



Munich Personal RePEc Archive

**Export performance and macro-linkages:  
A look at the competitiveness and  
determinants of cocoa exports,  
production and prices for Ghana**

Boansi, David

Corvinus University of Budapest, Hungary

12 July 2013

Online at <https://mpra.ub.uni-muenchen.de/48345/>  
MPRA Paper No. 48345, posted 16 Jul 2013 09:20 UTC

EXPORT PERFORMANCE AND MACRO-LINKAGES: A LOOK AT THE COMPETITIVENESS  
AND DETERMINANTS OF COCOA EXPORTS, PRODUCTION AND PRICES FOR GHANA



Boansi David

[boansidavid@rocketmail.com](mailto:boansidavid@rocketmail.com)

Department of Agricultural Economics and Rural Development,  
Corvinus University of Budapest, Hungary

1

---

<sup>1</sup> Corresponding Author: Boansi David ([boansidavid@rocketmail.com](mailto:boansidavid@rocketmail.com))  
Department of Agricultural Economics and Rural Development, Corvinus University of Budapest, Hungary  
Mobile: +36 705506460

## **ABSTRACT**

This study presents an analysis of Ghana's performance in export of cocoa using the revealed comparative advantage and revealed symmetric comparative advantage measures of competitiveness for the periods 1964-69 (immediate years following the collapse of world price of cocoa), 1983-92 (Reform and Adjustment Period) and 2000-2010 (recent decade). In addition, the magnitude and effects of key economic determinants of cocoa exports, production and farm gate price for Ghana are estimated. RCA and RSCA figures computed in the current study show that Ghana has comparative advantage in export of both raw and processed cocoa, with its advantage being higher in exports of the raw product. Ghana's performance in export of cocoa has improved significantly since 1983. This observation is attributed to initiation of the Economic Recovery Program in 1983 (which created the right conditions for agricultural investment and helped address inefficiencies in marketing and fiscal disciplines), the Agricultural Services Rehabilitation Project (ASRP) between 1987 and 1990 (which helped in strengthening the capacity of agricultural research, extension and policy planning), opening up of the domestic market to competition through partial liberalization of internal marketing from the early 1990s, establishment of a price stabilization system and continuous government support to the sector through increased public spending on infrastructure and productivity-enhancing innovations.

Improvement in the export performance, anticipated increases in global demand and world price of cocoa, wide yield gap of Ghana, positive attitude of farmers towards supply of cocoa due to increased government support, and intensification of competition on the domestic market indicate potential for further improvement in Ghana's production and export of cocoa. However, upon estimates obtained in the current study, to realize any further improvement in the performance of the cocoa subsector, measures should be put in place to bridge the wide yield gap, ensure continuous government support to various stakeholders in the supply chain, and tighten the loose border between Ghana and Côte d'Ivoire to help minimize smuggling in times of increasing farm gate price of cocoa in Côte d'Ivoire

**Keywords:** Competitiveness, cocoa exports, value addition, determinants, government support, price stabilization, world price of cocoa, producer price of cocoa, cocoa production

## **1.0 INTRODUCTION**

Holding firmly unto, developing and sustaining subsectors on which a country's agriculture strongly depends have been the actions reflected by various regimes in most developing countries worldwide. Such actions are reflected in pursuit of enhancing food security, reducing poverty and earning foreign exchange through exports (as against draining of it through imports). A very important subsector (and commodity) that holds much respect in this regard in Ghana is cocoa. Dramatic changes undergone by the cocoa sub-sector prior to initiation of the Economic Recovery Program (ERP) and thereafter, have been the primary reasons underlying the declines and improvements observed in Ghana's agriculture sector for the past five decades. By virtue of its immense contribution to the agriculture sector and the economy as a whole, cocoa has been described as the backbone of Ghana's economy (Osei, 2007), with Lundstedt and Pärssinen (2009) topping it up with the title "Cocoa is Ghana, Ghana is cocoa".

Cocoa is a major contributor to Ghana's gross domestic product (GDP), accounts for approximately 23% of foreign exchange earnings (ICCO, 2012) and is a major source of income to over 800,000 farmers and many others engaged in trade, transportation and processing of cocoa (World Bank, 2011). Beyond its narrow role in Ghana, cocoa provides livelihoods for millions of smallholder farmers in over 50 countries across Africa, Latin America, the Caribbean and Asia (Kaplinsky, 2004; World Bank, 2011). Upon the unique position it holds in the economy of Ghana, several policy measures have been devised and implemented towards developing and ensuring continuous contribution of the cocoa subsector to national development. Such measures are devised, amidst pressing constraints (like production risk, market risk, enabling environment risk and vulnerability risks) to help restructure the industry, improve productivity and reduce inefficiencies in marketing. Addressing of these dimensions is purported on improving the country's export potential, improving the competitiveness of the sub-sector and improving standards of living for the various stakeholders within the supply chain.

In pursuit of improving the country's potential and competitiveness in export of cocoa, farmers are presently incentivized through increased share in export price (net f.o.b. price) among other bonuses, and measures are in place to help achieve the country's medium term objective of processing at least 40% of cocoa output locally (thus increasing value addition). Besides increasing value addition in its cocoa exports, the Government of Ghana (GoG) hopes to maintain its reputable position on the world cocoa beans market with the remaining 60% through increased volumes of production and export. To achieve these goals amidst anticipated increases in supply-side competition, there arises a need to analyze past and current competitiveness of the cocoa sub-sector and to identify and assess the magnitude and effects of drivers for the major strongholds of the subsector namely cocoa beans export, cocoa beans production and domestic producer price for cocoa. Identification of the magnitude and effects of such drivers would help optimize benefits from current boosters and mitigate adverse influences from inhibitors. Analysis of the competitiveness of the sub-sector would help provide information on the performance of Ghana in export of cocoa beans and processed cocoa products. Findings from the current study could be useful to policy makers, farmers, prospective investors and for agribusiness planning.

### **1.1 EVOLUTION OF GHANA'S ECONOMY, COCOA POLICY AND ASSISTANCE**

Cocoa has historically been regarded a key economic sector and a major source of export and fiscal earnings (McKay and Arytee, 2005). Prior to independence, emphasis was placed on the production of cocoa among other industrial crops (like coffee and oil palm) for export at the expense of staple food crops for domestic consumption. By virtue of the immense contribution of the cocoa subsector during that period to the Ghanaian economy through foreign exchange earnings, Cocoa Marketing Board (CMB), an important institution of the colonial government was established and made a monopoly buyer of cocoa at fixed price paid to producers. Majority of the profits from trading in cocoa was

absorbed by reserves of the board until 1951, where taxes were raised and cocoa profits diverted to general public investment (Brooks *et al*, 2007).

Having inherited fortunes from the pre-independence era, the government sought to industrialize the economy post-independence period between 1957 and 1983. This vision was however, undermined by political instability, ideological splits and policy reversals. The government during this period, specifically in early post-independence period, invested heavily in the cocoa sub-sector even when revenues were lower (due to declines observed in cocoa prices after 1957). It became much involved in central planning from 1961, rather than limiting spending on public goods. Along with expansion in output came increasing cost of marketing and further declines in government revenues. In addition to these, rising imports for public investment led to deterioration of the currency and shrinkage of foreign exchange reserves. In response to these, foreign exchange controls and import licensing were introduced and from 1961, public spending by the government was shifted away from the provision of public goods towards the development of large state-owned-enterprises (SOEs) designed to substitute domestic production for imports (Brooks *et al*, 2007).

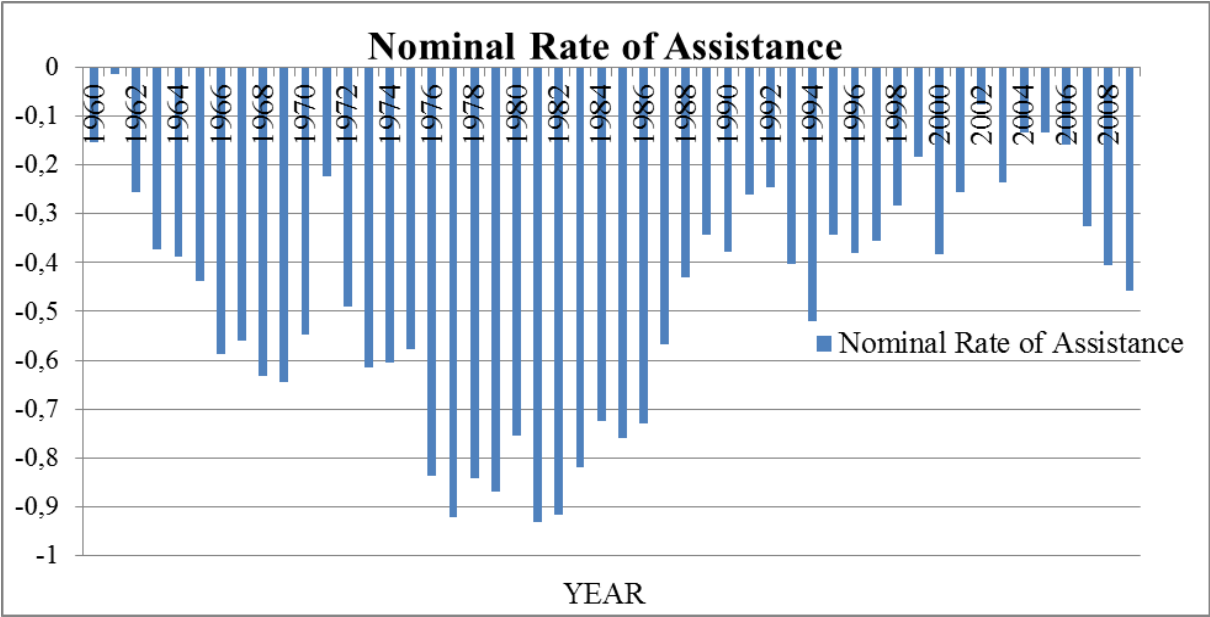
The collapse of world cocoa prices in the late 1964 prompted the government to print money into the system to help meet expenses, fuelling inflation in the process and lowering real wages. This gradually led to dissolution of the Ghanaian economy. The falling of cocoa prices and overvaluation of the cedi led to tightening of the struggle over cocoa revenue between farmers and the government. The situation was worsened by the rising costs of the CMB and the smuggling of cocoa to neighboring countries, most notably Côte d'Ivoire where producer prices were much higher at the black market exchange rate (Stryker, 1990). These observations led to a steady deterioration of the economy and widespread rent-seeking, which increasingly undermined Ghanaian institutions and the society. Ghana by the early 1980s lost its stand as one of the highest per capita income countries, government revenues fell from 15% of GDP in the early 1970s to 6% in 1982, public sector wages fell by an average of 10% in real terms per year between 1975 and 1983, export earnings fell to a low of 7% of GDP, and external financing dried up (Brooks *et al*, 2007).

In addressing the situation the country had found itself in, the government under the auspices of the International Monetary Fund (IMF) and the World Bank in April 1983, initiated the Economic Recovery Program (ERP) as a measure to stabilize the economy and reform the market. The reform was focused on realigning relative prices, removing direct controls and interventions, and restoring fiscal discipline among other issues. Initiation of the Economic Recovery Program (ERP) according to Brooks *et al* (2007) led to increased inflows of external financing and annual increase of 4% in real GDP between 1983 and 1992. In addition, the ERP contributed immensely towards improving the exchange rate policy. The formulation of appropriate fiscal policies under the ERP helped balance national budget, lower government's financing needs and brought inflation under control ( from 123% in 1983 to 10% in 1992) (Brooks *et al*, 2007). The stability achieved in fiscal and monetary disciplines were however tested in the run-up elections in 1992. In the post reform period (from 1992), emphasis has been placed on reforming the cocoa sector, divesting state-owned-enterprises, and establishing effective tax collection and expenditure systems for the government (Leith and Söderling, 2000). Export growth during this period has been stimulated through depreciation in real exchange rate resulting from the use of market-determined exchange rate and a weakening fiscal position.

The sources of taxation for cocoa have historically been direct export tax, farm taxation and exchange rate overvaluation. Farm taxation has however fallen markedly in recent years from over 80% in the late 1970s to approximately 13% in 2005, increasing thereafter to about 46% in 2009 (Anderson and Nelgen, 2012). The relative decrease in farm taxation over that for the 1970s implies an increase in the share of export price received by farmers. Raising this share has been the goal of the Government of Ghana (GoG) and the Cocoa Board. The share of farmers in export price (net f.o.b. price) was approximately 70% in 2007. The increase of farmers' share in the export price is one of reasons underlying current surges in cocoa output in the country. In addition to this price incentive, bonus payments to farmers (in cash and in kind) have also increased. The major source of government

revenue from the cocoa sub-sector currently is export tax and to a lesser extent on taxation of farmers. The tax rate on export is determined annually, and the rate for the year 2007/2008 was 11.1% of the f.o.b. price (Sharma and Morrison, 2011), up from 5% in 2005 (BoG, 2007). Revenue derived from the tax is used to finance COCOBOD’s activities. Import tariff of 20% is currently applied on imported cocoa products. This is to help stimulate value addition in the country’s cocoa exports and domestic sales through processing of at least 40% of cocoa output locally (GoG’s medium-term objective)

Figure 1.0 Nominal Rate of Assistance



Source: Author’s construct with data from Anderson and Nelgen (2012)

**1.2 THE ROLE OF COCOA IN GHANA’S ECONOMY**

Cocoa has long played a vital role in Ghana’s economic development and remains an important source of employment to most folks in the rural community. It is a major source of income for over 800,000 farmers and many others engaged in trade, transportation and processing of cocoa (World Bank, 2011). In addition, cocoa remains the country’s most important agricultural export crop, accounting for approximately 23% of total export earnings of the country (ICCO 2012) and 11% of agricultural Gross Domestic Product (GDP) (a decrease from 34% in 1964 based on FAO data). The importance of the cocoa subsector to poverty reduction in the country cannot be overstated. The national poverty rate of Ghana according to Coulombe and Wodon (2007) fell from 51.7% in 1991/1992 and 39.5% in 1998/1999 to 28.5% in 2005/2006. Poverty among cocoa farmers is reported to have declined significantly, with cocoa growth being more pro-poor than growth in other sectors. While the poverty rate among cocoa farmers stood at 60.1% in 1991/1992, it declined significantly to 23.9% in 2005/2006, representing 112,000 cocoa-farming households in absolute terms. In addition to these, cocoa contributed to 28% of agricultural growth in 2006, up from 19% in 2001 World Bank (2007a).

Table 1.0 The role of cocoa in past poverty reduction

	1991/92	1998/99	2005/06
<b>Total Population</b>			
Poverty rate	51.7	39.5	28.5
Poverty gap	18.5	13.9	9.6
<b>Cocoa producers</b>			
Poverty rate	60.1	36.7	23.9
Poverty gap	23.3	9.4	6.0

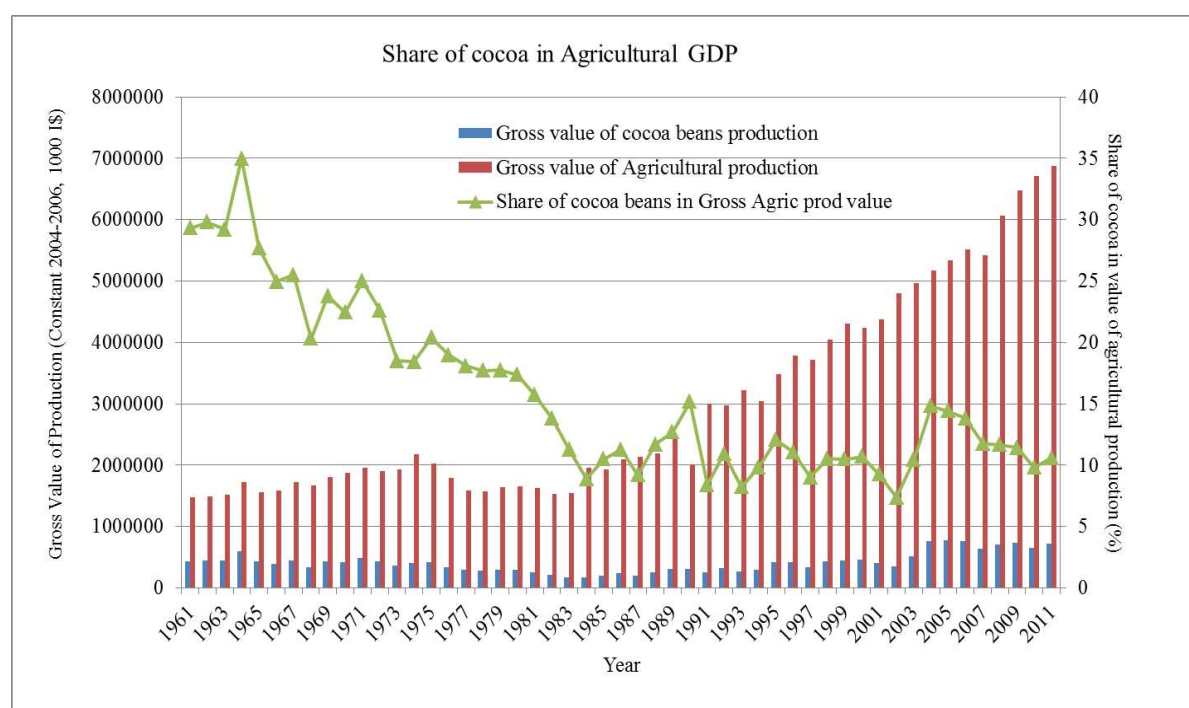
Source: Colombe and Wodon, 2007

Table 2.0 Cocoa derived export earnings as percentage of total exports (by value)

Year	Share in foreign exchange earnings
2002	25.08%
2003	33.98%
2004	55.17%
2005	32.58%
2006	33.72%
2007	25.00%
2008	19.77%
2009	23.06%

Source: ICCO, 2012

Figure 2.0 Contribution of cocoa to agricultural GDP



Source: Author's construct with data from FAOSTAT

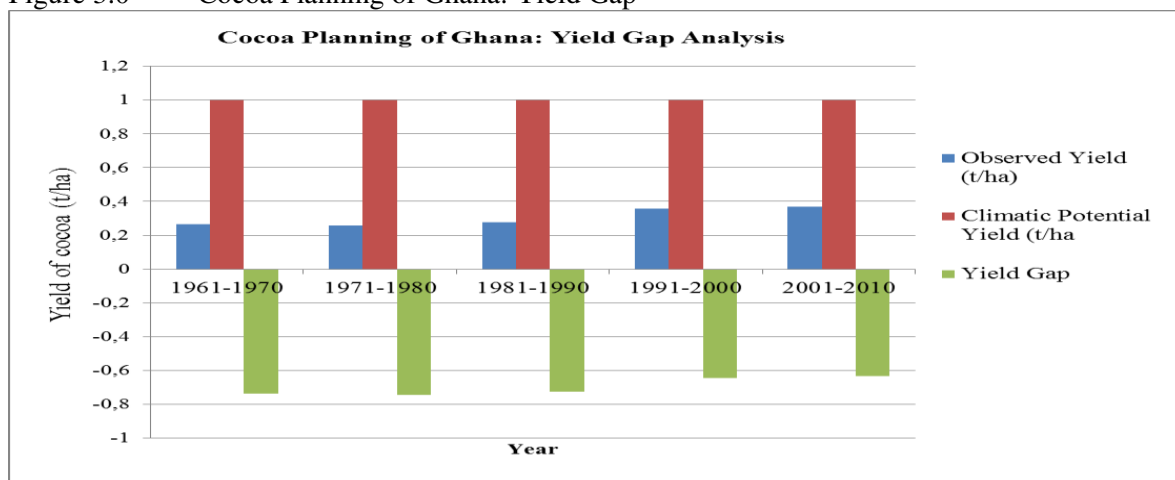
### 1.3 CONSTRAINTS TO DEVELOPMENT OF THE COCOA SUB-SECTOR

In spite of the recent improvements observed in Ghana’s cocoa production and exports after its collapse in the pre-ERP era, several inhibitions have been identified by various researchers. In its supply chain risk assessment (SCRA) report to the COCOBOD, World Bank (2011) identified a number of risks that threaten to derail the subsector’s recovery. These include production risks (disease, pests attack, bush fires, cocoa acreage loss), market risks (cocoa price volatility, exchange rate volatility, interest rate volatility, input price volatility, Counterparty risks), enabling environment risks (cocoa smuggling due to price differential between Ghana and its neighboring cocoa producers notably Côte d’Ivoire, market regulation risks, policy risks, logistics breakdown, misappropriation of funds) and Vulnerability risk. Among these, the World Bank identified diseases (black pod disease and swollen shoot), pests attack (Mirids/capsids), cocoa price volatility and smuggling as the major risks that pose greatest threat to Ghana’s cocoa subsector.

Black pod disease is considered the most pervasive and costly to farmers. Regardless of current control measures put in place, the average estimated value of annual crop losses stemming from black pod disease according to the World Bank (2011) was more than US\$ 300 million during the period 2008-2010. Within the aforementioned period, outbreaks of swollen shoot is reported to have affected more than 100,000 hectares across Ghana’s cocoa production belt, resulting in a first-year cumulative loss of an estimated US\$84.9 million. Pests’ attack, notably capsids attack, identified second only to black pod resulted in crop losses estimated at approximately US\$172 million. Putting such attacks under control has been the focus of COCOBOD’s mass spraying program. Amidst the numerous market risks in cocoa marketing, high volatility of cocoa prices on the open market has been identified as a persistent challenge that exposes COCOBOD to a number of related risks, most notably, smuggling. Smuggling of cocoa through the loose borders of the country is reported to have led to an estimated US\$158.9 million financial loss to the Government of Ghana (GoG) and other stakeholders in the supply chain.

Beside these supply chain related risks, the cocoa subsector is hindered by low yields. Yields of cocoa in Ghana are well below international averages (37% below that of neighboring Côte d’Ivoire). The low yields of cocoa trees in the country is attributed among others to absence of widespread row planting, aging trees, pest and disease attacks, inadequate fertilizer application and constraints on other inputs. With a climatic potential yield of 1.0 Mt/ha (MoFA, 2011), an average yield of approximately 0.4 Mt/ha is observed in Ghana, leaving a gap of 60%. This gap, coupled with anticipated increases in World price of agricultural export goods over the next decade (IMF 2007; World Bank 2007) suggest potential for productivity-driven growth and increased competitiveness.

Figure 3.0 Cocoa Planning of Ghana: Yield Gap



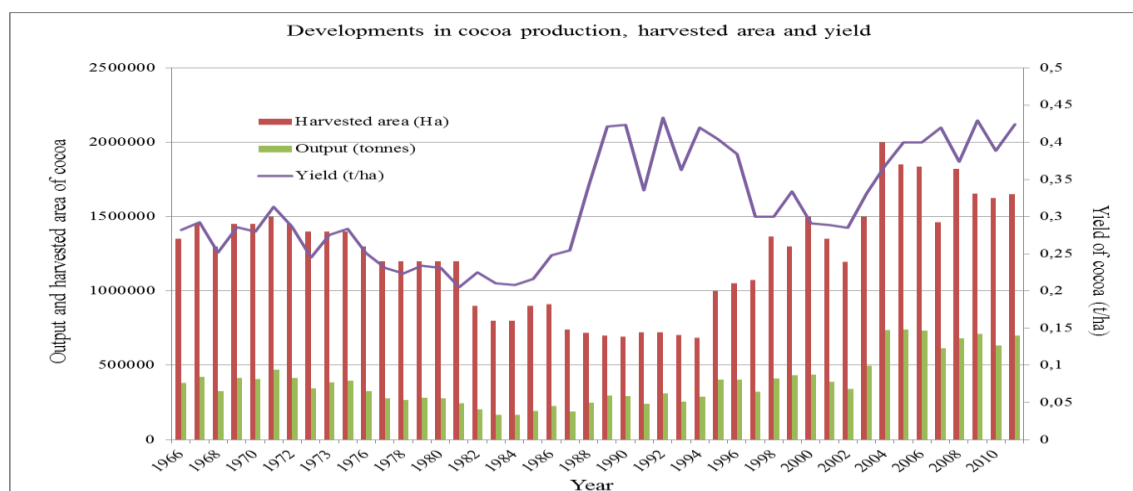
Source: Author’s construct with data from FAOSTAT and MoFA (2011)



## 1.4 DEVELOPMENTS IN DOMESTIC SUPPLY INDICATORS

With improvements having been observed in cocoa output in recent years, the sustainability of cocoa growth in Ghana is in doubt due to the gradual exhaustion of land suitable for cocoa production in the Western, Ashanti, Brong-Ahafo, Eastern, Central and Volta regions of the country. Increases observed in output have been driven by land expansion and increased use of labor as against improvements in yield. A comparison of land currently devoted to cocoa production and land suitable for cocoa production by Breisinger *et al* (2008) shows that future growth in production through area expansion will be limited. The very suitable land for cocoa production is gradually being exhausted and the virgin lands of the three northern regions where cocoa is yet to be grown are not suitable for cocoa production. By figures of the FAO, area harvested of cocoa increased from 693,249 hectares for the year 1990 to 1,650,000 hectares in the year 2011. This represents an increase of 138% in area harvested. Output of cocoa between the two aforementioned years increased by 138.62%, 293,355 tonnes for the year 1990 and 700,000 tonnes in the year 2011. Contrary to these significant improvements in area harvested and output, yield of cocoa has more or less stagnated between the two years. An average yield of 0.421 was observed in the year 1990, with 0.424 been observed in the year 2011. This represents an increase of 0.71%, which is relatively quite low. In spite of the stagnation in yield between the two years however, current yield is an improvement over yields for the early years between 2000 and 2011.

Figure 4.0 Trends in cocoa production, harvested area and yield



Source: Author's construct with data from FAOSTAT

## 1.5 DEVELOPMENTS IN COCOA EXPORTS AND VALUE ADDITION

Cocoa export of Ghana is made up of six products classified into raw, semi-processed and processed products. Ghana exports cocoa beans, cocoa butter, cocoa powder, cocoa paste and cocoa husks (shells), with export of the latter commencing in the year 1986. In spite of efforts by the government to increase value added in its export of cocoa, less than 20% of cocoa exports for the period 1961-2010 were processed. This implies that, at least 80% of all cocoa exports of the country are in the raw form. The highest achievement in value addition (percentage-wise) so far was in the year 1997, where 19.82% of all cocoa exports were processed. Export of cocoa butter increased from 17,432 tonnes for the year 1970 to 23,026 tonnes in 2010. In monetary terms, the value of exports of cocoa butter increased from \$26,707 ("000") for the year 1970 to \$86,459 ("000") in the year 2010. Likewise, the volume of export for cocoa paste increased from 1,128 tonnes to 2,920 tonnes between the two aforementioned years, with value increasing as well from \$1,026 ("000") to \$11,763 ("000").



Cocoa beans      Cocoa butter      Cocoa powder      Cocoa paste      Cocoa husks; shells

Exports of cocoa powder decreased from 16,358 tonnes for the year 1970 to 8,782 tonnes in 2010. However, its value increased from \$2,795 (“000”) for the year 1970 to \$21,219 (“000”) in the year 2010. Exports of cocoa husks from Ghana commenced in the year 1986 with 8,000 tonnes at an estimated value of \$3000 (“000”). By the year 2010, it had reached 13,240 tonnes with a value of \$3,322 (“000”). Export of cocoa beans decreased from 367,362 tonnes for the year 1970 to 281,437 tonnes for the year 2010. It however, increased in monetary terms from \$294,390 (“000”) for the year 1970 to \$847,395 (“000”) in 2010. Variations are however observed in quoting of these figures due to differences in export volumes and values reported by the various research and data management bodies. Based on figures from the agricultural production database of the FAO (FAOSTAT), approximately 13% of all cocoa exports in the year 2010 were processed.

Table 3.0      Value addition in cocoa exports of Ghana

Year	Total cocoa exports (\$1000)	Value of cocoa beans exports (\$1000)	Value of processed cocoa exports (\$1000)	Value Added (%)
1980	739,888	655,921	83,967	11.35
1981	432,531	398,764	33,767	7.81
1982	418,721	385,650	33,071	7.90
1983	265,833	242,000	23,833	8.97
1984	380,320	346,956	33,364	8.77
1985	393,253	358,274	34,979	8.89
1986	496,671	460,851	35,820	7.21
1987	529,939	475,109	54,830	10.35
1988	471,069	428,938	42,131	8.94
1989	415,501	386,380	29,121	7.01
1990	398,781	357,000	41,781	10.48
1991	350,780	315,770	35,010	9.98
1992	299,030	272,310	26,720	8.94
1993	280,630	246,350	34,280	12.22
1994	321,280	295,820	25,460	7.92
1995	356,750	327,000	29,750	8.34
1996	712,266	610,869	101,397	14.24
1997	459,348	368,311	91,037	19.82
1998	518,063	465,959	52,104	10.06
1999	463,864	410,652	53,212	11.47
2000	454,967	404,200	50,767	11.16
2001	425,423	396,000	29,423	6.92
2002	557,242	480,964	76,278	13.69
2003	797,900	676,090	121,810	15.27
2004	984,034	850,000	134,034	13.62
2005	914,605	792,151	122,454	13.39
2006	1,224,309	1,060,000	164,309	13.42

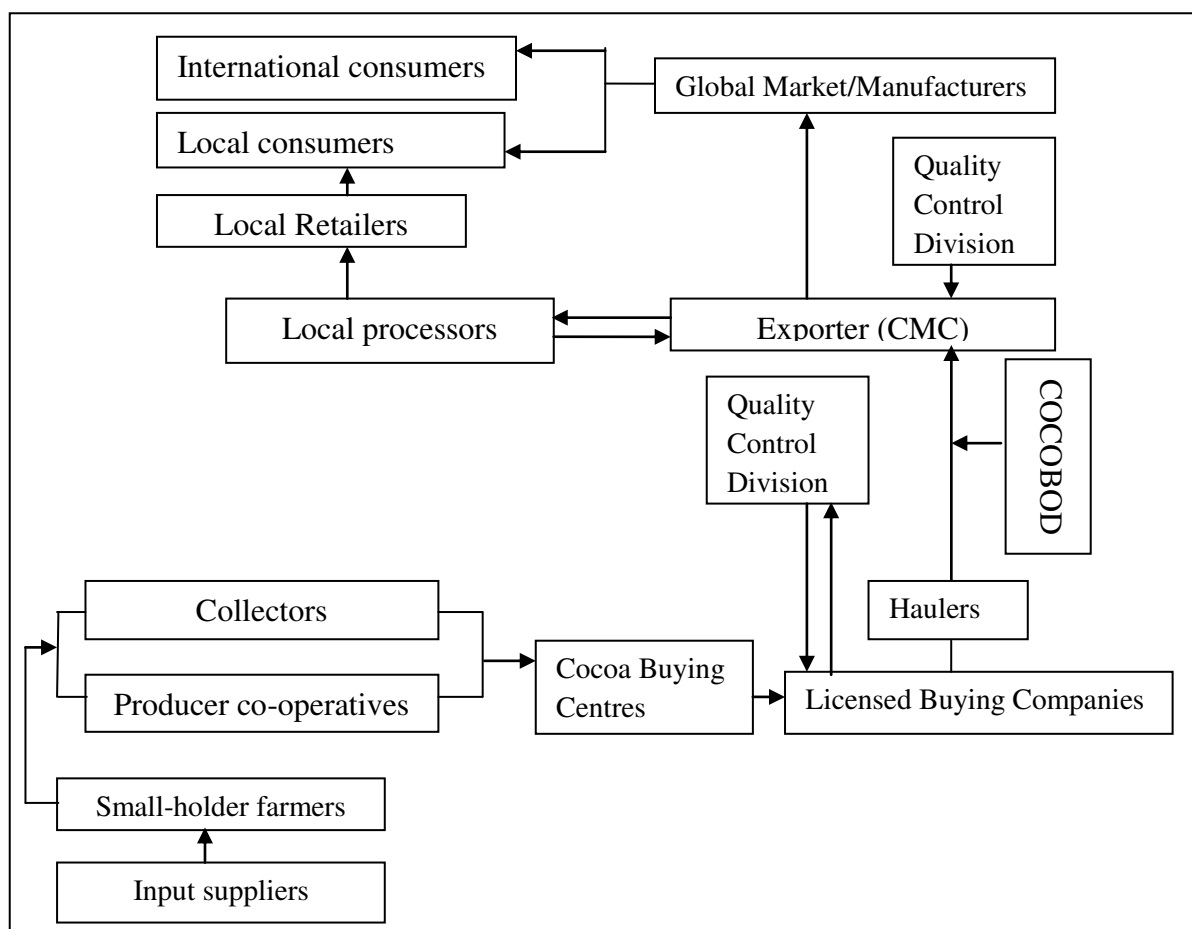
2007	1,048,383	895,703	152,680	14.56
2008	1,045,148	979,098	66,050	6.32
2009	1,156,557	1,090,910	65,647	5.68
2010	970,158	847,395	122,763	12.65

Source: Author's computation with data from FAOSTAT

## 1.6 COCOA SUPPLY CHAIN OF GHANA

The cocoa supply chain of Ghana is characterized by a unique marketing arrangement that combines elements of privatization and with a strong government presence. The entire supply chain is made up of input suppliers, farmers, collectors/cooperatives, Licensed Buying Companies (LBCs) (and their clerks who engage in purchases at cocoa buying centres), Haulers, Cocoa Marketing Company (CMC) (the wholly-owned subsidiary of the COCOBOD with the sole responsibility to market and export Ghana cocoa beans to local and foreign buyers), local processors, local retailers, global marketers/manufacturers and international and local consumers. Activities on the domestic side in the entire chain are supervised by the Ghana Cocoa Board (COCOBOD) each step of the way. In holding firmly unto its high standards in terms of quality of cocoa beans export, the Quality Control Division of Ghana under the auspices of the COCOBOD oversees quality control measures at all stages of the supply chain.

Figure 5.0 Cocoa Supply Chain of Ghana



Source: Author's construct

Supply of input in Ghana is mostly in the hands of the private sector. In line with its strategy to raise productivity and output, the Government of Ghana (GoG), through COCOBOD retains an active role through subsidized input distribution programs targeting cocoa farmers, although farmers bear majority of the cost (World Bank, 2011). The input needs of farmers are met by suppliers through marketing of agrochemical (including fertilizers, pesticides, and insecticides) and farm equipment. The primary role of farmers in the chain is to ensure availability of cocoa beans through a year-round production. Cocoa production in the country is dominated by smallholder farmers who cultivate on smallholdings with an average size of two to three hectares. About a quarter of production is on a share-cropping basis (Hainmueller *et al.*, 2011). After harvesting of cocoa, the beans are dried and fermented to help develop the unique flavor and other attributes that attract premium for Ghana cocoa beans on the world market.

Once all the necessary post-harvest treatments have been performed, the beans are sold through either individual collectors or producer cooperatives to cocoa buying centres established in major cocoa producing areas. Such centers are occupied by purchasing clerks of the Licensed Buying Companies. The beans are purchased from the farmers at minimum price set by a Producer Price Review Committee (PPRC) which comprises COCOBOD officials, a farmer's representative, government representatives and representatives of the Licensed Buying Companies (LBCs). By this, the revenues of the LBCs are not based on prices differentials, but rather on volumes of cocoa marketed. Under this condition, LBC's maximize their profits by minimizing "turnaround" times (thus, the period from purchase of the beans at farm gate to the selling of them at the takeover centers).

After purchasing the cocoa, the LBCs invite the Quality Control Division to grade and seal the cocoa at a fee determined by the PPRC. The graded and sealed cocoa is then evacuated by the LBCs using private cocoa hauliers to designated take over points at Tema, Takoradi and an inland port at Kaase (in Kumasi). The rates offered for evacuation are determined by the PPRC, and so are the LBCs paid by the COCOBOD according to margins set by the PPRC. On reaching the take-over points, the graded and sealed cocoa is taken over by officials of the Cocoa Marketing Company. The Cocoa Marketing Company (Ghana) Limited (CMC) is a wholly-owned subsidiary of the Ghana Cocoa Board and has the sole responsibility for the sale and export of Ghana cocoa beans. Its major responsibilities include procurement of graded and sealed cocoa beans from the LBCs at the take-over points, stocking of cocoa prior to shipment, securing optimal prices and maximizing foreign exchange revenues, managing sales and collecting receipts, and settling of any disputes via direct arbitration (World Bank, 2011).

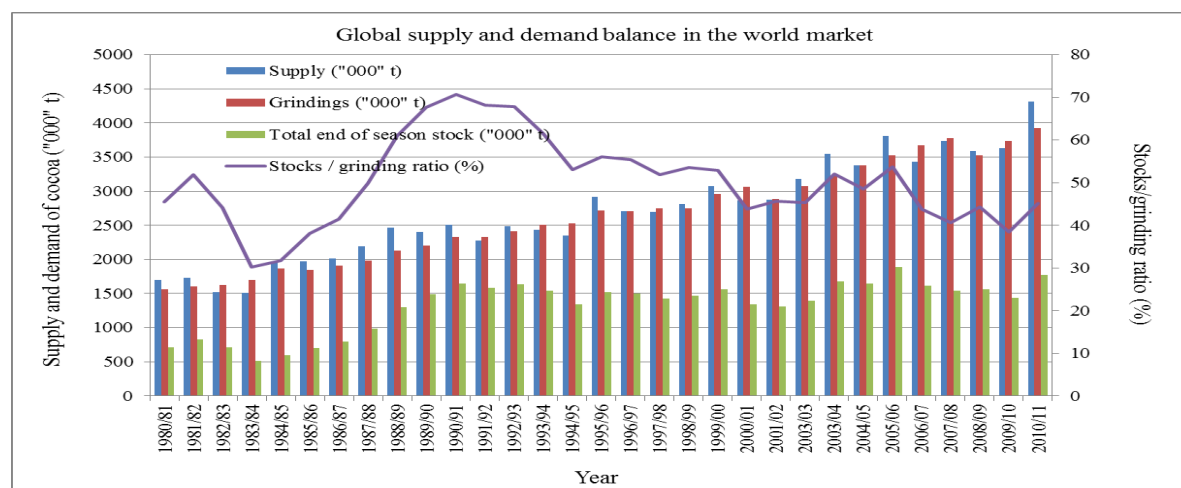
After the take-over, management of cocoa becomes the responsibility of the CMC until it is shipped overseas. Prior to shipment however, the Quality Control Division inspects and fumigates all shipping vessels and cocoa consignments. A greater share of purchased cocoa beans is exported in the raw form with some however been processed. The smaller sized (light crop) beans are sold to processing industries in the country at a discount. Light crop beans are smaller in volume than the main crop variety exported in the raw form, although the quality of the bean is the same. About 90% of all processed cocoa is exported while the remaining 10% is used in the production of confectionery products (Ashitey, 2012). Export of the domestically processed cocoa products to overseas destinations is as well done by the CMC. The processed products that are not exported are sold to domestic consumers, and some of the processed products on the international market find their way back into the country. Such imports attract a tariff of 20%.

### **1.7.1 GLOBAL SUPPLY AND DEMAND BALANCE IN THE WORLD MARKET**

After depicting a continuous increasing trend between the years 1984 and 1990, the global stocks/grindings ratio took a declining trend from the years 1991 to 2010, showing slight temporal increases in the years 2004, 2006, 2009 and 2011. This observation reflects increasing demand for cocoa beans for processing. The gap between supply of the crop and global grindings have been

negative on thirteen different occasions between the years 1981 and 2011, implying deficits in global supply of cocoa beans. These deficit were observed in the years 1983 (-113,000 Mt), 1984(-202,000Mt), 1992(-63,000Mt), 1994(-91,000Mt), 1995(-200,000Mt), 1997 (-20,000Mt), 1998(-78,000Mt), 2001(-220,000Mt), 2002(-29,000Mt), 2005(-38,000Mt), 2007 (-279,000Mt), 2008(-75,000Mt) and 2010(-138,000Mt) (ICCO, 2012). As seen from the noted years, most of the deficits were recorded in the years between 2000 and 2011 and for half of the years in the 1990s. This signals likely increases in future grindings and cautions a need to increase future supply of the crop to help meet anticipated increase in future demand

Figure 6.0 Global supply and demand balance of cocoa



Source: Author’s construct with data from ICCO (2012)

Most of the changes observed in world grindings of cocoa are as a result of changes in grindings for Europe (mostly for the EU), the Americas, and Asia and Oceania, as these three regions account for approximately 82% of global grindings.

Table 4.0 Global grindings of Cocoa

Region	2008/09	2009/10	2010/11	2008/09	2009/10	2010/11
	(thousand tonnes)			(Year-on-year change)		
European Union	1348.4	1400.4	1477.7	-90.9	+51.9	+77.4
Total Europe	1474.7	1523.8	1611.7	-107.6	+49.0	+88.0
Total Africa	621.7	684.5	657.1	+58.1	+62.8	-27.4
Total Americas	779.8	814.7	859.9	-51.5	+34.9	+45.2
Total Asia and Oceania	654.5	707.7	794.6	-143.3	+53.2	+86.8
World Total	3530.8	3730.7	3923.3	-244.3	+199.9	+192.6

Source: ICCO, 2012

### 1.7.2 GLOBAL EXPORTS AND IMPORTS OF COCOA

With global exports of cocoa having increased in recent years from 3133 (“000”) tonnes in the year 2007 to 3768 (“000”) tonnes in 2011, the role of Africa in global exports of cocoa cannot be overstated. Exports from Africa accounted for approximately 77% of world cocoa exports between the years 2007 and 2011, with the Americas accounting for 6.3%, and Asia and Oceania 16.3%. Most of the global exports of cocoa however are recorded in the names of five main countries namely Côte d’Ivoire, Ghana, Indonesia, Nigeria and Cameroon. These five countries accounted for 87% of cocoa

exports between the years 2007 and 2011. Individually, exports from Côte d'Ivoire represent 37.4% of global exports, Ghana 21.7%, Indonesia 14.7%, Nigeria 7.1% and Cameroon 6.1% (ICCO, 2012).

On the import side, global imports of cocoa increased from 3242 ("000") tonnes in the year 2007 to 3589 ("000" tonnes) in the year 2011. Import of cocoa by Europe accounted for 58.2% of global imports between the years 2007 and 2011, America 26.6%, Asia and Oceania 13.5% and Africa 1.6%. Most of the imports however were into the European Union and the United States. Germany accounted for 13.1% of global imports between the years 2007 and 2011, Belgium 6.6%, France 5.8%, Russian Federation 5.5%, the United Kingdom 5.4%, Italy 4.1% and the United States 19.9% (ICCO, 2012)

Table 5.0 Net exports of cocoa by country

Country/Region	2006/07	2007/08	2008/09	2009/10	2010/11	5-year average 2006/07-2010/11	
	(thousand tonnes)						Share
World Total	3133	3078	3143	3344	3768	3293	100.0%
Total Africa	2402	2431	2402	2508	3002	2549	77.4%
Total Americas	195	139	198	244	266	208	6.3%
Total Asia and Oceania	535	508	543	592	501	536	16.3%
<i>Members:</i>							
Côte d'Ivoire	1200.15	1191.38	1165.25	1194.94	1405.06	1231.36	37.4%
Ghana	702.78	673.40	603.28	698.89	902.76	716.22	21.7%
Nigeria	207.08	222.78	254.97	243.10	246.96	234.98	7.1%
Cameroon	162.77	178.79	222.67	204.66	229.48	199.67	6.1%
Ecuador	110.31	115.26	117.72	149.14	155.15	129.51	3.9%
Togo	77.76	110.95	104.95	101.19	141.82	107.33	3.3%
Dominican Republic	43.00	34.11	62.87	55.39	55.14	50.10	1.5%
Sierra Leone	8.91	11.00	9.97	14.34	10.45	10.93	0.3%
Indonesia	520.48	465.86	482.64	529.65	419.50	483.63	14.7%

Source: ICCO (2012)

*NB: Net exports of cocoa beans plus net exports of cocoa products converted to beans equivalent using the following conversion factors: cocoa butter 1.33; cocoa paste/liquor 1.25; cocoa powder and cake 1.18. Totals may differ from sum of constituents due to rounding*

Table 6.0 Net imports of cocoa by country

Country/Region	2006/07	2007/08	2008/09	2009/10	2010/11	5-year average 2006/07-2010/11	
	(thousand tonnes)						Share
World Total	3242	3163	3169	3182	3589	3269	100%
Total Europe	1908	1896	1869	1761	2085	1904	58.2%
Total America	822	781	861	914	967	869	26.6%
Total Asia and Oceania	465	432	385	452	478	443	13.5%
Total Africa	46	53	54	55	59	53	1.6%
<i>Members:</i>							
Germany	433.92	424.92	417.08	401.54	457.73	427.04	13.1%
Belgium	204.43	193.31	197.62	224.13	260.00	215.90	6.6%
France	230.06	184.21	172.83	167.82	193.65	189.72	5.8%
Russia Federation	176.15	197.07	168.65	167.82	185.85	179.11	5.5%
United Kingdom	193.71	190.80	178.85	168.29	145.88	175.51	5.4%
Italy	122.52	141.33	127.12	142.78	143.46	135.44	4.1%
United States	611.87	565.06	662.41	703.99	715.37	651.74	19.9%

Canada	122.82	125.53	120.12	128.01	145.06	128.31	3.9%
Japan	144.58	87.98	103.70	105.03	103.74	109.01	3.3%
Ukraine	68.68	81.62	65.57	71.19	70.96	71.61	2.2%

Source: ICCO (2012)

## 1.8 VALUE ADDITION IN WORLD COCOA EXPORTS

In as much as world cocoa exports have increased in recent years, most of the exports are in the raw form. The world leading exporter of cocoa, namely Côte d'Ivoire processes between 24% and 35% of its cocoa exports, Ghana 6% and 15%, Indonesia 23% and 34%, Nigeria 6% and 14%, and Cameroon 10% and 27%. None of the major exporters processed more than 40% of its cocoa exports between the years 2003 and 2009. In contrast to this however, almost all cocoa exports from minor exporters like Thailand, India, Brazil, Mexico and Guatemala (the last two being North American countries) are in the processed form, with approximately 90% of exports from Costa Rica also being in the processed state.

Table 7.0 Cocoa products as percentage of all cocoa exports (by value)

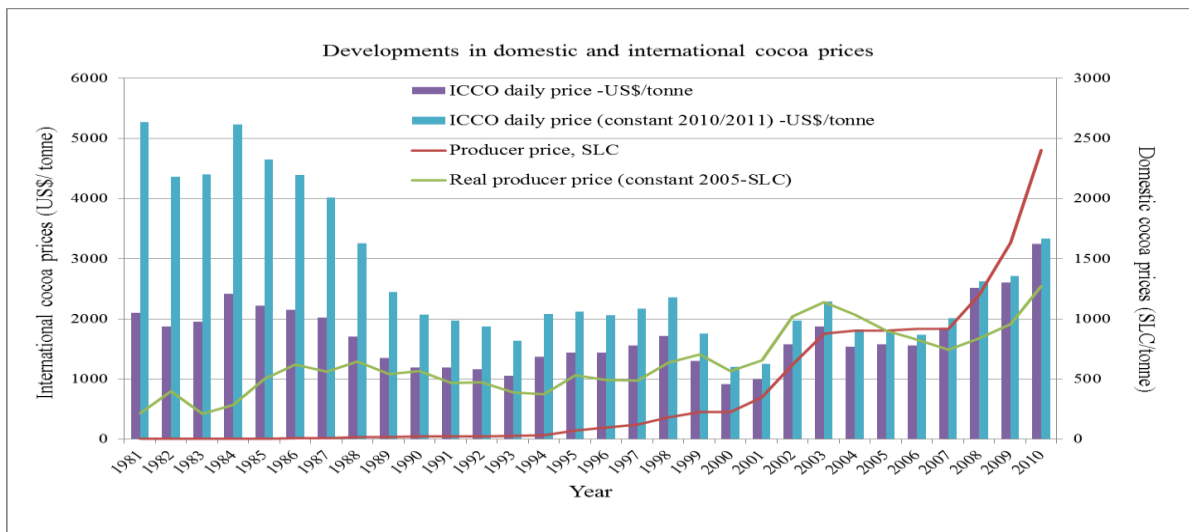
Countries	2003	2004	2005	2006	2007	2008	2009
Thailand	100%	99%	100%	100%	100%	100%	100%
Brazil	99%	99%	100%	100%	100%	100%	100%
India	99%	99%	100%	100%	100%	98%	90%
Costa Rica	96%	91%	93%	92%	83%	89%	89%
Côte d'Ivoire	24%	23%	26%	28%	31%	35%	28%
Indonesia	34%	33%	30%	27%	33%	33%	23%
Ghana	14%	13%	13%	13%	15%	6%	15%
Nigeria	6%	9%	9%	14%	14%	10%	10%
Cameroon	27%	14%	15%	16%	19%	10%	12%
Mexico	97%	100%	99%	98%	97%	100%	100%
Guatemala	98%	100%	99%	100%	100%	99%	100%

Source: ICCO (2012)

## 1.9 GLOBAL AND DOMESTIC PRICES OF COCOA AND INTER-COUNTRY COMPARISON

After depicting a continuous declining trend between the years 1984 and 1992, with the exception of the periods 1998-2001 and 2003-2006, world cocoa prices have steadily increased in both nominal and real terms since the year 1993. Nominal world price of cocoa observed for the period 1981-2010 was highest in the year 2010 (US\$ 3246/tonne) and lowest in the year 2000 (US\$919/tonne). In real terms however, the highest world price of cocoa was observed in the year 1981 (US\$ 5,265/tonne), with the lowest recorded in the year 2000 (US\$ 1201/tonne). In contrast to the fluctuations observed in nominal and real world cocoa prices however, the nominal domestic producer price of cocoa depicted a more or less continuous increasing trend between the years 1981 and 2010. The highest nominal price (GHS 2400.00, thus in Standard Local Currency) was recorded in the year 2010, with the lowest (GHS 0.53) recorded in the year 1981. In contrast to the observation in nominal domestic producer price however, the real producer price of cocoa in Ghana went through some fluctuations, adjusting to changes in real world price of cocoa at some points in time, with the highest price (GHS 1270.24) been recorded in the year 2010 and the lowest (GHS 213.20) in the year 1981. Decreases observed in real domestic prices were minor as compared to the real world price and lasted for relatively shorter period of time. This observation is attributed to the shielding of Ghanaian cocoa farmers against world price volatility by the government through the use of a price stabilization system.

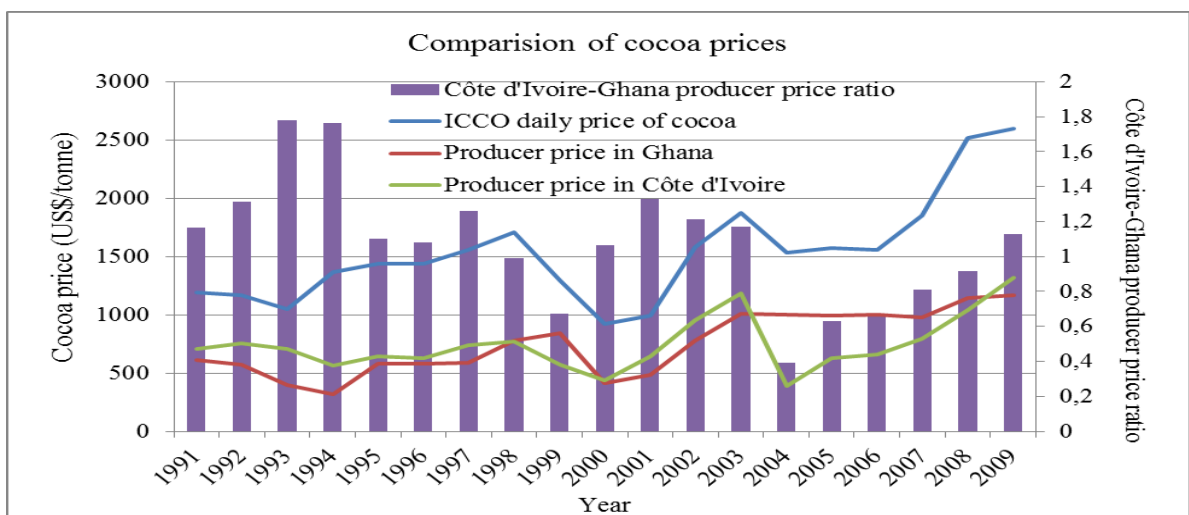
Figure 7.0 Trends in domestic and international price of cocoa



Source: Author's construct with data from ICCO (2012), FAOSTAT and own-computation

In contrast to Ghanaian farmers who have for some time benefited from guaranteed prices however, farmers in Côte d'Ivoire market their crop on a spot basis throughout the harvest period, with prices determined nearly exclusively by changes in international cocoa prices (World Bank, 2011). This implies that, whenever international cocoa price moves higher or lower throughout the harvesting season, a disparity in price is created between Côte d'Ivoire and Ghana. In times of increasing world price of cocoa, the farm gate price in Côte d'Ivoire mostly rise above COCOBOD's fixed price, with the opposite been observed in times of decreasing world price of cocoa. Such disparity in prices according to Bulir (1998) increases incentive to either sell on the domestic market or smuggle cocoa into Côte d'Ivoire in times of favorable prices on the Ivorian black market. Smuggling of cocoa however hinders COCOBOD's ability to accurately forecast and hedge output (World Bank, 2011).

Fig 8.0 Global and inter-country price comparison



Source: Author's construct with data from ICCO (2012), FAOSTAT and own-computation



## 2.0 MODEL SPECIFICATION AND DATA

The current study analyzes the performance of Ghana in export of cocoa (exports of cocoa bean, processed cocoa products and total cocoa exports) and estimates the magnitude and effects of key economic determinants of cocoa exports, production and domestic producer price. Although domestic price of cocoa is set by the Producer Price Review Committee (PPRC) at the beginning of each harvest season, information on internal and external influences on producer price could be useful to farmers, policy makers, prospective investors, and in agribusiness planning. Such information could as well be useful to COCOBOD and its Producer Price Review Committee (PPRC). Achievement of these goals involved the use of time series data on vital variables specified in latter sections of the study. All data for the study were collected from the agricultural production database of FAO (FAOSTAT), the International Cocoa Organization (ICCO), the United Nations Conference on Trade and Development (UNCTAD) and the International Rice Research Institute (IRRI)

### 2.1 COMPETITIVENESS

Trade theory suggests that the competitiveness of a country for a specific commodity is based on the concept of comparative advantage. Comparative advantage in a two-country, two-input case under the Ricardo and Heckscher-Ohlin models postulates that, trade flows among other factors are the result of differences in production cost among countries and that a given country will specialize in the production of a good in which it has comparative advantage. Several trade measures have been suggested in past studies for measuring a country's competitiveness in a commodity. Among such measures are the Revealed Comparative Advantage (RCA) (Balassa 1965), Relative Import Advantage and Relative Trade Advantage (Vollrath, 1991), the Net Export Index (NEI) (Banterle and Carraresi, 2007), Export Market Shares (EMS) as a simple measure of competitiveness (Latruffe, 2010), and Revealed Symmetric Comparative Advantage (as index of competitiveness) (Nwachuku *et al*, 2010).

The current study analyzes the competitiveness of Ghana in its export of cocoa using the Revealed Comparative Advantage (RCA) measure suggested by Balassa (1965) and the Revealed Symmetric Comparative Advantage (RSCA) measure employed by Nwachuku *et al* (2010).

- **Revealed Comparative Advantage, RCA**

This measure calculates the ratio of a country's export share of a commodity in the international market to the country's export share of all other commodities. In the current study however, RCA is defined as follows

$$RCA_{ij} = (X_{ij}/X_{it}) / (X_{jw}/X_{tw})$$

Where  $X_{ij}$  is the value of Ghana's exports of cocoa (beans, processed cocoa, and total cocoa exports);  $X_{it}$  is the total value of agricultural exports of Ghana;  $X_{jw}$  is the value of world exports of cocoa (beans, processed, and total cocoa exports); and  $X_{tw}$  is the world total value of agricultural exports

- **Revealed Symmetric Comparative Advantage (RSCA)**

The Revealed Comparative Advantage according to Nwachuku and colleagues, could be made symmetric by obtaining an index called Revealed Symmetric Comparative Advantage (RSCA). This is computed as follows:

$RSCA = (RCA-1 / RCA+1)$ , and it varies from -1 to +1. The closer the value is to +1, the higher the competitiveness of a country in the commodity of interest.

These measures of competitiveness for Ghana are estimated for the periods 1964-1969 (the immediate years following the collapse of world cocoa prices), 1983-1992 (Reform and Adjustment Period) and the period 2000-2010 (the recent decade)

## 2.2 DETERMINANTS OF COCOA EXPORT, PRODUCTION AND PRODUCER PRICE

In estimating the determinants of cocoa export, production and domestic producer price, data on the individual series were verified through the Phillips-Perron Unit root test (trend and intercept at level, intercept on first difference). After performing the test (on condition that no  $I(2)$  variable is found), the following regression equation was estimated:

### Equation for cocoa exports:

$$\ln QE_t = \beta_0 + \beta_1 \ln DP_{t-1} + \beta_2 \ln RP_t + \beta_3 \ln (RWP_t / RP_t) + \beta_4 \ln RCP_t + \beta_5 \ln DC_{t-1} + \beta_6 \ln EXR_t + \beta_7 \ln NRA_{t-2} + \beta_8 \ln FDI_t + \beta_9 \ln QE_{t-1} + \beta_{10} \ln SGR_t + u_t$$

A priori exp.:  $DP_{t-1} > 0$ ;  $RP_t > 0$ ;  $(RWP_t / RP_t) < > 0$ ;  $RCP_t < 0$ ;  $DC_{t-1} < 0$ ;  $EXR_t > 0$ ;  $NRA_{t-2} < > 0$ ;  $FDI_t < > 0$ ;  $QE_{t-1} < > 0$ ;  $SGR_t < 0$

### Equation for cocoa production:

$$\ln DP_t = \beta_0 + \beta_1 \ln RP_{t-1} + \beta_2 \ln (RWP_{t-1} / RP_{t-1}) + \beta_3 \ln QE_t + \beta_4 \ln EXR_t + \beta_5 \ln NRA_t + \beta_6 \ln YLD_t + \beta_7 \ln FDI_t + u_t$$

A priori exp.:  $RP_{t-1} > 0$ ;  $(RWP_{t-1} / RP_{t-1}) < > 0$ ;  $QE_t < > 0$ ;  $EXR_t < > 0$ ;  $NRA_t > 0$ ;  $YLD_t > 0$ ;  $FDI_t > 0$

### Equation for domestic producer price of cocoa:

$$\ln P_t = \beta_0 + \beta_1 \ln P_{t-1} + \beta_2 \ln WP_{t-1} + \beta_3 \ln QE_{t-1} + \beta_4 \ln EXR_t + \beta_5 \ln NRA_t + \beta_6 \ln SGR_{t-1} + \beta_7 \ln DP_{t-1} + \beta_8 \ln DC_{t-1} + u_t$$

A priori exp.:  $P_{t-1} > 0$ ;  $WP_{t-1} > 0$ ;  $QE_{t-1} < > 0$ ;  $EXR_t < > 0$ ;  $NRA_t > 0$ ;  $SGR_{t-1} < 0$ ;  $DP_{t-1} < 0$ ;  $DC_{t-1} > 0$

- Where  $QE_t$  - quantity of cocoa beans export (tonnes)  
 $DP_t$  - production of cocoa beans (tonnes)  
 $RP_t$  - real domestic producer price of cocoa beans (Standard Local Currency, GHS)  
 $(RWP_t / RP_t)$  - real world price of cocoa to real domestic producer price of cocoa ratio  
 $RCP_t$  - real producer price of cocoa in Côte d'Ivoire (Ivorian Local Currency, FCFA)  
 $DC_t$  - domestic consumption of cocoa (tonnes)  
 $EXR_t$  - exchange rate (GHS/US\$)  
 $NRA_t$  - nominal rate of assistance (%)  
 $SGR_t$  - world stocks/grindings ratio (%)  
 $FDI_t$  - foreign direct investment (US\$ million at current prices and current exchange rates)  
 $YLD_t$  - yield of cocoa (Mt/ha)  
 $P_t$  - nominal domestic producer price of cocoa (Standard Local Currency, GHS)  
 $WP_t$  - nominal world price of cocoa (US\$/tonne)  
 $\beta_0$  - Intercept term  
 $\beta_i$  - coefficients/ elasticities  
 $u_t$  - Stochastic error term assumed to be  $iidN(0, \Sigma)$

### 3.0 RESULTS

This section of the current study is divided into two parts:

- The first part is on analysis of the performance (competitiveness) of Ghana in its export of cocoa (covering aggregate export of cocoa, export of cocoa beans and export of cocoa products). This part focuses on the periods 1964-69, 1983-92 and 2000-2010
- The second part is on estimation of the magnitude and effects of key economic determinants of cocoa exports, production and domestic producer price for the period 1981-2009

#### 3.1 COMPETITIVENESS OF GHANA'S COCOA EXPORTS

Result on the performance of Ghana in its export of cocoa shows that the country is highly competitive in total export of cocoa, in export of cocoa beans and in export of processed cocoa. Its performance however, is highest in export of cocoa beans than in export of processed cocoa and in total cocoa exports. For the three periods under consideration, the country's competitiveness in aggregate export of cocoa and in cocoa beans export was lowest during the period 1964-1969. This observation is attributed to the collapse in world price of cocoa during that period coupled with inappropriate government policies implemented in the immediate post-independence period.

Table 8.0 Performance of Ghana in cocoa exports

Year	Total cocoa exports		Cocoa beans export		Processed Cocoa exports	
	RCA	RSCA	RCA	RSCA	RCA	RSCA
1964	60.721	0.968	70.199	0.972	18.807	0.899
1965	63.973	0.969	74.749	0.974	<b>22.019</b>	<b>0.913</b>
1966	69.187	0.972	82.339	0.976	<b>25.185</b>	<b>0.924</b>
1967	53.828	0.964	60.304	0.967	<b>33.191</b>	<b>0.942</b>
1968	49.324	0.960	57.716	0.966	<b>25.670</b>	<b>0.925</b>
1969	41.480	0.953	50.886	0.961	16.735	0.887
1983	62.002	0.968	95.285	0.979	13.636	0.863
1984	47.380	0.959	70.525	0.972	10.737	0.830
1985	41.159	0.953	64.195	0.969	8.803	0.796
1986	41.781	0.953	63.136	0.969	7.807	0.773
1987	47.461	0.959	69.709	0.972	12.604	0.853
1988	<b>60.203</b>	<b>0.967</b>	<b>91.288</b>	<b>0.978</b>	13.478	0.862
1989	<b>69.216</b>	<b>0.972</b>	<b>105.890</b>	<b>0.981</b>	12.370	0.850
1990	<b>78.131</b>	<b>0.974</b>	<b>131.703</b>	<b>0.984</b>	17.457	0.892
1991	<b>83.412</b>	<b>0.976</b>	<b>143.739</b>	<b>0.986</b>	17.431	0.891
1992	<b>91.669</b>	<b>0.978</b>	<b>167.824</b>	<b>0.988</b>	16.298	0.884
2000	79.798	0.975	138.181	0.986	18.286	0.896
2001	76.122	0.974	134.167	0.985	11.157	0.835
2002	53.236	0.963	83.331	0.976	16.244	0.884
2003	48.089	0.959	79.946	0.975	14.973	0.875
2004	50.682	0.961	91.766	0.978	13.201	0.859
2005	55.684	0.965	102.362	0.981	14.097	0.868
2006	60.157	0.967	104.946	0.981	16.028	0.883
2007	60.950	0.968	112.000	0.982	16.590	0.886
2008	54.683	0.964	110.928	0.982	6.421	0.731
2009	50.674	0.961	91.913	0.978	5.993	0.714
2010	47.858	0.959	90.615	0.978	11.242	0.837

Source: Author's computation with data from FAOSTAT

Following the collapse in world price of cocoa in 1964, the government printed money into the system to help meet expenses, thereby fuelling inflation in the process and lowering real wages. It in addition overvalued the cedi, which consequently resulted in a sharp decline in value of the domestic currency equivalent of the f.o.b. price of cocoa and tightened the struggle over cocoa revenue between farmers and the government. In the same period, cost of the then Cocoa Marketing Board's (CMB's) activities increased and smuggling of cocoa into neighboring Côte d'Ivoire accelerated due to the relative higher producer prices at the black market exchange rate in Côte d'Ivoire between the years 1964-69 (Stryker, 1990). These made export of cocoa beans in the country less competitive and exporters had limited incentive to export the raw product.

In spite of these drawbacks, cocoa production in the country during the same period depicted an increasing trend. Increased production and limited incentive to export raw cocoa beans due to the collapse in world price of cocoa beans, stimulated domestic processing of cocoa to help minimize losses to farmers and ensure continuous production of cocoa. This explains the relatively high figures of the RCA and the RSCA in terms of export of processed cocoa during the period 1964-69 (This is as well clarified by the value addition figure in the Appendix –thus figure A.2)

Initiation of the Economic Recovery Program (ERP) in April 1983 helped address inefficiencies in fiscal disciplines and in reformation of the market. It in addition, led to increased inflows of external financing and general increase in national income. Exchange rate policy was as well improved (through depreciation to stimulate exports), national budget was regularly balanced, government's financing needs were lowered and inflation was brought under control. The share of farmers in export price (net f.o.b.) was gradually increased through a reduction in farm taxation from 82.05% in 1983 to 24.60% in 1992. Joint effect of these improvements led to a recovery in the performance of the cocoa sub-sector regardless of the low nominal and real world price of cocoa during the period 1983-92. This led to an increase in performance of the country in its export of cocoa beans and in aggregate cocoa exports relative to the period 1964-69. The increase in Ghana's competitiveness in cocoa exports during the period 1983-92 could as well be attributed to initiation of the Agricultural Services Rehabilitation Project (ASRP) between the years 1987-1990. This project was initiated among other things to strengthen the institutional framework for formulating and implementing agricultural policies and program, improve the delivery of public sector services, and improve the procurement and distribution of agricultural inputs by way of privatization (Sharma and Morrison, 2011). It succeeded in strengthening the capacity of agricultural research, extension, and policy planning. Improvement in these three dimensions was critical in revitalization of the cocoa sub-sector.

The relatively higher performance of Ghana in total exports of cocoa and cocoa beans in specific for the period 2000-2010 over that for the period 1964-69 is attributed to the increasing government support to farmers and opening-up of the domestic market to competition through partial liberalization of internal marketing, thereby allowing licensed buyers to engage in cocoa purchases as against earlier periods where only the Producer Buying Company (PBC) was given a sole license. The relatively lower RCA and RSCA figures for processed cocoa exports for the period 2000-2010 as against those for the period 1964-69 could be attributed to the increasing global demand of cocoa beans for grinding (which attracts export of raw products), inefficiencies in domestic processing due to low capacity, the decreasing share of Ghana in world grindings due to intensifying competition from uprising and major competitors, and increasing domestic demand for processed cocoa products which consequently decreases the quantity of processed products exported.

### **3.2 DETERMINANTS OF COCOA EXPORT, PRODUCTION AND PRODUCER PRICE**

Prior to estimation of the respective regression equations (with all variables in log form except the nominal rate of assistance (NRA)), the whole set of data was verified to ascertain the order of integration of the individual series. Ascertaining the order of integration of the respective series is a vital step in the data generation process and in choosing the appropriate estimator. The Phillips-Perron

unit root test was used in the current study for verification. Output from the test shows that with the exception of the annual volume of cocoa beans exported and annual production (output) of cocoa beans, all the variables specified in the three regression equations are non-stationary at level, but become stationary at first difference. Volume of cocoa beans exported is found stationary at level at the 5% significance level, with annual production of cocoa beans being stationary at level at the 1% significance level. Based on the outcome of the unit root test, the respective equations were estimated using the Ordinary Least Squares estimator.

Estimates for the three regression equations were tested for appropriate standard Gaussian properties namely absence of serial correlation, normality and homoscedastic nature of the residuals. They were also test for stability (and reliability) with the CUSUM and CUSUM of Squares tests, the results of which are presented in the appendix section of the current study. Tests on the Gaussian assumptions for the respective regression equations show that the residual series for each of the equations is normality distributed, homoscedastic, and free from the problem of serial correlation. Estimates for each equation were confirmed to be reliable and stable by the CUSUM and CUSUM of Squares tests.

Table 9.0 Phillips-Perron unit root test of variables (trend + intercept at level, intercept at first diff.)

Series	Test stat. Level	N-W B.width	Test stat. First diff.	N-W B.width	Conclusion on Level
ln QEt	-4.152016**	6	-8.298286***	3	$I(0)$
ln DPt	-7.436038***	25	-10.80197***	26	$I(0)$
ln DCt	-2.446304	3	-6.959233***	3	$I(1)$
NRAt	-1.350541	1	-5.237757***	3	$I(1)$
ln EXRt	-1.078407	0	-3.399529**	4	$I(1)$
ln Pt	-2.668138	1	-4.590585***	1	$I(1)$
ln RPt	-3.349479	1	-7.055645***	4	$I(1)$
ln WPt	-0.542015	9	-3.623870**	6	$I(1)$
ln RWPt	-0.316034	10	-3.583725**	6	$I(1)$
ln FDI <sub>t</sub>	-2.584939	2	-4.954059***	4	$I(1)$
ln SGR <sub>t</sub>	-1.578200	0	-4.153274***	0	$I(1)$
ln YLD <sub>t</sub>	-1.964068	1	-5.825100***	1	$I(1)$
ln RCP <sub>t</sub>	-2.629281	4	-6.297162***	6	$I(1)$
(RWP <sub>t</sub> / RP <sub>t</sub> )	-2.319115	0	-6.858841***	0	$I(1)$
Critical Value (5%)	-3.580623		-2.976263		

- **Determinants of cocoa export**

Export of cocoa (beans in specific) is found to be significantly driven by lagged output (production), lagged domestic demand (consumption), real producer price, real world price to real producer price ratio, real producer price in neighboring Côte d'Ivoire, prevailing exchange rate and by lagged export. The intercept is also significant at the 1% level with a coefficient of 10.504, implying that, should all things remain constant, Ghana would continue to export significant quantities of cocoa beans.

Domestic production of cocoa beans in the previous year has a coefficient of 0.667, significant at the 5% level. This implies that a unit increase in output of cocoa in Ghana in time  $t-1$  leads to a 0.667% increase in the country's export of cocoa in time  $t$ . Lagged instead of current production is used for the study because of the strategy employed by most exporters in pursuit of maximizing their profits. Increases in output in times of declining world price prompts most exporters to withhold a portion of the crop to take advantage of potential price increases later in the season or in the subsequent year. Exports therefore respond more appropriately to lag outputs than they do current outputs. Higher levels of production in time  $t$  at a favorable world price in time  $t$  would still lead to increases in stock on the domestic market to help minimize the adverse effects of adding-up on the global market which

results in decreasing world prices. Increases in production and stock for the previous year helps in bridging deficit in the current year's output to ensure sufficient quantities of cocoa beans on the domestic market for both exports in raw form and for domestic processing.

A unit increase in real producer price of cocoa leads to a 0.339% increase in exports, and this response is found to be significant at the 5% level. Increases in the real farm gate price of cocoa incites farmers to sell most of their produce to domestic licensed buyers as against smuggling them into neighboring countries with higher prices on the black market. In addition, increases in real farm gate price of cocoa helps farmers to invest appropriately in their fields in hope for better and sustainable outputs in the coming years. An increase in the real producer price of cocoa therefore affects cropping decisions, as well as farmers' decisions to sell domestically or to smuggle. In his report on the "price incentive to smuggle and the cocoa supply in Ghana", Bulif (1998) found that, some farmers even decide not to collect their current crop if the offered producer prices are too low. This shows that real producer price is a crucial factor in the supply decision of farmers, and setting it too low may have depressing effect on export.

The effect of the real world to real domestic price ratio of cocoa was a priori believed could go either way, as increases in this ratio is possible under four different scenarios;

- Increases in world price, while domestic price is held constant
- Decreases in domestic price, while world price is held constant
- Increases in both, but more in world price than in domestic price
- Decreases in both, but more in domestic price than in world price

The positive (0.326) and significant effect (at the 10% level) observed for this ratio shows that in as much as exporters would export more in times of increases in this ratio (due to increasing profit on their part), any negative reaction on the part of farmers in times of a decrease in the ratio is not significant. This could be attributed to the high dependence of most cocoa farmers on the crop for sustenance, and in-kind benefit farmers receive through government assistance and bonuses from buyers.

Table 10.0 Determinants of cocoa beans export

Variables	Coefficients	Standard error	t-Statistic
$\ln DP_{t-1}$	0.666796	0.231395	2.881631**
$\ln RP_t$	0.339086	0.156346	2.168812**
$\ln (RWP_t/RP_t)$	0.326231	0.171440	1.902885*
$\ln RCp_t$	-0.331410	0.138935	-2.385364**
$\ln DC_{t-1}$	-0.067113	0.031097	-2.158205**
$\ln EXR_t$	0.197926	0.084700	2.336800**
$NRA_{t-2}$	0.115020	0.344817	0.333569
$\ln FDI_t$	-0.049050	0.040371	-1.214972
$\ln QE_{t-1}$	-0.343774	0.190541	-1.804196*
$\ln SGR_t$	0.201452	0.212349	0.948687
Intercept	10.50421	3.340458	3.144541***
Adj. R <sup>2</sup>	0.919125	Akaike info criterion	-1.197539
Durbin-Watson Stat	2.390825	Schwarz criterion	-0.669606
F-statistic	30.54827	Hannan-Quinn criter.	-1.040557
Prob.(F-statistic)	0.000000	Jarque-Bera	0.043094 (0.978684)
Log likelihood	27.16678	B-G LM test F-stat (1)	1.184173 (0.2937)
S.E. of regression	0.114923	B-G LM test F-stat (2)	0.554349 (0.5866)
Mean dependent var	12.57919	ARCH test F-stat	2.355522 (0.1379)
S.D. dependent var	0.404110	Q-stat (1, 2)	1.5057(0.220); 1.8064(0.405)
Sum squared resid	0.211317	ADF Test of residual	-6.206595***

\*\*\*1%, \*\*5%, \*10%

A unit increase in the real producer price of cocoa in neighboring Côte d'Ivoire leads to a 0.331% decrease in cocoa exports of Ghana, and this decrease is significant at the 5% level. With domestic farmers been shielded from world price volatility through guaranteed prices as against their Ivorian counterparts who market the crop on a spot basis throughout the harvest period, prices in Côte d'Ivoire are determined nearly exclusively by movements in international cocoa futures price (World Bank, 2011). By this, whenever the international price of cocoa moves higher or lower throughout the harvesting season, a price disparity is created, with farm gate price in Côte d'Ivoire being mostly above COCOBOD's fixed price in times of increasing international price of cocoa. Such price disparities create incentive for smuggling, thereby reducing the volumes of cocoa beans available on the domestic market for export and for domestic processing. Smuggling of cocoa in turn is reported by the World Bank (2011) to hinder COCOBOD's ability to accurately forecast and hedge output. In addition, during the period 2008-2011, smuggling is reported by the World Bank to have resulted in estimated financial losses to GoG and other stakeholders in the supply chain in excess of US\$158.9 million.

A unit increase in domestic demand for cocoa leads to a 0.067% decrease in the volume of cocoa beans exported, and this decrease is significant at the 5% level. This observation affirms a suggestion (an argument) by Ball (1966) in his study on "The relationship between UK export performance in manufacturers and the internal pressure of demand" that at relatively high levels of domestic demand, the quantity of resources devoted to export is lower. So at lower domestic demand, the surplus from production leads to increased export volume. As long as domestic demand increases, export of cocoa beans would decrease by virtue of "pulling effect", unless domestic output of cocoa beans is increased significantly at equivalent or higher rates than domestic demand. Under such condition, there is a possibility that the "pulling effect" of domestic demand would not be significant.

A unit increase in exchange rate of Ghana (GHS/US\$) leads to a 0.198% increase in the country's export of cocoa beans, and this increase is significant at the 5% level. An increase in this rate implies depreciation in value of the local currency of Ghana, and this makes exports cheaper in international markets resulting in increased demand for exports. CMC (the subsidiary of COCOBOD in charge of export) then responds to increasing global demand for high quality Ghanaian cocoa by increasing the volumes of cocoa it exports. As a major player on the world cocoa market, expansion of exports from Ghana in period  $t-1$ , ceteris paribus, could lead to a substantial decline in world market prices for cocoa by virtue of "adding-up" effect. As agents who operate to maximize profits, exporters in times of decreasing prices of cocoa on the world market limit the volumes they export in subsequent years in hope for better prices. Restriction of exports by major players on the other hand could trigger higher prices of cocoa on the world market. With Ghana holding the second largest share (21%) in cocoa exports on the global pedestal, a unit increase in the country's export of cocoa in time  $t-1$ , is seen to lead to a decrease in export by 0.344% in time  $t$ . This decrease is significant at the 10%

Increasing stocks/grindings ratio under normal circumstances is expected to trigger a significant decline in global demand for cocoa beans. Ghana however is shielded from such effect due to the high quality of beans it exports. This statement is made in support of the positive (0.201) although insignificant (instead of a negative) coefficient observed for the SGR in Table 10.0. The effects of nominal rate of assistance and foreign direct investment (inflows) on exports were found to be insignificant. The role of FDI on export promotion has in empirical literature been found to be controversial. Pfaffermayr (1996) found a significant positive effect of FDI on export. However, in their study on the "Determinants of export structure of countries in Central and Eastern Europe", Hoekman and Djankov (1997) found an insignificant effect of FDI on export. The role of FDI in export promotion in developing countries therefore depends crucially on the motive for such investment (Majeed and Ahmad, 2006). If the motive for such investment is to capture domestic market (tariff-jumping type investment), it may not contribute to export growth, but if such investment is made with an export-oriented motive (due to the comparative advantage of the recipient country), then it may contribute to export growth. A total of about 91.91% of variations in cocoa beans export of

Ghana between the years 1981 and 2009 are explained by variables specified in the equation on cocoa exports in section 2.2. The joint effect of all the variables on export is highly significant (reflected by the F-statistic and its associated probability value)

- **Determinants of cocoa production**

Production of cocoa beans in Ghana is dependent on by lagged real producer price, lagged real world price to real producer price ratio, nominal rate of assistance, exchange rate, yield, and foreign direct investment. The intercept term has a coefficient of 4.624 significant at the 1% level. This implies that, should all things remain constant, farmers would continue to supply significant volumes of beans on the domestic market. This confirms the high dependence of most cocoa farmers on the crop for sustenance.

A unit increase in lagged real producer price of cocoa leads to a 0.372% increase in output in the subsequent year, significant at the 1% level. An increase in the farm gate price received by cocoa farmers increases their financial base and enables them to meet the increasing cost of pest control, disease control, fertilization of their fields and the high cost of labor among other things. Addressing these areas is crucial to ensuring high productivity of farmers' fields through increases in yield and output. A unit increase in the lagged relative real price(s) leads to a 0.504% increase in output, significant at the 1% level. With increases in profits of exporters and buyers due to an increase in this ratio comes increasing demand for beans in the subsequent years. With a possibility of this ratio increasing due to a decreasing real domestic producer price, farmers continue to invest in their fields with hope of getting a higher price for their producer due to a likely increase in the profits of buyers and exporters. This observations could as well be attributed to the high dependence of most cocoa farmers on the crop for sustenance, thereby responding inappropriately to declines in the price they receive (thus under the condition of the ratio increasing due to a relative decrease in real producer price).

Table 11.0 Determinants of cocoa beans production

Variables	Coefficients	Standard error	t-Statistic
$\ln RP_{t-1}$	0.372298	0.095155	3.912534***
$\ln (RWP_{t-1}/RP_{t-1})$	0.504200	0.094430	5.339419***
$NRA_t$	0.376944	0.199424	1.890165*
$\ln EXR_t$	0.156628	0.036819	4.254054***
$\ln YLD_t$	0.370040	0.106295	3.481266***
$\ln FDI_t$	0.050030	0.025264	1.980275*
$\ln QE_t$	0.457878	0.087659	5.223406***
Intercept	4.624555	1.137396	4.065913***
Adj. $R^2$	0.968358	Akaike info criterion	-1.883437
Durbin-Watson Stat	2.367158	Schwarz criterion	-1.502807
F-statistic	119.0421	Hannan-Quinn criter.	-1.767074
Prob.(F-statistic)	0.000000	Jarque-Bera	0.473687 (0.789115)
Log likelihood	34.36812	B-G LM test F-stat (1)	1.026535 (0.3237)
S.E. of regression	0.083900	B-G LM test F-stat (2)	0.600591 (0.5591)
Mean dependent var	12.76697	ARCH test F-stat	0.041589 (0.8401)
S.D. dependent var	0.471658	Q-stat (1, 2)	1.2060(0.272); 1.2702(0.530)
Sum squared resid	0.140793	ADF Test of residual	-6.078271***

\*\*\*1%, \*\*5%, \*10%

A unit increase in nominal rate of assistance, as a measure of government support, leads to a 0.377% increase in output, significant at the 10% level. Increase in government's support through an increase in the share of export price (net f.o.b.) received by farmers' and a decrease in farm taxation, increases



the financial base of farmers and enable them to timely meet the cost of performing vital cultural practices on their fields like pest and disease control through spraying, and fertilizer application among others. In addition, increasing government's assistance to farmers enables them to increase the land area on which they plant cocoa trees, resulting in the planting of more trees (although not a commendable move in terms of environmental sustainability)

A unit increase in exchange rate leads to an increase of 0.157% in output, significant at the 1% level. With cocoa farmers currently been shield from global cocoa price and exchange rate volatilities, increasing exchange rate which consequently stimulate export growth has rather beneficial effect to producers than it would have been without government assistance. The shielding of farmers against volatility in exchange rate allows local prices to increase even when international prices fall. This coupled with the stimulation of export growth by depreciation of the currency triggers output growth. Although depreciation of the currency leads to increased cost of vital inputs used in production (like fertilizer, pesticides, fungicides among others), such inputs are mostly subsidized by the government (although farmers bear majority of the cost).

A unit increase in yield leads to a 0.370% increase in cocoa output, significant at the 1% level. Increase in output per unit area is a reflection of increased productivity of farmers' fields as a result of increasing fertility of the fields, better control of pests and diseases, and timely harvesting of produce. Any improvements observed in these areas would under normal circumstances have the obvious positive effect on output. With most of the very suitable and moderately suitable lands for cocoa cropping currently been exhausted, increasing yields of farmers' fields may be the sustainable and recommendable way to ensure future increases in cocoa outputs. A unit increase in foreign direct investment leads to a 0.050% increases in output, significant at the 10% level. The effect of foreign direct investment on output is mostly manifested through spill-over effects (from improved cropping techniques) and in diseases and pest control programs. These help in achieving higher yields and in promoting environmental sustainability. A significant positive association is observed between current exports and output. A unit increase in export leads to 0.458% increase in output. This effect was found to be significant at the 1% level, implying that increases in exports of cocoa beans stimulate production of it in the country. With increases in export comes decreasing stock on the domestic front and corresponding increase in demand for raw materials for export and domestic processing. Increasing demand as well comes with increasing prices which all things being equal have beneficial effect as against adverse effect on producers.

A total of about 96.84% of variations in output observed between the years 1981 and 2009 are explained by variables specified in the equation on cocoa production in section 2.2. The joint effect of all the variables is highly significant.

- **Determinants of domestic producer price of cocoa**

With the setting of producer price at the beginning of each harvest season by the Producer Price Review Committee (PPRC) based on nominal as against real values, nominal instead of real prices were used in the equation on domestic producer price in section 2.2. Producer price of cocoa is found to be dependent on lagged nominal producer price, lagged nominal world price of cocoa, nominal rate of assistance, exchange rate, lagged stocks/grindings and lagged domestic consumption. Contrary to the observation for cocoa beans exports and production however, the intercept term for the producer price equation is not significant. This implies that without any significant change(s) in any of the variables, there would be no significant increase or decrease in producer price of cocoa.

With producer price set without prior knowledge of future world price of cocoa, domestic prices are set mostly based on knowledge of past prices and future expectations (the effect of the latter been mostly captured in the nominal rate of assistance). A unit increase in lagged nominal producer price leads to a 0.341% increase in domestic producer price of cocoa, significant at the 5% level. A unit

increase in lagged world price leads to a 0.476% increase in domestic producer price of cocoa, significant at the 10% level. By this, in as much as a greater percentage of export price (net f.o.b.) goes to farmers, an increase in world price of cocoa tends to benefit the Cocoa Marketing Company (sole exporter) than it does producers due to the relatively low transmission of increments in price as reflected by the coefficient of the lagged nominal world price. In considering the share of farmers in export price and the degree of transmission of increments, both cocoa producers and the CMC benefit at the end of the day, thereby leaving no losers to be compensated by winners.

A unit increase in the nominal rate of assistance through a decrease in farm taxation and increase of farmers share in export price of cocoa leads to a 0.911% increase in nominal producer price of cocoa, significant at the 5% level. Decreasing farm taxation implies that relatively smaller share of farm income accrued through sales of cocoa is taxed. Consequently, relatively higher portions of revenue from sales go to farmers as against periods with high taxation of farm income. A unit increase in exchange rate leads to a 0.576% increase in producer price of cocoa, significant at the 1% level. Devaluation (depreciation) of the Ghanaian Cedi against major international currencies (coupled with the present shielding of farmers against price and exchange rate volatilities) allows local producer price to increase even in times of declining international prices. An increase in exchange rate as well makes exports cheaper, stimulates demand on the global market, and with it comes increases in price of cocoa. A unit increase in stocks/grindings ratio leads to a 0.765% decrease in nominal producer price of cocoa, significant at the 1% level. Increasing stocks/grindings ratio implies excess supply of cocoa beans on the global market and with such condition comes decreasing demand for cocoa beans and a corresponding decrease in global price of cocoa. Although COCOBOD is reported to have never lowered the farm gate price of cocoa since the launching of fixed-farmer price program (World Bank, 2011), any future deviations from this could be due to changes in global prices induced by changes in global stocks/grindings ratio.

Table 12.0 Determinants of producer price of cocoa

Variables	Coefficients	Standard error	t-Statistic
ln P <sub>t-1</sub>	0.341493	0.141699	2.409984**
ln WP <sub>t-1</sub>	0.476386	0.243049	1.960069*
NRA <sub>t</sub>	0.911124	0.359758	2.532605**
ln EXR <sub>t</sub>	0.575659	0.153808	3.742703***
ln QE <sub>t-1</sub>	0.137491	0.208296	0.660072
ln SGR <sub>t-1</sub>	-0.764885	0.247030	-3.096320***
ln DP <sub>t-1</sub>	-0.051911	0.223720	-0.232035
ln DC <sub>t-1</sub>	0.091472	0.036476	-2.507705**
Intercept	2.310120	2.473115	0.934093
Adj. R <sup>2</sup>	0.995796	Akaike info criterion	-0.811656
Durbin-Watson Stat	2.370630	Schwarz criterion	-0.383447
F-statistic	800.3441	Hannan-Quinn criter.	-0.680748
Prob.(F-statistic)	0.000000	Jarque-Bera	2.081024 (0.353274)
Log likelihood	20.36318	B-G LM test F-stat (1)	1.622989 (0.2189)
S.E. of regression	0.141945	B-G LM test F-stat (2)	2.192978 (0.1421)
Mean dependent var	4.271568	ARCH test F-stat	0.201559 (0.6573)
S.D. dependent var	2.189104	Q-stat (1, 2)	1.7162(0.190); 3.0473(0.218)
Sum squared resid	0.382822	ADF Test of residual	-4.545900***

\*\*\*1%, \*\*5%, \*10%

A unit increase in domestic consumption of cocoa leads to a 0.091% increase in producer price of cocoa, significant at the 5% level. An increase in producer price with increasing domestic consumption is a measure to incite farmers to increase supply of cocoa beans for both export and for domestic consumption. Increasing supply of the cocoa beans could help mitigate the adverse/pulling

effect of domestic consumption on exports. A total of about 99.58% of variations in nominal farm gate price of cocoa between the years 1981 and 2009 are explained by variables specified in the producer price equation in section 2.2, and their joint effect is highly significant

#### 4.0 SYNTHESIS OF RESULTS AND RECOMMENDATIONS

In contributing towards achievement of the Government of Ghana's medium term objective of adding value to the country's cocoa exports and at the same time maintaining its reputable position on the world market for cocoa, the current study analyzed the competitiveness of Ghana in its total cocoa exports, cocoa beans export and processed cocoa exports. In addition, it estimated the magnitude and effects of key economic determinants of cocoa exports (focusing on beans), production and domestic producer price (mostly set at the beginning of the harvest season).

In analyzing the competitiveness of the country in its export of cocoa, three periods were considered namely 1964-69 (immediate years following the collapse of world price of cocoa), 1983-92 (Reform and adjustment period) and 2000-2010 (recent decade). The Revealed Comparative Advantage measure suggested by Balassa (1965) and the Revealed Symmetric Comparative Advantage employed by Nwachuku *et al* (2010) were used in the analysis. Figures on the RCA and RSCA for the respective periods show that Ghana has comparative advantage in exports of cocoa beans, processed cocoa and in its total export of cocoa (thus raw and processed). The country's comparative advantage was however highest in export of the raw product (thus cocoa beans). Its export performance in processed cocoa (a reflection of value addition) was highest during the period 1964-69. This was attributed to significant increases in cocoa output during that period amidst collapse in the world price of cocoa beans which reduced incentive for exporters to export more of the raw product (beans). Increased processing of cocoa beans during that period was to help minimize losses on the part of farmers and to ensure continuous production and export of cocoa. The performance of Ghana in its aggregate export of cocoa and in cocoa beans export for the periods 1983-92 and 2000-2010 were higher than in the period 1964-69. Its latter improvement over the earlier period (1964-69) was attributed to initiation of the Economic Recovery Program (ERP) in 1983 (which created the right conditions for agricultural investments and helped address inefficiencies in marketing and fiscal disciplines), the Agricultural Services Rehabilitation Project (ASRP) between 1987 and 1990 (which helped in strengthening the capacity of agricultural research, extension and policy planning), opening up of the domestic market to competition through partial liberalization of internal marketing from the early 1990s, the establishment of a price stabilization system (and the relative reduction in farm taxation), and continuous government support to the sector through increased public spending on infrastructure and productivity enhancing innovations.

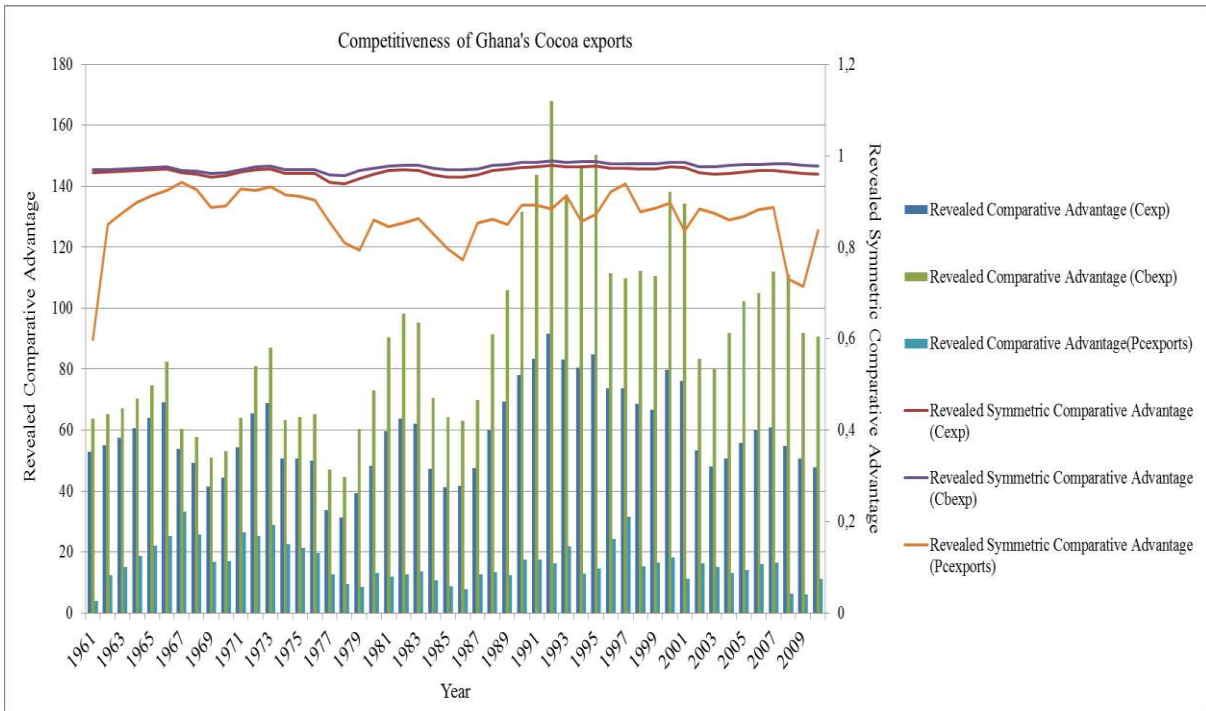
In estimating the magnitude and effects of key economic determinants of cocoa export, production and domestic producer price, the results showed a significant position association between export of cocoa beans and lagged output, real producer price, real world price to real producer price ratio of cocoa, and depreciation in value of the domestic currency (thus increases in exchange rate, GHS /US\$ ratio). Export of cocoa beans had a significant negative association with increases in real producer price of cocoa for Côte d'Ivoire (which stimulates smuggling of cocoa from Ghana into Côte d'Ivoire), lagged domestic consumption and lagged export of the raw product (beans) (due to adding-up effect which lowers world price of cocoa). Domestic supply (production) of cocoa had significant position association with lagged real farm gate price of cocoa, lagged real world price to real producer price ratio of cocoa, nominal rate of assistance, depreciation in value of the domestic currency against the US\$, yield, foreign direct investment and export of cocoa. Nominal producer price in a given year was found to be positively driven by increases in nominal producer price in the previous year, nominal world price of cocoa in the previous year, nominal rate of assistance, depreciation in value of the domestic currency against the US\$, and lagged domestic consumption (demand) of cocoa. It however

decreases with increasing global stocks/grindings ratio due to a likely decrease in world price of cocoa under such condition.

Improvement in the country's export performance, anticipated increases in global demand and world price of cocoa, wide yield gap of Ghana, positive attitude of farmers in the supply of cocoa due to increased government support through COCOBOD (reduced farm taxation, increased farmers share in export price, bonuses in cash and in kind) and intensification of competition on the domestic market through partial liberalization of internal marketing indicate potential for further improvement in Ghana's performance in cocoa production and exports. However, to realize any further improvement in production and exports of both raw and processed cocoa products, measures should be put in place to help increase productivity of farmers' fields (by bridging the wide yield gap), ensure continuous government support to farmers and the subsector as a whole, and tighten the loose border of the country to help minimize smuggling in times of increasing producer price of cocoa in Côte d'Ivoire.

APPENDIX

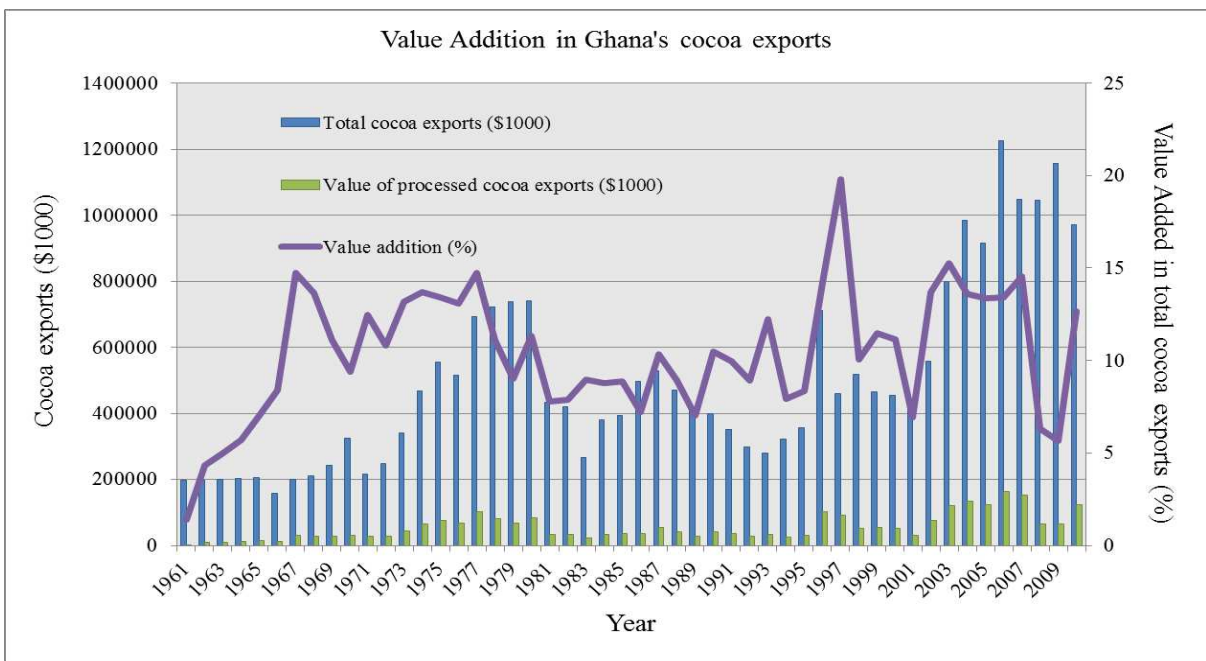
Figure A.1 Performance of Ghana in Export of cocoa (1961-2010)



Source: Author's construct with data from FAOSTAT

NB: Cexp – Total cocoa exports; Cbexp – cocoa beans export; PCexport-processed cocoa exports

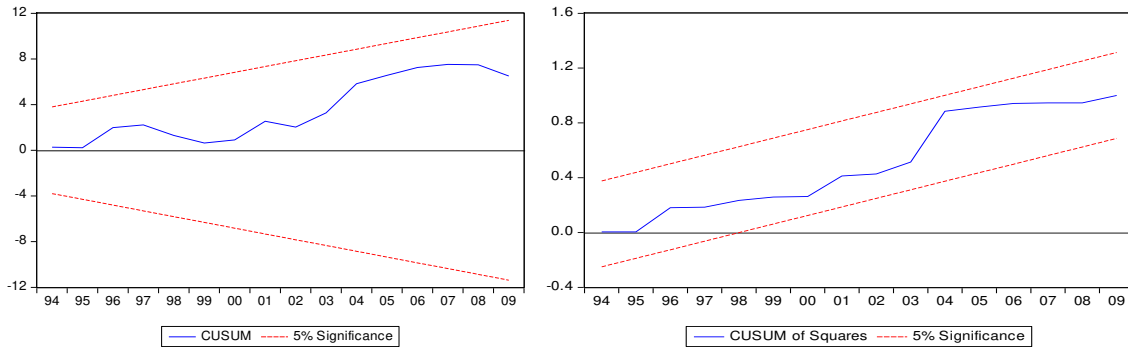
Figure A.2 Value Addition in Ghana's cocoa exports (1961-2010)



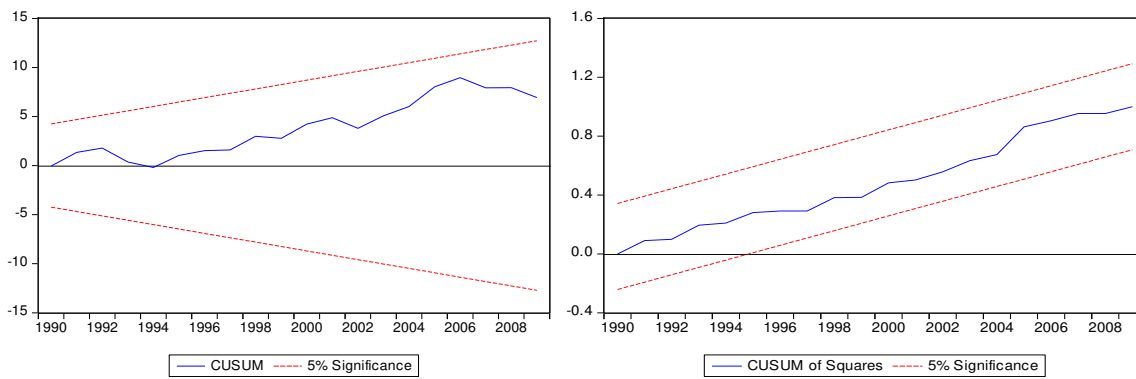
Source: Author's construct with data from FAOSTAT

Figure A.3 Stability test of estimates (CUSUM and CUSUM of Squares)

Estimates for determinants of cocoa exports



Estimates for determinants of cocoa production



Estimates for determinants of domestic producer price of cocoa

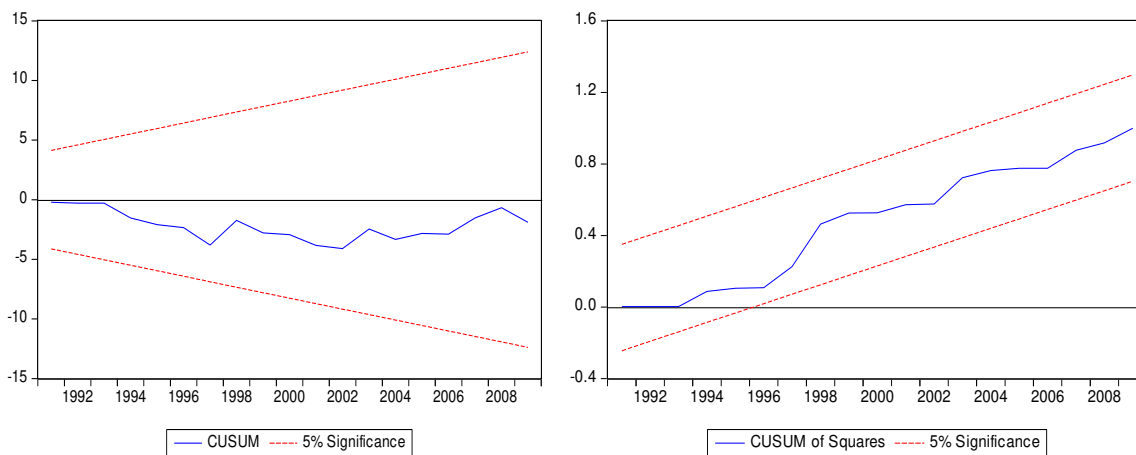


Table A.1 Regional Purchases of cocoa by COCOBOD

Year	Ashanti Region	Brong-Ahafo Region	Eastern Region	Central Region	Western Region	Volta Region	Total Domestic Purchases
1970	125406	115393	69431	55236	31113	20878	417457
1971	130434	112076	73805	59813	36153	15348	427629
1972	148935	116916	76224	62762	47516	10107	462460
1973	125649	112754	74578	43469	43129	22118	421697
1974	106977	78502	65617	47707	41338	14489	354630
1975	109802	81533	73393	50766	52106	14009	381609
1976	124334	88480	69201	38547	40343	9228	324111
1978	89619	69541	41289	21553	41968	7369	271339
1979	86913	50408	50200	25700	45873	5980	265074
1980	100363	74894	45051	19034	52301	4776	296419
1981	91537	47598	46632	25563	45148	1496	257974
1982	70790	49747	36890	22069	43703	1683	224882
1983	55310	35174	31254	17604	35109	3776	178227
1984	47059	29685	25504	13818	40161	2659	158886
1985	44692	28629	28009	18754	51412	1018	172514
1986	54466	36474	34612	27636	64731	1115	219034
1987	56870	32643	33399	26912	76038	1903	227765
1988	49766	28796	29951	19115	58738	1805	188171
1989	76268	48647	39193	28423	105894	1676	300101
1990	72124	45126	33296	31208	111513	1785	295052
1991	60958	42016	32261	26517	128955	2645	293352
1992	52467	33734	26196	19356	109469	1595	242817
1993	65353	37014	34608	29587	143288	2273	312123
1994	47172	30927	25372	21936	128323	924	254654
1995	64026	37014	33667	20518	153162	1068	309455
1996	81977	39048	38932	36410	206570	906	403843
1997	64534	34195	34306	22415	165361	1678	322489
1998	78909	39898	29468	29468	216955	976	409360
1999	74390	40212	40503	29653	210545	2060	397363
2000	82068	39310	41526	31360	240331	2351	436946
2001	72933	33110	46226	32136	203626	1681	389772
2002	56983	31354	39348	29992	181865	1021	340563
2003	82445	45308	51604	39989	276587	913	496846
2004	121269	69695	68634	55819	419650	1909	736976
2005	90535	55025	48868	59308	344246	1336	599318
2006	133026	72766	55871	55497	422223	1075	740458
2007	95427	65629	51132	43757	357827	761	614532
2008	124270	66921	55916	62378	369458	838	680781
2009	110643	61562	63405	60686	413395	951	710642
2010	116538	60600	55736	57562	359910	595	650941

Source: COCOBOD (2012)

[http://www.cocobod.gh/weekly\\_purchases.php](http://www.cocobod.gh/weekly_purchases.php)

## REFERENCES

- Anderson, K. and Nelgen S. (2012). Updated National and Global Agricultural Trade and Welfare Reduction Indexes, 1955 to 2010. Spreadsheet at [www.worldbank.org/agdistortions](http://www.worldbank.org/agdistortions). World Bank, Washington DC, March.
- Ashitey, E. (2012). Cocoa Report Annual. Global Agricultural Information Network, GAIN Report Number GH1202, USDA.  
[http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Cocoa%20Report%20Annual Accra Ghana 3-15-2012.pdf](http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Cocoa%20Report%20Annual%20Accra%20Ghana%203-15-2012.pdf)
- Balassa, B. (1965). Trade liberalization and revealed comparative advantage. *The Manchester School of Economics and Social Studies*, Vol. 33, No.1, pp. 99-123
- Ball, R.M. (1966). The Relationship between U.K. Export Performance in Manufactures and the internal pressure of Demand. *Economic Journal*, 76, 501-518
- Banterle, A. and Carraresi, L. (2007). Competitive performance analysis and European Union trade: The case of the prepared swine meat sector: *Food Economics –Acta Agricult Scand C*, Vol. 4, pp. 159-172
- BoG (Bank of Ghana) (2007). Balance of payments. Accra, Ghana.
- Breisinger, C., Diao, X., Kolavalli, S. and Thurlow, J. (2008). The role of cocoa in Ghana's future development. Ghana Strategy Support Program (GSSP) Background Paper No. GSSP 0011.
- Brooks, J., Croppenstedt, A., and Aggrey-Fynn E., (2007). Distortions to Agricultural Incentives in Ghana. Agricultural Distortions Working Paper 47, December 2007. World Bank, Washington, DC  
[http://siteresources.worldbank.org/INTTRADERESEAR/RESOURCES/544824-1146153362267/Ghana\\_0708.pdf](http://siteresources.worldbank.org/INTTRADERESEAR/RESOURCES/544824-1146153362267/Ghana_0708.pdf)
- Buliř, A. (1998). The price incentive to smuggle and the cocoa supply in Ghana, 1950-96. IMF Working Paper WP/98/88, International Monetary Fund, African Department.  
<http://www.imf.org/external/pubs/ft/wp/wp9888.pdf>
- Coulombe, Q. and Wodon, H. (2007). Poverty, livelihoods, and access to basic services in Ghana. Background paper for Ghana's Country Economic Memorandum, World Bank, Washington D.C.
- FAOSTAT. Agricultural Production Database. Food and Agriculture Organization of the United Nations.  
<http://faostat.fao.org/site/703/default.aspx#ancor>
- Hainmueller J, Hiscox M, Tampe M. 2011. Sustainable Development for Cocoa Farmers in Ghana. MIT and Harvard University. January 2011
- Hoekman, B. and Djankov, S. (1997). Determinants of Export Structure of Countries in Central and Eastern Europe. *The World Bank Economic Review* 11:3, 471-487
- ICCO (International Cocoa Organization) (2012). The World Cocoa Economy: Past and Present. EX/146/7. 26 July 2012
- IMF (International Monetary Fund) (2007). International financial statistics online.  
<http://www.imfstatistics.org/imf/>. Accessed October 2007
- International Rice Research Institute, IRRI. World Rice Statistics: <http://ricestat.irri.org:8080/wrs/>
- Kaplinsky, R. (2004). Competitions Policy and the Global Coffee and Cocoa Value Chains: Institute of Development Studies University of Sussex, and Centre for Research in Innovation Management, University of Brighton. [kaplinsky@ids.ac.uk](mailto:kaplinsky@ids.ac.uk). Paper prepared for United Nations Conference for Trade and Development (UNCTAD)



- Latruffe, L. (2010). Competitiveness, Productivity and Efficiency in the Agricultural and Agri-Food Sectors. OECD Food, Agriculture and Fisheries Papers, No. 30, OECD Publishing. <http://dx.doi.org/10.1787/5km91nkdt6d6-en>
- Leith, J.C. and L. Söderling (2000). “Ghana: Long Term Growth, Atrophy, and Recovery”. Report for the OECD Development Centre project on Emerging Africa, Paris: OECD
- Lundstedt, H. and Pärssinen, S. (2009). Cocoa is Ghana, Ghana is Cocoa. Evaluating reforms of the Ghanaian cocoa sector. Department of Economics at the University of Lund 2009:12. Minor Field Study Series No. 198. ISSN 0283-1589. <http://www.nek.lu.se/Publ/mfs/198.pdf>
- Majeed, M. T. and Ahmad, E. (2006). Determinants of exports in developing countries. *The Pakistan Development Review* 45: 4 Part II (Winter 2006) pp. 1265-1276
- McKay, A. and E. Aryeetey. 2004. Operationalizing pro-poor growth: A country case study on Ghana. A joint initiative of AFD, BMZ (GTZ, KfW Development Bank), DFID, and the World Bank. <http://www.dfid.gov.uk/pubs/files/oppghana.pdf>
- MoFA (Ministry of Food and Agriculture) (2011). Agriculture in Ghana: Facts and Figure (2010). Statistics, Research and Information Directorate (SRID), MoFA, Accra, Ghana
- Nwachuku, I.N., Agwu, N., Nwaru, J. and Imonikhe, G. (2010). Competitiveness and Determinants of cocoa export from Nigeria. *Report and Opinion* 2010; 2(7):51-. ISSN:1553-9873 [http://academia.edu/1015922/COMPETITIVENESS\\_AND\\_DETERMINANTS\\_OF\\_COCOA\\_EXPORT\\_FROM\\_NIGERIA](http://academia.edu/1015922/COMPETITIVENESS_AND_DETERMINANTS_OF_COCOA_EXPORT_FROM_NIGERIA)
- Osei, I. (2007). “Sustainable Practices in the Global Cocoa economy – A producer’s perspective”. In proceedings of the 4<sup>th</sup> Indonesia International Cocoa Conference and Dinner: [www.askindo.org/conference2007/program.html-21k](http://www.askindo.org/conference2007/program.html-21k) , [http://www.cocobod.gh/cocoa\\_marketing.php](http://www.cocobod.gh/cocoa_marketing.php)
- Pfaffermayr, M. (1996). Foreign outward Direct Investment and Exports in Austrian Manufacturing: Substitutes or Complements? *Weltwirtschaftliches Archiv* 132(2): 501-522
- Sharma, R. and Morrison, J. (2011). Articulating and mainstreaming agricultural trade policy support measures. *E-ISBN 978-92-5-106931-8 (pdf)*. Trade and Markets Division: Food and Agriculture Organization of the United Nations, Rome
- Stryker, J.D. (1990). Trade, Exchange Rate, and Agricultural Pricing Policies in Ghana: World Bank Comparative Studies. Washing D.C., World Bank
- UNCTAD (2013). Economic trends and foreign direct investment <http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx>
- Vollrath, T.L. (1991). A theoretical evaluation of alternative trade intensity measures of revealed comparative advantage. *Weltwirtschaftliches Archiv*, Vol. 130, pp. 265-279
- World Bank (2011). Supply Chain Risk Assessment: Cocoa in Ghana. Ghana Cocoa SCRA Report 2011 ARMT.pdf <https://www.agriskmanagementforum.org/doc/supply-chain-risk-assessment-cocoa-ghana> <https://www.agriskmanagementforum.org/sites/agriskmanagementforum.org/files/Documents/Ghana%20Cocoa%20SCRA%20Report%202011%20ARMT.pdf>
- World Bank. (2007a). World Development Report: Agriculture for Development. Washington, DC: World Bank.
- World Bank (2007). World development report 2007: Development and the next generation. Washington D.C.: World Bank