An Analysis of the Socio-Economic Determinants of Cocoa Production in Meme Division, Cameroon

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Research Article

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ABSTRACT

This study presents a vivid assessment of the socio-economic determinants of cocoa production, which remains the mainstay of the economic life of Meme Division. A systematic random sample of 200 households out of 153,568 was chosen in the three subdivisions that make up Meme Division. In addition, secondary information on cocoa output for 33 years (1980-2012) was obtained. The data were analyzed with the use of the Generalized Method of Moments (GMM) and Trend analyses for cocoa output show that unusual variations were experienced in some years. Based on the regression analysis on the socio-economic determinants of cocoa production, capital, labour and price, they all show a positive effect on the output of cocoa. The dummy variables (political influence and gender) have both a positive and negative influence on cocoa output respectively; however, their influences on output are insignificant. In addition, more than 61% of variations in the output of cocoa were observed to be the result of variations in these variables in our regression equation taking into consideration the number of years and the number of variables included in the analyses. Based on the findings, the study concluded that the observed socio-economic variables affect cocoa production in Meme Division but the degree and direction to which each variable affect output varies. The study recommends, among others, the need to improve on the storage facilities of farmers so as to avoid price fluctuations while the institution of an Economic Pricing Policy that will continuously stabilize cocoa prices and hence farmers’ income is imperative.

Keywords: Socio-economic Determinants, Cocoa Production, Price Fluctuation, Storage Facilities.

1.1 INTRODUCTION

The significant role of cocoa as a driver of economic growth has gained overall acceptance in all cocoa growing economies. According to the United Nations Conference on Trade and Development, UNCTAD, (2004), cocoa is a highly competitive and lucrative economic cash crop ranked highest in terms of income generation amongst other agricultural activities in the global markets. The nutritional value of cocoa to man (health supportive) with regards to its constituent elements like butter (54%), protein (11%), cellulose (9%), pentosan (7.5%), tannin (6%), water (5%), theobromin (1.2%), sugar (11%) and caffeine (0.2%) have made it a more dependable cash crop which is encouraged worldwide. Millions of people around the world enjoy consuming chocolate whether as part of a snack, drink or dessert (International Cocoa Organisation, ICCO, 2001).

Globally, an estimated average of 3 million metric tons of cocoa are produced every year (UNCTAD, 2004). Of these 3 million metric tons, 90% of the world’s production comes from eight countries which are Ivory Coast (38%), Ghana (21%), Indonesia (13%) Nigeria and Cameroon (5%) respectively, Brazil (4%) Ecuador (3%), Dominican Republic (1.4%) and Malaysia (0.9%) (UNCTAD, 2004). West Africa, with a total cultivated area of 420,000 hectares, account for over 70% of world production (ICCO, 2001).

Between 2003 and 2007, the cocoa sector contributed about 0.89% to 1.45% of Cameroon’s gross domestic product and accounted for between 5 to 9.652% of annual total export revenues. The production of cocoa rose from 75,000 tons in 1961 to approximately 125,000 tons in 2000. Cameroon currently produces 180,000 tons, hence 5% of global production and is ranked the fifth world cocoa producer (Kumase et al, 2008). About 50% of Cameroon’s cocoa beans come from the South West, 35% from the Centre and 15% from the South East Regions (Cameroon Marketing Commodity (CAMACO), 2010). Out of the total cultivated area in the South West Region, about 40% comes from Meme Division, 11% from Fako Division, 14% from Kuep Muanenguba and 25% from Manyu Division (Estimates from South West Regional Delegation of Agriculture and Rural Development, 2007).

The cocoa sector for the past years has had to contend with a number of natural elements to favour its production. Climatic factors such as rainfall, temperature, sunshine, humidity, soil moisture and wind affect cocoa
production. But the two major climatic parameters which are important in determining cocoa growth are temperature and rainfall (International Cocoa Organisation, ICCO, 2011). Cocoa generally requires high temperatures with a maximum annual average of 30-32°C and a minimum average of 18-21°C. Average daily maximum temperature exceeding 33.5°C should not be more than 1 month. Variations in the yield of cocoa trees from year to year are affected more by rainfall than by any other climatic factor. An annual rainfall level of between 1500mm and 2000mm which is well distributed is good. Dry spells where rainfall is less than 100mm per month should not exceed three months (International Cocoa Organisation, ICCO, 2011). Apart from these natural factors, other factors such as capital, labour, cocoa prices and the number of years of farming (experience) are very essential in determining cocoa production. All these determinants have, over the years, influenced the production of cocoa. However, the rates at which these variables determine cocoa production varies and therefore it is necessary to assess the impact of one set of this determinants and suggest strategic intervention actions to ensure that the negative effects of these determinants are minimized.

It is almost impossible to talk about the socio-economic life of the inhabitants of Meme Division without making allusion to their main source of income – cocoa production. Cocoa feeds, clothes, shelters and takes care of the livelihood needs of the inhabitants of Meme division. This cash crop thrives well within this area and is even more important because it tolerates the growing of their major staple food crops (plantains, cocoyams, bananas and cassava). The important role of cocoa production in this division could be clearly identified during the periods of harvest, which begins from July to December. There are many factors which determine cocoa production in Meme division of the South West Region of Cameroon, ranging from natural factors (soil, rainfall, temperature, humidity, etc) to human factors (labour, capital, price, political influence, gender, education, culture, etc). Worthy of note is the fact that it is difficult if not impossible to alter the influence of the natural factors on the production of cocoa but that of the human factors can easily be altered, thus the reason for the choice of the human factors (socio-economic variables) in this study.

It is important to mention that the government of Cameroon has been involved in a number of moves towards providing improved farming inputs provided through the cooperatives in the area so as to enhance production and productivity. The dawn of liberalization in the agricultural sector also meant little government intervention to boost the sector (South West farmers Cooperative Union, SOWEFCU, 2010). Unfortunately, little has been done to actually establish the degree to which socio-economic variables determine the success of cocoa production. This calls for a study of this nature so as to ascertain the degree to which socio-economic variables influence the performance of cocoa production in Meme Division. Adam et al. (1998) carried out a similar study in which he concluded changes in agricultural supply result from a combination of changes in yields and changes in crops acreage as a result of the effect of both climatic (natural) and human factors. Richman (2010) investigated the determinants of technical efficiency using a balanced longitudinal (panel) data on Ghanaian cocoa farmers for period of 2001 to 2006, in which he concluded that both natural and socio-economic factors greatly affect cocoa production. From the above studies and others carried out by earlier researchers in this domain, it is clear that production and productivity in the cocoa sector is greatly affected by both human (socio-economic) and natural factors. However, since it is difficult to alter the effect of natural factors on crop yields, this study therefore focuses on human factors whose effect on crop yield can easily be altered so as to increase production, given the important role cocoa play in the livelihood of the inhabitants of Meme and Cameroonian in general.

This study covers the major cocoa producing areas of Meme Division. Much focus is on the socio-economic determinants of cocoa production. In this wise, major cocoa producing areas in the Sub-Divisions of Kumba, Mbonge and Konye were given greater attention. Attention was also given to all categories of cocoa farmers, be it small or large scale farmers. Going by the tenets of Vision 2035 which has as objective the need to transform Cameroon into “an emerging economy by 2035” and since agriculture is the backbone of the Cameroonian economy, it is necessary to design ways of sustaining agriculture taking into consideration its role as the major source of raw materials for industrial development, sustainer of lives and markets for industrial outputs.

Being the first of its kind in the Division in question, the study is organized in five sections. Section one gives the background of the study, the problem and the novelty of the study in question. Section two examines existing literature and theories that are related to the study, section three presents the scope of the research and the research methods employed while section four presents and discusses the findings of the study. Finally, section five dwells on the conclusions and recommendations of the study.

### 2.1 LITERATURE REVIEW

Amin (2001) ascertained that the main cash crop which provides about 40% of Cameroon’s export is cocoa. Before the country began exporting oil in 1979, cocoa production remained the mainstay of the country’s economy contributing up to 80% of the country’s Gross Domestic Product (GDP). Irrespective of the two decades of neglect and a poorly handled economic liberalization policy which has drastically reduced cocoa’s contribution...
to 1.5%, cocoa production is still the main economic activity of smallholders and ranks among one of the highest income generating cash crops to the GDP of the Cameroon.

Richman (2010) investigated into the determinants of technical efficiency using a balanced longitudinal (panel) data on Ghanaian cocoa farmers for the period 2001 to 2006. The panel version of stochastic frontier model was used to estimate Technical efficiency. The determinants of technical efficiency were estimated using the Random-effects Tobit Estimator and it stood on average at 44.2%. The result found demographic factors and non-labour inputs except household size and insecticides to have positive and significant impacts on technical efficiency. Controlling for demographic profile and selected non labour inputs, result suggests that farm level problems including black pod infestation, mistletoe attack, and termites and other problems, including flooding, weeds and bushfire are affecting technical efficiency among cocoa farmers. Other factors as fertilizer intensity and quality of farm maintenance had positive and significant impacts on technical efficiency. The latter suggest that providing farmers with extension service on best maintenance practices will positively impact technical efficiency. The study recommends that efforts aimed at raising productivity and efficiency must concentrate on reducing if not eliminating farm level problems and intensification of fertilizer usage and that, farmers should be given some education on maintenance practices. The degree of fertilizer application and other climate related factors are the focus of this study. However, in our study we are looking at those non climatic (socio-economic) factors that directly or indirectly affect cocoa production in Meme Division.

Wokia-azi, et al. (2008) in their study on cocoa production in Southern Cameroon ascertained that gender disparity with regards to land occupation is one of the problems affecting the multiplicity and increasing harvest in the cocoa growing communities of Southern Cameroon. According to them, women are highly disfavoured and certain cultures sometimes do not allow them to own land and as such, access to land is limited when compared to the men. Through different mechanisms, women are strongly disadvantaged when it comes to extension services, marketing and control of proceeds (sales).

According to Adams et al. (1998), changes in agricultural supply result from a combination of changes in yields and changes in crop acreage. Changes in crop yields are the result of climate changes and any human mitigating responses (such as increasing fertilizer or water use or adoption of new crop varieties), while changes in acreage are affected by producers’ expectations concerning changes in relative crop prices and per acre returns. Crops that decline in supply will rise in price, ceteris paribus. Higher prices reduce consumption levels and adversely affect consumer welfare. In some cases, the negative effects on consumers may be partially or totally offset by producer gains from higher prices, but in general, total welfare tends to decline when supply is reduced. In the long term, higher prices stimulate producers to seek ways to increase supply, resulting in new equilibrium levels of prices and quantities. So, the long term effect of a drop in cocoa yield per hectare negatively affects the welfare of the cocoa farmers in Meme Division.

Nyemek et al. (2007) concluded that there is the need to promote credit institutions which specializes in savings, mobilization and credit supply to smallholders. To them, when loans are made available to cocoa farmers without much emphasis on collateral security, the problem of poor harvest will become history as smallholder cocoa farmers will be empowered to go for any chemical without concern for the cost. Their survey showed that about 54% of cocoa farmers in Nigeria have access to credit, 37% in Cameroon, while in Ghana and Ivory Coast, only a few cocoa farmers have access to credit.

Peasant households depend on agriculture and related activities for whatever livelihood its members are able to echo out of their environment. Cocoa production is not only affected by natural factors, a number of socio-economic determinants of cocoa production exist and their understanding is crucial in agricultural planning. Nkamlieu (2004a and 2004b) stated that cocoa productivity levels can be enhanced either by improving technical efficiency or by improving technological application. He further added that a relevant burden for agricultural policy-makers should either be to pursue a strategy directed towards technological change by bringing new technologies, or a strategy geared towards efficiency by improving the use of existing technologies.

3.1 THEORETICAL UNDERPINNING

Production is simply the output realized with specified inputs. The physical productivity of inputs is an important determinant of output. It specifies how much can be produced. Inputs, sometimes called factors of production or resources, are the ingredients used by a firm or an individual to produce a good or service. An input here can be considered as labour, land, or capital. A production function can be given as,

\[ Q = f (N, L, K) \]

where N, L, K are land, labour and capital respectively, and Q is the output given that only three inputs are considered. This production is the technical relationship between inputs; it identifies the maximum amount of output that can be produced by a specific combination of inputs. We can represent a firm’s production function graphically by production isoquants. An isoquant (Figure 1) is a curve that shows all the combinations of inputs, that when used in a Technologically efficient way, will give a certain level of output. An isoquant further away from the origin indicates a higher level of output. From Figure 1, it is clear that one factor can be substituted
for another. This implies the slope of the isoquant measures the marginal rates of technical substitution or transformation (MRTS or MRTT).

The decision as to which input combination should be taken brings us to the concept of least cost combination. The isoquant on which the firm will situate depends on the income available. The least cost combination can be determined by super-imposing the isoquants and isocost. If this is done as above, then the firm will produce at E on Q₂ using L₂ hectares of land and X₂ units of labour. In the short-run, 3 stages of production can be clearly shown (Figure 2), this when one factor of production is variable and from above it is labour. This is in the short run; in the long run all factors of production are variable. Three scenarios can be identified here, Constant returns; when all factors change in the same proportion, increasing returns; when the change in inputs results to a more than proportionate increase in output; decreasing returns to scale, when the change in output is less than that in inputs. Production in Meme Division can be said to be in stage I, where both marginal product (MP) and average product (AP) are rising. Production at this stage is mostly rudimentary without any technological advancement; labour is mainly human with no machines and very little capital.

![Figure 1: An Isoquant Map showing the various combinations of production inputs (capital and labour) that can be used to produce a particular quantity of cocoa](image-url)
In this write up more emphasis is laid on the socio-economic variables (labour and capital), thus the concept of production and productivity is much valuable in this piece of work, given the important role these variables play in cocoa production.

3.2 The Augmented Cobb-Douglas Production Function of Cocoa Production

The Cobb-Douglas Production Function theory provides an explanation for the variations in output such as Cocoa output as a result of changes in the production inputs. The production inputs in this case include all the four factors of production, environmental factors as well as political variables and they form the basis combination on which maximum output is realized. The three factors Cobb-Douglas production function is given as:

\[ Q = A \left( L^{b_1} \right) \left( K^{b_2} \right) \left( M^{b_3} \right) \]

where \( L = \) labour, \( K = \) capital, \( M = \) materials and supplies, \( Q = \) product, \( b_1, b_2 \) and \( b_3 \) shows how output changes as a result of a change in any of the input factors \( L, K \) and \( M \).

With decreasing returns to scale, \( (b_1 + b_2 + b_3 < 1) \), a proportional increase in all inputs will lead to a less than proportionate increase in output and vice versa. With the stated conditions, a cost minimizing combination of inputs is used in computing the cost of producing a product. This was done by obtaining a cost function from which we derive the average and marginal cost functions.

Both average and marginal costs were increasing with marginal cost greater than average cost.

In the situation of increasing returns to scale \( (b_1 + b_2 + b_3 > 1) \), a proportional increase in all inputs results to an increase in output by more than the proportional constant. This gives the production function the following form:

\[ Q = A \left( L^{b_1} \right) \left( K^{b_2} \right) \left( M^{b_3} \right); \text{ where } b_1 + b_2 + b_3 > 1 \]
Using the same factor prices, Douglas computed the cost of producing the product using the cost minimizing combination of inputs, obtaining the cost function, and the average cost and marginal cost functions. He splices together the two cases above; to get something like a U-shaped average and marginal costs that is used in an oligopoly model (Muth, 1961). In the case of constant return to scale \((b_1 + b_2 + b_3 = 1)\), a proportional increase in all inputs results to the same proportional increase in output.

The analyses assumed that environmental factors and the level of technology remained unchanged. This controversially is not the case since the production of cocoa also depends on the overriding effects of the prevailing environmental and natural factors, as well as the level of technology.

The theory also assumes that output is solely a function of input. Recently, these factors mentioned above have greatly influenced the output of most agricultural crops especially cocoa, the crop under study. The effect of these factors on the environment as well as output has prompted entrepreneurs to reshuffle the combination of these input factors to maximize output. As a result of this, planning and spending on research in production now involves not only the human factors but also natural, environmental, entrepreneurial, as well as technological factors. Despite all these, the effect of labour and capital on cocoa production cannot be underestimated, thus this theory is of utmost importance in this work.

### 4.1 METHODOLOGY OF THE STUDY

Meme Division is one of the six divisions of the region which has a total surface area of 3,105km squared and a total population of 326,734 (BUCREP, 2010). The division lies between latitude 4° and 6° East of the Greenwich Meridian, and between longitude 9° and 10° north of the Equator. Meme Division is composed of three sub-divisions; Mbonge, Kumba Central and Konye subdivisions. The division is bounded to the north by Kupe Muanenguba, to the east by Littoral, to the south by Fako and to the west by Ndian Division. Except for Kumba, most of the population of Meme Division is engaged in agriculture both in the subsistence and plantation levels. Cocoa cultivation also absorbs a large size of the unskilled population.

This study essentially considers cocoa production within the three subdivisions of Meme Division that is, Mbonge, Konye and Kumba. In addition, the socio-economic determinants of cocoa production include labour, capital, price and other dummy variables such as government intervention and gender considerations. These variables where data could be readily obtained were considered as they were also judged to be the key determinants of cocoa production. The study covers a period of 33 years (1980-2012) and the design widely employed includes the ex-post facto research design (since the study will obtain information on the past trends of cocoa production), descriptive (a presentation of the picture on ground), quantitative and analytical (involving comparisons and explanation).

The study employed the stratified random sampling technique in which the three Sub-Divisions that make up Meme Division, that is, Kumba, Mbonge and Konye were sampled using questionnaires. A sample of 200 households out of 153,568 estimated farming households was chosen in the three subdivisions that make up Meme Division (Table 1). Random sampling is used because it is observed that the cocoa farming areas show a very high degree of homogeneity in terms of their farming activities, problems encountered and their livelihood needs.

<table>
<thead>
<tr>
<th>Sub-Division</th>
<th>Estimated Farming population</th>
<th>No. of Questionnaires</th>
<th>Total No. of Respondents</th>
<th>% Score of Questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mbonge</td>
<td>86769</td>
<td>75</td>
<td>50</td>
<td>67%</td>
</tr>
<tr>
<td>Konye</td>
<td>33533</td>
<td>75</td>
<td>65</td>
<td>87%</td>
</tr>
<tr>
<td>Kumba</td>
<td>33266</td>
<td>50</td>
<td>40</td>
<td>80%</td>
</tr>
<tr>
<td>Total</td>
<td>153568</td>
<td>200</td>
<td>155</td>
<td>78%</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2012

The study focused on cocoa farmers who own farms that are already being harvested. In addition, secondary information on cocoa output for 31 years (1980-2010) was obtained. There was bias in the distribution of the questionnaires with Mbonge and Konye which were judged to be more engaged in the activity, receiving 150 questionnaires (75 each) while Kumba received 50. The access population were cocoa farming groups in which a total of 3 farming groups comprising 25 randomly chosen members were considered for Mbonge and Konye while two groups were considered for Kumba.

Labour was obtained from the household samples of the proportions involved in cocoa farming. Land allocated for cocoa production was used as a proxy for capital and it was measured in hectares per price of hectare. A measure of price was gotten from CAMACO Cocoa Company, Kumba and the prices were measured per kilogram. This is the average price recorded per year. A measure of capital and labour was gotten from the
Meme Divisional Delegation of Agriculture and from field investigation respectively. Land was assumed to be the main source of capital since time series data on the other assets used in the process of production were difficult and in most cases impossible to quantify in monetary terms. Land as a proxy for capital was measured in hectares and multiplied by the price per hectare of land. Labour was measured by the number of people employed by each household, and also, by the number of people employed in cocoa production as depicted by the Divisional delegation of Agriculture for Meme and the Regional Delegation of Statistics, Buea.

The theoretical relationship between inputs and outputs in the process of production is clearly presented in the concept of production. The augmented Cobb Douglas production function deals with a situation in which socio-economic variables of production are considered. According to this theory, it will be difficult, if not impossible for someone to talk about output in the process of production without labour and capital. This justifies the use of these two variables (capital and labour) in our model below. In recent years entrepreneurs have included other variables such as price in the Cobb Douglas production function model giving rise to the augmented Cobb Douglas production function which is our model of use in this write up. The model is presented thus:

\[ Q = f(Z) \]

Where \( Q \) = output
\( Z \) = vector of socio-economic variables (labour, capital, price, Political influence and Gender).

From above the socio-economic variables such as political influence and Gender are dummy variables. Data here are analyzed to show the effect of socio-economic factors on cocoa output. The model used in this analysis is presented thus:

\[ CCOUT = f(LAB, KAP, CCPP, PI, G) \]

\[ CCOUT_t = a_0 + a_1LAB_t + a_2KAP_t + a_3CCPP_t + PI_t + G_t + e_t \]

\[ Apriori = a_1 > 0, a_2 > 0, a_3 > 0, a_4 > 0, a_5 < 0 \]

Taking logs on both sides, the equation can be presented as shown below.

\[ \log CCOUT_t = \log a_0 + a_1 \log LAB_t + a_2 \log KAP_t + a_3 \log CCPP_t + a_4 \log PI_t + a_5 \log G_t + e_t \]

The equation is logged to linearise the equation because linear equations permit direct estimation and interpretation of coefficients of the model as elasticities.

\( LAB = \) labour, \( KAP = \) capital, \( CCPP = \) cocoa price per kg \( CCOUT = \) cocoa output, \( PI = \) Political influence (government support), \( G = \) Gender, \( e = \) stochastic error term, \( a_0 = \) constant term, \( t = \) time

\( a_1, a_2, a_3, a_4, a_5 \) are coefficients of the parameters. Political influence (PI) and Gender (G) are dummy variables.

Output was regressed against socio-economic variables (labour, capital, price, Political influence and Gender) based on the Generalised Method of Moment (GMM) technique. The GMM is a method of deriving the estimates of parameters of any relationships supported with facts and theories. This technique does not require distributional assumptions, like normality; it can allow for Heteroscedasticity of unknown form; it can estimate parameters even if the model cannot be solved analytically from the first order conditions and, unlike other estimation techniques, the validity of the instruments is beyond doubt if the model leads to a conditional moment restriction.

5.1 PRESENTATION OF RESULTS

Observations were made based on returns from the questionnaires and secondary data from concerned institutions on five significant socio-economic variables of cocoa production. They were observed to have a strong relationship with the output of cocoa. In this situation a majority of the farmers agreed that labour and capital increases lead to an increase in cocoa output. The values for regression analysis considered include cocoa output (dependent variable), capital, labour, price, Political influence and Gender (independent variables). These values were obtained for the 33 years period under study. The test statistics were obtained at first difference with critical values at 5% and 10% levels of significance. The regression results of output presented below were differenced and regressed using Generalized Method of Moments against capital, labour, political influence, gender and the prices of cocoa as instruments.

The coefficient for labour is 8.2 (Annex II). It is positive, showing a proportional relation between labour input and cocoa output. As a result, labour in this model has a positive effect on the output of cocoa in our study area. The household size was used to derive labour force. The coefficient shows that a unit increase in spending for labour led to an increase in total cocoa output by 8.2 tons in Meme Division. The probability value of labour is 0.067. This shows that the result is significant at 10% level of significance. In addition, this means that labour is significant in this study and can be used in making predictions on the output of cocoa production. The implication of such a result is that increase in labour could result to the expansion of cocoa farms which leads to an increase in total output. However, the output per hectare may not witness an increase since other variables need to be
considered to fully determine an increase in cocoa output. This finding is further confirmed by Idowu et al. (2007) who concluded that labour intensity and chemical use were statistically significant in determining cocoa output. They confirmed that most of the rise in output came from increase in land area not land productivity.

The results presented (Annex II) shows that capital (land and cocoa ovens) has a coefficient of 7.56; this shows a positive relation between capital investment and cocoa output. This means that capital in this model positively affects the output of cocoa. The coefficient of capital (7.56) shows that a unit increase in spending for capital will lead to a 7.56 tons increase in the annual output of cocoa. The foregoing findings are in line with earlier theory posited by Samuelson and Norhaus (2005) who established that capital investment in a business among other resources such as labour cost influence productivity of resources.

The price per ton of cocoa has a coefficient of 2.81. It is positive showing a proportional relation between price and cocoa output. This means that price in this model has a positive influence on the output of cocoa. Increase in prices causes farmers to run down stocks to benefit from the high market prices. An increase in price acts as a signal for the cocoa farmers to make more profits by increasing production. Price has both the short term and long term effect on cocoa output.

In the short run an increase in price will motivate the farmers to intensify the use of input resources and quality controls to boost output, while the long run effect is that more land will be brought under cultivation as more people move into the activity to reap the benefit of the price increase.

The coefficient for price per ton is 2.81 (Annex II) showing that a unit increase in the price of cocoa has led to a 2.81 tons increase in total cocoa output. The probability value of price is 0.086. This implies that price is statistically significant at 10% level; price is a significant determinant of cocoa output in our study area. This in turn means that the coefficient of price is more than 90% reliable as such should be considered in policy predictions. This result is backed by the theory of supply which identifies price as a major factor which has a very crucial effect on the supply of the agricultural products. The theory sees price as a strong and linear determinant of agricultural output. Conversely, variations in Cocoa prices have a strong positive and automatic reaction. This observation is in line with the earlier conclusions of Adams et al. (1999).

The coefficient of political influence (dummy variable) is 0.75 (Annex II), showing that political influence has had a positive effect on cocoa output. Thus, a unit increase in farm inputs from the government has led to a 0.75 ton increase in cocoa output. The probability value of political influence is 0.16. This is statistically insignificant at 10%. Political influence in form of government support through the supply of farm inputs to farmers can be seen by farmers as a subsidy in the cost of production whose effect can be felt in the capital variable, thus making the effect of political influence on cocoa output insignificant. The coefficient of gender (dummy variable) is negative, implying that the production of cocoa is gender bias. However, the effects of both dummy variables on cocoa output are insignificant.

The value of the lagged output (excess stocks) is -4.2. This implies that the output of the previous year (excess stocks) is inversely proportional to that of the current year. The probability value of the lagged output is 0.026, meaning that it is significant at 5% level. This is probably because an excess stock has certainly led to a drop in prices of agric outputs among which is cocoa production since in Cameroon there are no storage facilities. This will consequently lead to a fall in output in the current year. Furthermore when much stock is left the farmers who are mostly peasants are left with little or no income for the purchase of farm inputs for the preceding season. The R^2 of 0.61 (Annex II) means that more than 61% of variations in the output of cocoa is as a result of variations in the independent variables in this equation taking into consideration the number of years and the number of variables included in the analyses.

### 6.1 CONCLUSION AND RECOMMENDATIONS

Cocoa farming still remains a profitable and most important activity in Meme Division. Since this activity is a profitable one, the government and institutions (including NGOs) aimed at providing jobs and profitable livelihood activities for Cameroonians especially in the cocoa growing regions should promote the production of cocoa. This will equally boost the foreign exchange earning capacity of the agricultural sub-sector of the economy thus helping in accelerating growth of the agricultural sector of Meme Division in particular and the economy as a whole. Peasant households depend on agriculture and related activities for whatever livelihood its members are able to eke out their environment.

Since it has been proven that Cocoa production in Meme Division is affected by a number of socio-economic variables such as labour, capital, price, political influence and gender, it implies that a unit increase or decrease in any of these variables will lead to a significant increase or decrease in output. The lagged output variable has a negative significant effect on output, thus a unit increase in this variable will lead to a significant decrease in cocoa output. The effects of the dummy variables (political influence and gender) on cocoa output are insignificant. This by implication means a unit increase or decrease in the values of any of these variables does not significantly affect cocoa output.

Based on the above conclusion, we recommend that; there is need to improve upon the storage facilities especially those that will enable Cocoa farmers to overcome weight and content lost. By so doing, price
fluctuations which have an effect on cocoa output would be avoided. Moreover, in line with the absence of financial institutions (that will provide loans to farmers for investments), the amalgamation of various “Njangi groups” in the communities to form a micro-financial unit otherwise known as village banks will make loans available to farmers, as their cocoa farms can serve as collateral security. In addition, the opportunities for obtaining capital for the expansion of cocoa farms should be made possible. The government should also create farm to market roads to reduce the cost of transportation and increase cocoa prices to match the increase in farm inputs.

There should be the adoption of an Economic Pricing Policy that will continuously stabilize cocoa prices and hence farmers’ income. The applicability of this approach will greatly help to stabilize cocoa prices without a reduction of cocoa farmers’ income. For this to be effectively implemented there is the need for the creation of a farmers’ bank. This will serve as an institution that will be able to make funds available for farmers in time of need. It is also necessary to embark on ways of stabilizing prices of cocoa to reduce its effect on cocoa production.

Furthermore, political influence through government support to cocoa farmers by supplying farm inputs to subsidize their cost of production should further be intensified since it has a positive relationship with an increase in farmers output. Besides that, labour shortage which is the outcome of rural depopulation (a problem which arises due to rural service in-viability within the area) affects cocoa production in Meme Division. It is recommended that agro-industrialization should be instituted as its multiplier effect will bring about rural repopulation. This will ensure adequate labour supply.

Community participation on road maintenance is recommended. This should be done through the collective amalgamation of physical labour, finances, material and ideologically contributions and it should be done every year before the start of rains. In addition, there should be inter-village collaboration in the maintenance of roads in cases where evacuation roads link one village to the other. The Chinese experience is a good expel to emirate. Furthermore, inter council collaboration in the maintenance of roads should be done through the budgeting for road maintenance alongside other priority projects in a collective provision of financial, material resources (machinery) and labour assistance to regularly grade and refill bad spots with stone during the dry seasons.

BIBLIOGRAPHY


Annex II: Generalized Method of Moment Results

Dependent Variable: DLOG(COUTPUT)
Method: Generalized Method of Moments
Date: 06/09/13  Time: 11:53
Sample (adjusted): 1984 2011
Included observations: 28 after adjustments
Kernel: Bartlett, Bandwidth: Fixed (3), No prewhitening
Simultaneous weighting matrix & coefficient iteration
Convergence achieved after: 20 weight matrices, 21 total coef iterations
Instrument list: DLOG(COUTPUT(-)) DLOG(LAB(-)) DLOG(CAP(-)) DLOG(PRICE(-)) POINFLU(-) DLOG(COUTPUT(-2))

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLOG(LAB)</td>
<td>8.217704*</td>
<td>4.280459</td>
<td>1.919818</td>
<td>0.0679</td>
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<tr>
<td>DLOG(CAP)</td>
<td>7.565940**</td>
<td>3.047680</td>
<td>2.482524</td>
<td>0.0212</td>
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<tr>
<td>DLOG(PRICE)</td>
<td>2.809573*</td>
<td>1.564346</td>
<td>1.796005</td>
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<tr>
<td>POINFLU</td>
<td>0.752707</td>
<td>0.517502</td>
<td>1.454502</td>
<td>0.1599</td>
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<tr>
<td>DLOG(COUTPUT(-1))</td>
<td>-4.153750**</td>
<td>1.736647</td>
<td>-2.391822</td>
<td>0.0257</td>
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<tr>
<td>C</td>
<td>-0.855808**</td>
<td>0.413993</td>
<td>-2.067203</td>
<td>0.0507</td>
</tr>
</tbody>
</table>

R-squared 0.709490  Mean dependent var 0.048552
Adjusted R-squared 0.606752  S.D. dependent var 0.363863
S.E. of regression 1.714668  Sum squared resid 64.68193
Durbin-Watson stat 1.865985  J-statistic 0.092413

Series: Residuals
Sample 1984 2011
Observations 28
Mean 0.362161
Median 0.112646
Maximum 5.744674
Minimum -2.976769
Std. Dev. 1.503200
Skewness 1.487594
Kurtosis 7.807225
Jarque-Bera 37.28801
Probability 0.000000