



# Strategies of Offers and Agricultural Sustainable Food Security

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**Abstract--**This paper aims to identify the strategy for the efficient and capable of improving the welfare of cotton farmer's agricultural supply. The estimation results of model type Nerlove (2003) show that the strategy of supply of cotton with food crops such as maize and cassava recursively improves the welfare of cotton farmers. This strategy has fostered that informal cross-border trade between Benin, Niger and Togo. Virtuous relationship between cotton and grain crops (maize and cassava) promote increased agricultural incomes and help ensure food security. The actual strategy also minimizes the long waiting periods for cotton farm incomes and reduced selling off chemical inputs for cotton. For sustainable green growth strategy that must be sustained and subject to the creation of an agricultural sector organized. This sector should be supported by public and private investments, practices and periodic training on the new challenges of sustainable diversified agriculture.

**Keywords:** Offers Agricultural Food-Safety-Welfare-Price Differentials Strategies **Classification JEL:** Q02- Q18- F13-C35

## I. INTRODUCTION

The choice of strategies offers food in African countries south of the Sahara are marginalized and sacrificed<sup>1</sup> to some extent in favor of cash crops (cotton, groundnut, coffee ..... ) whose main functions are export the inflow of foreign currency. These strategic choices of agricultural policies exacerbate rising food prices in developing countries (PD). Faced with rising food prices, it is urgent that new strategies of agricultural offerings are supported by sustainable agricultural policies.

In cotton growing areas Banikoara initiatives to revive agriculture not based on agricultural<sup>ii</sup> diversification, equity is no more respected in the granting of credit (cash and inputs) agricultural, only large cotton farmers have access credits (farmers who planted more than 4 hectares have access to input credit (SONAPRA, 2010), the dissemination of agricultural technology innovations is not yet effective , the repeated conflicts between farmers and herders accentuate the separation between agriculture and livestock, non- agricultural market integration inhibit perfectly marketing , only cotton producers receive subsidies chemical inputs and other forms of frames (extension, credit campaign .... ) . Despite the agro-ecological potential which has the cotton zone of Benin, the risk of food insecurity is 33.2 % , more than a third of the rural population of 6 to 59 months suffer from chronic malnutrition , school enrollment is less than 8.64 % ( INSAE , 2009). Very lackluster indicators in the cotton zone therefore put into question the effectiveness of

agricultural price policies. Producer prices no longer derive great farm incomes and improving the well -being of cotton farmers. These alarming situations have led to new strategies for agricultural offerings, highly favored by the price differentials between neighboring countries. The three strategies Ranch offers the most adopted in the cotton zones Banikoara are: unique offering cotton without association with other crops, the supply of cotton with the offers of speculation diet and offer cotton offers associated with speculation maize and cassava. The strategy offers unique cotton is the most dominant in areas Banikoara APRM (2008). In this strategy offers based on cotton monoculture, the question is to determine the factors that influence the choice of this strategy.

Other cotton producers with a view to ensure their food security and especially increased their income opt for the strategy of deals associated with offers speculation diet cotton. It is also in this case, whether the production of incoming food in the diet of rural agricultural households actually benefits from rear impacts of the production of cotton in the cotton growing areas in the Republic of Benin as some studies suggest.

In the search for higher levels of food security and agricultural super- other cotton producers Banikoara opt for the strategy of deals associated with food speculation marketed (maize and cassava) south Benin and neighboring countries (Nigeria cotton Niger, Togo and Burkina Faso). The difference is that the previous two crops (cotton and food) do not fit into the diet of cotton producers. Agricultural price differentials between Benin and neighboring countries have recurrent and positive impacts on commercial margins of cotton producers Banikoara? This study is limited, the spatial point of view, the Banikoara. This town located in the second agro-ecological zone. It is bounded on the north by the municipalities of Malanville and Karimama , to the south by the municipalities of BembèrèkèKouandé , to the east by the commune of Kandi and to the west by the town of Koukombirou . The Banikoara is located in the department of Alibori . It extends over an area of 69 km<sup>2</sup> and 22 is located between 10 ° 50 and 11 ° 30 north latitude and 2 ° and 2 ° 40 longitude. The population of the municipality is estimated 104,038 inhabitants<sup>3</sup> in 2002 to 151,802 inhabitants<sup>4</sup>. With a low density (22 inhabitants per km<sup>2</sup>), the population is predominantly agricultural estimated at more than 91.94 % . The relief is characterized by a set of plates. The town is crossed by some rivers, the most important are: Alibori and Konékoga .



The climate is Sudano- Sahelian type with a single rainy season from April to October. The vegetation is shrubby savannah and heavily degraded by deforestation and overgrazing. Soils are tropical ferruginous deep and promote cotton farming.

Cotton is grown in a storm system without irrigation. Other activities are less predominant livestock (1.5 % ) , trade (4% ) and hunting and fishing are very significant activities. Agro-ecological studies<sup>5</sup> show that this area has large favorable to the production of cotton and other crops such as maize, millet, sorghum potential, cowpea , groundnut and yam (ONASA, 2010). The municipality provides the greatest numbers of Borgou-Alibori both small ruminants for cattle. Transhumance is a cyclic motion, alternating between positive at different times of the year ecologies. This town has 10 districts and 29 municipal councilors. It is therefore quite hoped that this article can contribute to the development of effective agricultural policies that improve the welfare of cotton farmers in Banikoara view to ensuring sustainable food security. After a literature review to the second section, the third section presents first section presents the econometric model and options. It then describes the data and specifies the variables. The fourth section presents the results and discussions, and the fifth offers the conclusion.

## II. LITERATURE REVIEW

Producers' decisions are taken on the basis of expected prices, not actual prices. Thus several authors have developed several theories linking the effects of development on those crops food on the one hand and identify the determinants of agricultural strategies other offers. Three theories explain the development of cash crops on those foods. The first thesis is that which condemns the growing of cash crops. For Albagli (1986) and Lewis (1978) African countries spend their strategies Ranch offers cash crops (cotton, coffee, cocoa, peanuts ..... ) . These countries are often unable to properly ensure their food security; they are subject to their deteriorating food situation, hunger, malnutrition and loss of food production per capita due to the deterioration of terms of trade and the inelasticity of demand for annuity products. The limit of their argument is that the failure to take account of the effects of inputs supply, supervision enjoyed by producers of crops. Ranch offers strategies focused on crops induce an indebtedness of farmers. This argument also ignores the effect of technology adoption related to crops, the behavior of producers. It attaches great importance to the relative values. Theses strategies for agricultural deals on cash crops are based on different resource endowments. These theories explain a good operating endowment allows countries to reap benefits from trade. The authors as Streeten (1987), Wetta (1996), Schwartz (1991) and Bambara et al (2001 ) argue that cash crops led to the adoption of agricultural technology innovations. The adoption of agricultural innovations is a source of increased productivity of food crops. The effect

of complementarity between the strategies of agricultural food offerings and that annuity ensures food security and especially the welfare of producers. These authors believe that the food crisis cannot be explained by the substitution of food crops by those annuity , but rather by the vagaries of the weather and other factors such as non- price wars , floods, bushfires and overexploitation of poor soils . Centrist thesis shows that prices offered on the market periodically influence the behavior of producers. Producer prices, government policies oriented strategies Ranch offers. Binswanger (1990), Tenon (1992) and Thiombiano (1992 ) confirm the existence of the virtuous relationship between crops and those of food.

This virtuous relationship induces a positive complementarity and allows producers to ensure and guarantee their food security on the one hand, to cope with production costs on the other. Factors price and non- price each act therefore on strategies for agricultural offerings. Among these factors we have: Investment in Research and Development ( R& D ) , marketing , infrastructure and climatic conditions while stimulating factors strategies Ranch offers Ogbu et al (1990). Studies Doyon et al (2008) and Fontagné et al (2007) show that the factors are of several kinds: organizational ( integration of agricultural markets , prices ), technical ( production factors ), economic ( agricultural credit subsidies, agricultural banks ) , environmental ( land and agrarian reform ) , climate ( droughts, floods) , social and political ( wars , embargo, religious and ethnic conflict ) and the costs of production ( purchase of fertilizers, transport)<sup>6</sup> . Work Uma Lele

et al (1990) show the positive impact of management structures on the unique offer cotton strategy in Cameroon, the work of Boserup (1965) and Randrianarisoa et al (2003) show that the density of the population and access to markets and the adoption of agricultural technology innovations promote the multiplicity of strategies for the welfare of producers. Savadogo et al (1995) show that financing constraints are critical strategies in agricultural offerings. Access to institutions the informal rural finance is real levers of the acquisition of the investment in an environment characterized by formal credit rationing. Bonfiglioli (1991) shows that risks related to the production and harvesting strategies limit farm offers. This increases the nutritional deficiencies and makes unstable sustainability strategies Ranch offers. Work Bonjean et al (1999) show that the instability of agricultural income does not promote sustainability strategies Ranch offers. Byerlee et al (2005) show that the volatility of agricultural prices "imported" from international markets is crucial in agricultural strategies offers. Couller (2005) shows that the multiplicity of strategies Ranch offers must go through recourse to the international market with a view to stabilize agricultural prices. This is strongly zero- imports and exports, and even subsidies. Boussard et al (2006) explain the consequences of this instability are those behavioral changes in agricultural strategies offers. Poulton et al (2006) emphasize the transparency and



credibility of stabilization policies in agricultural prices. Bricas et al (2009) show that widespread protectionism makes it more unstable international markets. This reduces the effectiveness of strategies for agricultural tenders, which generates production costs.

### III. DATA and ECONOMETRIC MODELING OPTIONS

This section describes the data source, modeling and specification of variables and econometric options.

#### 3.1. Data

The data used in this study are essentially secondary. They are collected from specialized agencies and ministries in agriculture. Among these organizations we have the Ministry of Agriculture, Livestock and Fisheries (MAEP), the National Support to Food Security (ONASA), the National Society for Agricultural Promotion (SONAPRA), the National Institute for Agricultural Research of Benin (INRAB) and the Ministry of Commerce (MC). These state structures have allowed us to obtain the different areas sown respectively, the prices of various speculations, agricultural input prices, agro-ecological potential and the price of cotton producers in neighboring countries. All data collected over a period of 30 years (1980-2012).

#### 3.2. Modeling and specification of variables

The work of Nerlove (1958) discusses the expectations of prices on the agricultural market. Nerlove indicates that the expected price is assumed to be equal to the weighted sum of past prices, the weighting being geometrically decreasing when we go back in time, in the case of adaptive coping. Two limitations need to be highlighted: the existence of a biologically determined delay, and Pilerai Technology (1996).

A central question about the case of the tree, is the identification of various investment decisions Akiyama et al (1987). The author stresses the importance of an approach that distinguishes along the different phases of the production of tree features: the first production period and the role of technical progress. This model is well suited to our article to analyze the expectations of producers in different strategies Banikoara model Nerlove (1958), which implies :

$$P_t^e = P_{t-1} + a (P_{t-1} - P_{t-2}^e) \quad (1)$$

where  $P_t^e$  is the expected price for the year t to t -1 ( the one that will be used for calculations of profitability )  $P_{t-1}^e$  is the observed price in year t, has an " elasticity of anticipation ." The principle of rationality means that an investment report more than what it cost , fertilizer prices relative to that of cotton and those of food crops must be conducive to decide the producer to use ( NPK, Urea, pesticide ... .... ) . Therefore, an increase in relative prices, all else being equal, negatively affects agricultural strategies offers. The cultivation of cotton and food crops are those storm . Increased supply depends in part on the

distribution of these along the production cycle Kagira (1996) and Lumbu (1997). The composite index (HDI) in selected models offers suggests an improvement of intangible investments ( health and education) producers can induce agricultural growth . Late payment of agricultural income (delay) is a very important factor in the agricultural sector . Late payment therefore reduce consumption , and especially the motivation for producers . Agricultural prices highlight the imbalance between supply and demand. These agricultural prices are unstable. They become " political price" Access to bank financing in time and input time credits induce motivation to increase farmland ( Wampfler , 1998; 2000) and Ricardo et al (2005).

#### 3.3. Econometric options

Adjustments in light of the strategy deals with agricultural and non-price factors are often carried out slowly and shift due to the existence of adjustment costs. In this situation, the actual output level is different from the noted desired production level noted. The inclusion of two extensions in the presence of assumptions in the model used to specify the Nerlove adaptive expectations.

These expectations are formulated as follows:

$$P_t^\alpha = P_{t-1} + \gamma (P_{t-1} - P_{t-1}^\alpha) \text{ with } (P_{t-1} - P_{t-1}^\alpha) \text{ the error} \quad (2)$$

Where  $P_t^\alpha$  is the expected price for period t,  $P_{t-1}$  is the observed price in period t -1 is the coefficient of adaptive expectations and assumed constant between 0 and 1. At each period or crop, the producer revises its expectations in proportion to the error associated with the previous level of expectations. The error in this case is equal to the difference between the observed price level and the expected level. There are two special cases wherein the coefficient takes advance respectively 0 or 1. Then analyze these two situations: The first case  $\gamma = 0$  then equation (2) becomes:

$P_t^\alpha = P_{t-1}^\alpha$ , actual prices are completely disconnected expectations.

The second case  $\gamma = 1$ , then equation (2) becomes:  $P_t^\alpha = P_{t-1}$ , expectations of producers are naive because they anticipate that the price at time t will be identical to that of the previous period. The expected price is a decreasing geometric moving average weights previous price Koyck(1954).

This mathematical formulation of the expected prices can rewrite equation (2) becomes:

$$P_t^\alpha = \gamma P_{t-1} + (1 - \gamma) P_{t-1}^\alpha \quad (3)$$

Delaying the equation (3) of a period, it becomes:

$$P_{t-1}^\alpha = \gamma P_{t-2} + (1 - \gamma) P_{t-1}^\alpha \quad (4)$$

Successive values shifted expectations are replaced in equation (4) to become the anticipation of price in period t



based on observed variables. This iteration order n offsets can rewrite equation (4), and it becomes:

$$P_{t-1}^{\alpha} = \gamma(P_{t-1} + (1 - \gamma)P_{t-2} + (1 - \gamma)^2P_{t-3} \dots)$$

$$= \gamma \sum_{i=1}^{\infty} (1 - \gamma)^{i-1} P_{t-i} \quad (5)$$

Price expectations from equation (4) are defined according to a distributed lag model as defined Koyck (1954).

The delay used operator can rewrite equation (4) becomes:

$$P_t^{\alpha} = \gamma(P_{t-1} + (1 - \gamma)LP_{t-1} + (1 - \gamma)^2L^2P_{t-1} \dots)$$

$$= \gamma(1 + (1 - \gamma)L + (1 - \gamma)^2L^2 + \dots)P_{t-1}$$

#### IV. RESULTS AND DISCUSSION

Analysis of the results of the two models long and short term strategy offers unique cotton

Tables 1 and 2 show that the area sown cotton Banikoara are largely explained by the set of explanatory variables unique offer cotton long and short-term (model (R2 = 0.60) and (R2 = 0.64) and probability (F-statistic) (.0080 (long term) and short 0,005) are less than 5%). The coefficient of resid(-1) associated with the restoring force is negative (0.957273) and significantly different from zero (0.0033 \*\*\*). There is therefore a mechanism for error correction. The error correction model (short-term model) offers unique cotton meets all standard tests of ordinary least squares (OLS). This strategy is determined by the elasticity of price differentials cotton between Benin and Niger (DLprteng (-1)) and that of Benin and Togo (DLprctbtg (-1)). These two significant short- elasticities( 0069 and 1885) and long term (0213 and 8657) induce positive net margins. These margins stimulate motivation for large acreage in cotton producers Banikoara. Net margins are positive mainly because of smuggling facilitated by porous borders between the three countries and especially cash payments on the spot that

would reduce stays cotton producers Banikoara outside the national territory. This positive net margin is greater than one (1) for cotton producers Banikoara because of the less distant between Benin and Niger geographical position between Benin and Togo. The elasticity of the purchase price of NPK input of the previous year (D (lpreing) (-1)) in the short (7324) and long term (19.030) is significant at the 5% level. This surprising result is explained by the fact that over the sale price of this input NPK, the higher the cotton producers tend to sold off a large portion of the amounts received. The price differential ente cotton and corn from the previous year in the cotton zone LPRIMC (-1) to short (4.80E -07) and long-term t (1.16E07) thus emerged a small commercial net margin positive. This result is the consequences of slashing chemical inputs confirming weaknesses dosages unsuitable for crops of cotton and maize. The composite indicator (ILHR (-1)) of the previous year coefficients of short-term positive sign (0.506221) and long-term negative sign (-0.055797). This result was not the short term transient positive effect on the long term in the single cotton supply. This cotton therefore has limited income on training and community development impacts. Non- price factor (previous area sown cotton (LSUPCOTB (-1)) has negative and significant elasticities sign in the single supply of cotton. (-5.209974) Short term and (-0.579951) long term. This result explains the many organizational, economic and structural problems that subject the cotton sector in Benin. Late payment of cotton revenues in previous years D (IATE) (-1) have significant negative signs.

They are (6257) and short-term (20968) long term. This factor motivates more smuggling of white gold in the neighboring countries of Benin. Rainfall factors ((Lpluviomtiii (-1)) and Lpluviom (-1)) LUVIOMT (-1) in the short and long term helped determine the optimal value of the quantity for this strategy. This small volume of water (0.042 mm) causes a slight increase in the area planted to cotton (0.42 hectares). This result is a corollary of the effects of deforestation and climate change significantly affect agricultural production

Table 1. The results of the estimation of the long-term model offers unique cotton and tests of validity of the model: Independent variable: LSUPCOTB

Variables	Coefficients	Probability
C	-2491.681	0.1407
LSUPCOTB (-1)	-0.579951	0.0464**
DLPRTENG (-1)	0.213886	0.0739*
DLPRCTBTG (-1)	8.65712	0.0534*
DLPRIMC (-1)	1.16E-07	0.0609*
Error (-1)	-20.96831	0.6731
LPREING (-1)	19.030814	0.005***
LPLUVIOMT (-1)	-83.40797	0.1471
LPLUVIOM (-1)	989.8766	0.0112**
HDI (-1)	-0.055797	0.0331**



	8.211744	R-squared =0.604147	DW=5.03
F-statistic	= 0.0087	Adjusted R-squared =	0.706221
Prob (F-statistic)	=		

Source: Results from our estimates

Table 2. The results of the estimation of the short-term model offers unique cotton and tests of validity of the model: Independent variable: D(LSUPCOTB)

Variables	Coefficients	Probability
C	7.442368	0.3369
D (LSUPCOTB (-1))	-5.209974	0.8392
D(DLPRTENG) (-1)	0.069937	0.0781*
D(DLPRCTBTG) (-1)	1.88583	0.0844*
D(DLPRIMC) (-1)	4.80E-07	0.0129**
D(Error) (-1)	-6.257513	0.0498**
D(LPREING) (-1)	7.324729	0.0663*
D(LPLUVIOMT (-1))	-21.88601	0.6218
D(LPLUVIOM (-1))	268.7797	0.5696
D(HDI) (-1)	0.506221	0.0151**
RESIDT (-1)	-0.957273	0.0033***
F-statistic = Prob(F-statistic)	= 2.968408 0.005616	R-squared =0.649 DW= 4.32

Source: Results from our estimate

Empirical Evidences of the supply strategy of cotton with speculation in dietary approach Nerlove

All series are stationary in first differences with the values of ADF statistics lower than the critical values of Hamilton at the 5 % ( Table 5). Table 3 shows that there are strong correlations between the areas sown cotton ( Lsupcot ) and those speculations mil ( Lsupmil ), peanuts ( Lsupart ) and cowpea ( Lsupnb ) . Cotton production Banikoara therefore combine millet, groundnut and cowpea production. These agricultural products are a priori complementary and / or substitutable. Results 4 and 5 show that the area planted in the strategy provides the associated speculation diet cotton are largely explained by the set of explanatory variables in the models of short and long term ( = 0.69 , ( 0.82 ) and probabilities ( F -statistic ) of 0.22 and 0.004 are less than 5 % ) . residt coefficient ( -1 ) associated with the restoring force is negative ( - 0.857273 ) and significantly different from zero ( 0.0083 \*\*\* ) . This error correction model ( shortterm model ) satisfies all the classical tests of ordinary least squares (OLS) . elasticities cotton previous prices between Benin and neighboring country Togo ( ( Ldlprctbtg (-1) ) and Niger ( ( Ldlprteng ) (-1) ) to short ( ( -2.079145 ) and ( 92.21973 ) and long term ( ( -1.748659 ) and ( 68.68445 )

) are significant at the 5% level with negative signs for Togo and positive for Niger . these positive signs for the Niger show positive net margins for the border trade between the two countries. These positive and greater than unity (1) elasticities explain that the majority of speculation diet are marketed to the Niger , whose demand is strong in food crops ( millet, sorghum , peanuts ... ) . Factors "delay" in previous years D ( DELAY (-1) ) in the short ( 3.700195 ) and long term ( 1.430988 ) have coefficients of positive sign in this offer associated strategy. Late payment of cotton income factor seems to be offset by income from crop marketing diet to Niger. Elasticities planted cotton acreage earlier ( Dlsupcot (-1) ) in the supply strategy of cotton with have significant negative signs at the 5 % short ( -0.381298 ) and long term ( -0.487371 ) . These negative values reflect the overexploitation and regular cuts of fertilized land in the cotton area. Variable area planted peanut previous years D ( LSUPART (-1) ) have coefficients of positive signs and significant short and long term. The values of the elasticities are less than unity (1) ((0.06377) and short-term ( 0.198567 ) in the long term). These results show that cotton producers are producers and consumer.

Table3:The statical correlation between the area planted speculation diet and cotton acreage

Series in first differences	D(LSUPMIL)	D(LSUPRG)	D(LSUPRZI)	D(LSUPART)	D) LSUPCOT)	D(LSUPNB)
D(LSUPMIL)	1.000000	0.523882	-0.190261	0.811342	0.752671**	0.874475



D(LSUPRG)	0.523882	1.000000	-0.430754	0.289910	0.300817	0.491785
D(LSUPRZI)	-0.190261	-0.430754	1.000000	-0.066527	0.269576	2.36E-17
D(LSUPART)	0.811342	0.289910	-0.066527	1.000000	0.745053**	0.846749
D(LSUPCOT)	0.752671	0.300817	0.269576	0.745053	1.000000	0.886199
D(LSUPNB)	0.874475	0.491785	2.36E-17	0.846749	0.886199**	1.000000

Source: Results from our estimates

Table 4. Estimated long-term model of supply of cotton with speculation diet:  
Dependent Variable: D (LSUPCOT)

Variables	Coefficients	Probability
C	573.1753	0.9372
LSUPCOT (-1)	-0.487371	0.0309**
LDLPRCTBTG (-1)	-1.748659	0.0084***
LDLPRTEG (-1)	68.68445	0.0932*
LSUPART (-1)	0.198567	0.0115**
LSUPRG (-1)	-4.63E-08	0.9259
ERROR (-1)	1.430988	0.7194
LPLUVIOMT (-1)	86.41611	0.8253
LPLUVIOM (-1)	-519.0738	0.8749
HDI (-1)	-23.8	0.0800**
F-statistic = Prob(F-statistic) = 9.17 0.0004		R-squared = 0.820 Adjusted R-squared = 0.73

Source: Results from our estimates

Table 5. Model estimation short term supply of cotton with speculation diet:  
Dependent Variable: D (LSUPCOT)

Variables	Coefficients	Probability
C	7.189602	0.4151
D (LSUPCOT (-1))	-0.381298	0.0484**
D(LDLPRCTBTG(-1))	-2.079145	0.1041
D(LDLPRTEG(-1))	92.21973	0.0040***
D(LSUPART(-1))	0.063677	0.0564*
D(LSUPRG (-1))	-2.15E-07	0.0908*
D(RETARD(-1))	3.700195	0.0337**
D(LPLUVIOMT(-1))	369.8115	0.2317
D(LPLUVIOM(-1))	-3055.897	0.2366
D (IDH (-1))	-15.62598	0.7048
RESIDT (-1)	-0.857273	0.0083***
F-statistic =0.69 DW= 5.034		Prob (F-statistic) =0.22 R-squared = 1.83 Adjusted R-squared = 0.0034

Source: Results from our estimates

Empirical Evidences of supply strategy associated with cotton sold to the South cultures Benin and neighboring countries

We show the existence of a strong relationship between the two variables, but in the opposite direction . This inverse relationship reflects an increase in supply ( Dlsupcot (-1) ) significantly reduced spending on health and education of children producers HDI ( D (HDI) (-1) ). This means that revenues from previous years that strategy play a regulatory role for health spending and education of

the next. Past cotton price differential between Benin and Niger D ( Ldperteng (-1) ) in the short -term coefficient therefore negative ( -7.55 ) and significant at the 5% level . increasing the anterior discount agricultural supply in this strategy. Beninese cotton price is low compared to that of Niger .price volatility of white gold has a negative impact on food speculation. improved composite indicator of previous years ( HDI (-1) ) in the short ( 40.51 ) and long term ( 3748 ) have positive effects on cotton supply associated with food speculation marketed (maize and



cassava) . The increase in intangible investments ( health and education) induces growth of agricultural supply associated 37% short hectares and 405 hectares in the long term . An increase of 10 % of cotton area sown earlier D ( Lsupcot (-1) ) in the short ( -0456 ) reduced by 4.5% and increases hectares long term ( 0.07148 ) of 0.7148 hectares. Cotton production in the long term a positive transitory effect on the production of maize and cassava .

This result confirms the existence of a virtuous relationship between cotton and grain (maize and cassava) . The delay factor in the long term has a negative and significant coefficient sign at the 5 % ( -0,123 ) . This result suggests that the marketing of crops ( maize and cassava) happens not diminished the long waiting period of cotton revenues .

Table 6. Model Estimation long term supply of cotton with speculation marketed  
Dependent Variable: D(LSUPCOT)

Variables	Coefficients	Probability
C	-913.5138	0.8826
LSUPCOT (-1)	0.071480	0.7568
HDI(-1)	40.51925	0.0016***
LSUPMAIT (-1)	0.122385	0.0190**
LSUPMC (-1)	90.23120	0.0671*
LPREING (-1)	-83.80148	0.0070**
ERROR (-1)	-0.123295	0.0713*
LPLUVIOMT (-1)	-41.00543	0.9025
LPLUVIOM (-1)	567.3423	0.8398
LDLPRTENG (-1)	-65.68066	0.1716
LDPRTBNG (-1)	-0.001549	0.8913
F-statistic =10.8307 Prob(F-statistic) =0.000 DW= 2,432		R-squared Adjusted R-squared =0.564334 = 0.084530

Source: Results from our estimates

Table 7. Model estimation short term supply of cotton with speculation Marketed  
Dependent Variable: D(LSUPCOT)

Variables	Coefficients	Probability
C	6.084226	0.5334
D(LSUPCOT (-1))	-0.456595	0.0257**
D(IDH (-1))	3.748187	0.0292**
D(LSUPMAIT (-1))	0.095905	0.0127**
D (LSUPMC (-1))	70.74681	0.1792
D(LPREING (-1))	-37.85219	0.5101
D(RETARD (-1))	-3.286763	0.2825
D(LPLUVIOMT(-1))	333.3061	0.2773
D(LPLUVIOM (-1))	-2778.270	0.2805
D(LDLPRTENG (-1))	-7.55164	0.0439**
D (LDPRTBNG (-1))	0.008410	0.4677
RESIDT (-1)	-0.657273	0.02433***
F-statistic =0.61 Prob(F-statistic) =0.00 DW =2.0834		Adjusted R-squared = 0.19 R-squared =0.602

Source: Results from our estimates



## V. CONCLUSION

Strategy offers unique cotton is positively influenced by the differential of the Niger previous prices (  $Dlprteng$  (-1) ) of Togo (  $Dlprctbtg$  (-1) ) and the previous price of chemical inputs (  $LPreing$  (-1) ) while non- price factors such late payment prior (  $delay$  (-1) ), the area sown earlier (  $Lsupcotb$  (-1) ), the rainfall of the previous year (  $Lpluviomt$  (-1) ) and education and health in the previous year (HDI (-1) levels) handicap growing cotton . In the strategy offers cotton crop associated diet both differentials previous prices have impacts contrary that of Togo (  $Dlprctbtg$  (-1) ) is negative and significant . Commercialization crop diet does not generate positive net margins , while towards the Niger ( (  $Dlprteng$  (-1) )) the elasticity is significant and positive . this result is mainly due to the strong demand for cereals ( millet, sorghum and groundnuts) in this country planted where food insecurity is recurrent. coefficient factor of delay (  $delay$  (-1) ) offers this strategy is positive and significant. delayed payment of agricultural income is omnipresent and significantly reduces the motivation to increase the area planted. Despite the association of culture in this strategy offers the variable area of cotton (  $Lsupcotb$  (-1) ) has a positive and significant elasticity. this reflects a predominance of this culture in the area Banikoara and that an increase in the area planted peanuts (  $Lsupart$  ) (-1 ) reduced agricultural supply in this strategy. The strategy offers associated with cotton sold to the South Benin and neighboring countries has positive and recurring impacts on the well -being of producer's cultures. It allows producers to achieve the expenditure on health and education of children (HDI (-1) ) . This strategy is favored by the price differential between Benin and Niger generates substantial net margins that reduce long periods payment of cotton revenues (  $Delay$  (-1) ) . The major advantage of this long-term strategy is transitory impact on the production of maize and cassava. Both productions have rear effects of cotton. Considering the results, the importance of the strategy associated with cotton production of maize and cassava is being highlighted. Indeed, this strategy has significant associated socio -economic issues for Benin and especially the cotton zone Banikoara. Three strategies Ranch offers it improve over the welfare of producers (regulations in health spending and education), significantly reduced the long wait times of cotton revenue and promote production of cassava and maize. Moreover, the proposed solutions envisaged in the short and long term sustainable green growth is the continuation of a diversified agriculture, supported by public and private investment, an organization of the agricultural supply strategy and periodic training of farmers practice on issues of diversified agriculture. Payment of cotton income in a short time to reduce the effect of attractive price leaders trained in Niger and Togo as for cotton and other food crops.

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