computed by the authors.

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2: Test result for model 2 stability (cusum Test)

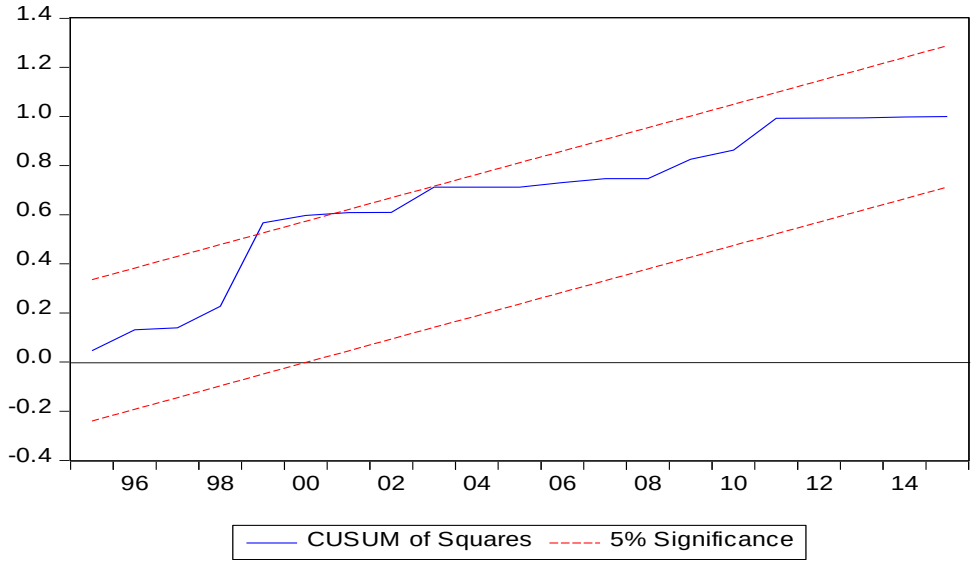

Fig.2: Test result for model 2 stability (CUSUM Test)

Source: Computed by the authors.

V. CONCLUSION AND RECOMMANDATIONS

The main target of this paper was to examine the domestic agricultural investment function and agricultural production function using the advanced cointegration test utilizing time series data spanning the period 1990-2015. The software Eviews 9 was used for our econometric analysis. The unit root tests were conducted to verify the stationarity of our database both at level and first difference. In the same order, the cointegration test was performed to check the existence of the long-run relationships among our variables. The results clearly demonstrate that government investment in agricultural sector play a significant and important role in the economic development of Côte d'Ivoire both at short and long term. In contrary, socio-economic and natural factors influence national agriculture production level in long run but not in short term. The study also detected that long run elasticities are higher than short run elasticities showing that there is long run relationship between domestic investments and production in agricultural sectors on their respectively determinants. As policy recommendation, the government of Côte d'Ivoire and the private sector must combine their investment efforts in the rural area at the farming level, production and transformation of agricultural production in order to boost national gross production.

Furthermore, the domestic investment in agricultural sector by the government improved significantly rural population welfare because more than 75% of population works in the agricultural sector. The study also identifies some difficulties which must be solved. We note that the national agricultural production is robustly linked to price level and the volume of rainfall. To solution this problem, we suggest government and policy makers to invest more in this sector in order to improve production level by mechanization. The direct consequence of such reform is to reduce the sector dependency to natural phenomena like rain and drought. Concerning the price problem, we suggest the creation of a stabilization fund of agricultural products price in order to solve price fluctuations. We also noticed that carbon emission is weak and that explains the weak level of agricultural products transformation in Côte d'Ivoire. To solve this, we must implement a policy of production transformation at the national level. The resolution of all these problems pointed out will allow to improve work conditions in Ivorian rural area and improve living standards even life expectancy.

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