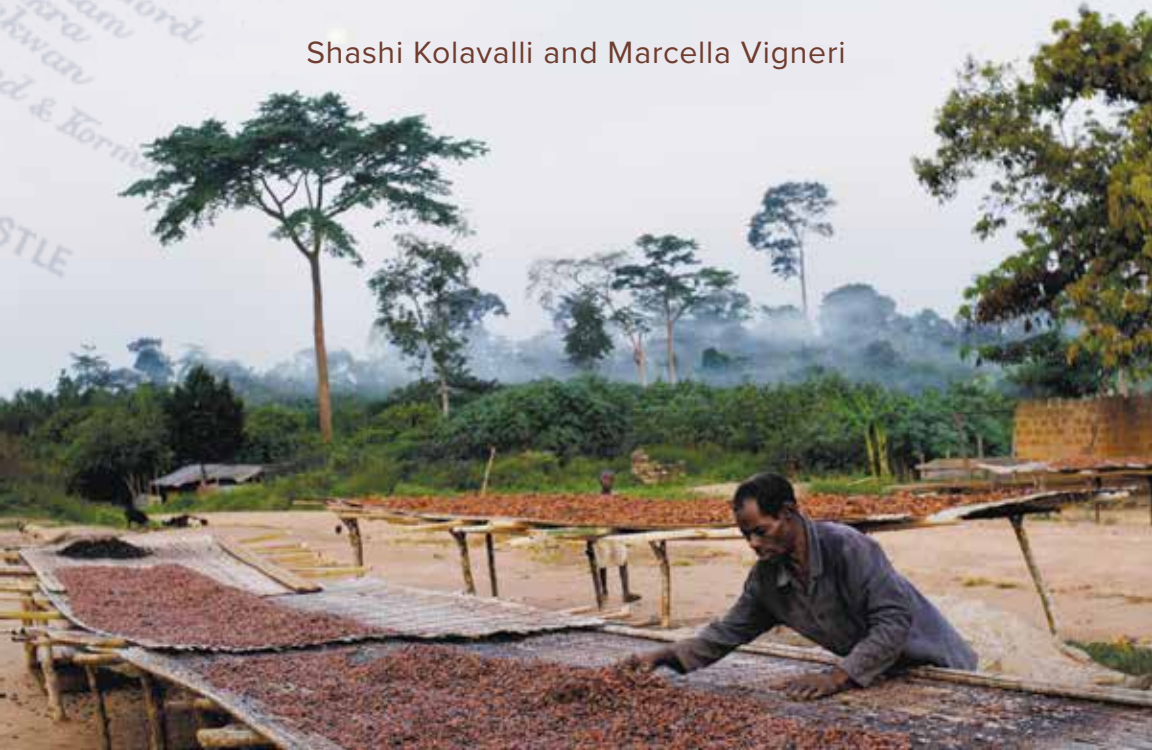
THE COCOA COAST

THE BOARD-MANAGED COCOA SECTOR IN GHANA

Shashi Kolavalli and Marcella Vigneri



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Abstract

The book examines how after nearly two decades of decline in cocoa production, Ghana was able to make reforms that increased the share of export prices going to producers, thus stabilizing and more than doubling production in the past decade. Moreover, these reforms did not include liberalization of domestic and export marketing. The issues examined include how a stakeholder-advised process for determining producer prices is delivering an increasing share of export prices to producers; how effective the Ghana Cocoa Board (COCOBOD) is in the activities it undertakes to retain a portion of the producer revenues to enhance productivity on smallholder farms and what the impact is on the private sector; and how centralized marketing and maintenance of the high export quality for which Ghana is reputed enables the country to offer stable prices to producers and opportunities for local businesses to participate in the sector and retain some power in the global value chain. Insight into the history, management, and political economy of COCOBOD is combined with detailed analysis of smallholder production, domestic marketing, and the global cocoa value chain. These lines of inquiry portray a sector that reemerged as a leading producer of cocoa after periods of disarray under different political administrations. The book concludes with recommendations on how Ghana can improve the efficiency of COCOBOD's necessary functions while cutting back on services that would be better provided by a private sector that could emerge.

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Foreword

Ghana has achieved sustained per capita growth over several decades, making it an economic success story. Its cocoa sector, which has seen sustained growth in exports of high quality cocoa, is no less of a success. Ghana's accomplishments are even more significant given the poor state of the cocoa sector and of the country's economy 40 years ago. *The Cocoa Coast: The Board-Managed Cocoa Sector in Ghana* seeks to understand how Ghana achieved such success without liberalizing its marketing, as Washington Consensus standards would call for, but instead through continued management by a marketing board.

The authors review the history and political economy of the Ghana Cocoa Board and analyze the Ghanaian cocoa sector using various survey data on cocoa farmers. The analysis shows that government accountability for cocoa-sector performance, centralized marketing, and high export quality have been important factors in Ghana's accomplishments. Looking forward, the authors find that Ghana could further improve its cocoa-sector performance through changes to the marketing board, including changes to reduce marketing costs. Marketing costs can be reduced through more transparent cocoa pricing and a greater role for the private sector. These reforms would offer farmers a larger share of prices and increase their access to inputs.

The Ghanaian cocoa sector's history, and *The Cocoa Coast*'s analysis of it, has important implications for economic development. While one school of economic thought holds that developing countries must liberalize their markets and abolish marketing boards, Ghana's experience shows that alternative approaches are possible, and aspects of Ghana's experience may be relevant to

reforms in other sectors and in other countries. This book provides a valuable case study in how a country can achieve high production levels in an agricultural sector without full market liberalization.

Shenggen Fan
Director General, IFPRI

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James Gockowski did a companion analysis of the impact of COCOBOD programs for the World Bank's policy document. We have drawn from his report and conducted our analysis in the spirit of his account. We are grateful to him for all the interactions over the years and his suggestions on simulating the effect of subsidies on household incomes by using various input levels (Chapter 6).

We are grateful to Francis Teal of the Centre for the Study of African Economies, Oxford University, for providing us with access to Ghana Cocoa Farmers Survey panel data. We also wish to thank the International Cocoa Initiative (ICI) for making available the 2013/2014 data from the Labour Market Research Study (2015), which was funded by the International

Finance Corporation, the Jacobs Foundation, the Lindt Cocoa Foundation, the Sustainable Trade Initiative, and the World Cocoa Foundation.

To understand the working of the sector, one of the authors had extended conversations with a cross section of stakeholders in the sector, including policymakers. They include the following, in alphabetical order: Richard Adu-Acheampong, senior research scientist, Cocoa Research Institute of Ghana (CRIG); Hon. Dr. Owusu Afriyie Akoto, then the minority spokesperson on the agriculture and cocoa affairs committee and currently the minister for food and agriculture; N. Akpebu, formerly of Federated Commodities Ltd.; Nana Obeng Akrofi, eastern regional chief farmer, Ghana Cocoa, Coffee, and Sheanut Farmers' Association (GCCSFA); Dr. Maxwell S. Amuzu, managing director, Cocoa Inputs Company; Felix Awu, Ministry of Food and Agriculture (MoFA); Alhaji Alhassan Bukari, national chief farmer, GCCSFA; H. E. John Agyekum Kufuor, former president of Ghana; Eric Obeng-Dapaah, district manager, Akuafo Adamfo Marketing Company Ltd; Reindolf Mark Teteh, district manager, Transroyal Ghana, Ltd; Jorgen C. Areentz Rostrup, Yara Ghana, Ltd. We are grateful to all of them.

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Chapter 1

INTRODUCTION

By the 1940s, the Gold Coast, as Ghana was formerly known because of the abundant gold deposits held by its several native kingdoms, had become the largest cocoa producer in the world. When Ghana became independent in 1957, it had the second-highest per capita income in Africa south of the Sahara and sufficient foreign exchange reserves to purchase three years of imports (Hadjimichael et al. 1996). Its relative prosperity was largely due to its foreign trade in cocoa, timber, and gold (Rimmer 1992). It had been an open economy for more than half a century and benefited from the opportunities to become relatively well off (Teal 2002). However, it was not rich by European standards, because the population was deprived of adequate social amenities, with the living conditions in the north considerably worse than those in the south.

The way in which the cocoa sector was managed is critical to how the sector fared and the nature of its impact on the rest of the economy. Beginning in the World War II period, the cocoa sector came under the control of the government, first with the British government offering to buy all the cocoa that was for sale from all its colonies as it became concerned with shrinking markets for cocoa and reduced transportation capacity during the war. These wartime purchases were followed by the postwar establishment of a marketing board with a monopoly over marketing. Although price stabilization was the stated objective of the state intervention, large reserves were built up by the practice of paying producers prices that were significantly lower than market prices. The disposal of these reserves was expected to have significant economic and political implications for these colonies (Bauer 1954b).

After gaining independence, Ghana retained the board to manage the sector. The first administration in the independent Ghana used the reserves built up by the cocoa marketing board to implement an ambitious but unsuccessful import substitution industrialization strategy. Depending heavily on cocoa for revenues and managing the sector through a bloated bureaucracy, even the subsequent administrations failed to offer producers adequate incentives.

Ghana's cocoa marketing board drove the cocoa sector into the ground as parastatal marketing boards did in many other countries.

Cocoa production, which had peaked at 581,000 tons in 1964/1965, making Ghana the largest producer globally with a share of 38 percent, was down to 160,000 tons in 1983/1984, bringing Ghana's share down to 10 percent and leaving Ghana as the third-largest producer behind Brazil and Côte d'Ivoire (Leite et al. 2000). Heavy taxation, inefficient state marketing combined with inflation, and overvalued exchange rates that eroded real producer prices contributed to the rapid decline of the sector (Stryker 1990). The distortions in the cocoa and agricultural sector, along with bush fires and drought, played a big role in the deterioration of the economy. By the early 1980s, per capita incomes in Ghana were reduced to half of what they were at independence.

The state control over the marketing of a profitable export commodity had longer-term, economy-wide effects. The government's ability to extract rents was central to the economic pathology that developed and persisted in Ghana (Frimpong-Ansah 1992). It encouraged the development of a large public sector and a political economy in which wealth acquisition became associated with political relationships (Rimmer 1992, cited in Austin 1996b). The failure of export agriculture was at the heart of the political and economic decline and disintegration of the Ghanaian economy (Frimpong-Ansah 1992; Stryker 1990).

Faced with few options as its economic situation worsened, Ghana adopted an Economic Recovery Program in 1983. Resisting Washington Consensus–based reforms that called for the abolition of parastatals, Ghana negotiated to reform the cocoa sector without liberalizing domestic and export marketing. Ghana committed to increase the share of export prices going to farmers primarily by reducing marketing costs. It eliminated many of the functions of the cocoa marketing board, including its participation in production and processing. It also implemented a cocoa rehabilitation project—revival of the cocoa sector, a major source of government revenue, was evidently an important aspect of the overall reforms.

The Ghana Cocoa Board (COCOBOD) began to use a stakeholder-advised process to set producer prices and the prices of other services in the sector.[1] Privatizing its cocoa-buying subsidiary, which had exercised a monop-

1 The agency responsible for marketing cocoa was created in 1947 with the original name of the Gold Coast Cocoa Marketing Board. It was renamed Ghana Cocoa Board, or COCOBOD, in 1984. The agency went through several name changes between 1947 and 1984, but for simplicity it is referred to throughout the book as "CMB," for Cocoa Marketing Board, during this 1947–1984 period.

oly over the purchase of cocoa from farmers, COCOBOD reintroduced the practice of using Licensed Buying Companies (LBCs) to procure cocoa from producers, requiring them to pay a price that it announced annually and that did not vary by region or season. This process came to be referred to as the partial liberalization of the cocoa sector (Kolavalli et al. 2012). The reorganized board, one of the few in Africa that retains its monopoly over buying and exporting, continues to set producer prices and administratively price other services in the sector.

By 2000 Ghana was able to increase the producer share in export prices to above 50 percent and bring production close to 400,000 tons. Beginning in 2001, as global cocoa prices rose, the government retained a significant portion of export revenues, as much as one-fifth in some years, to subsidize inputs and undertake plant protection spraying to increase and stabilize production. Production more than doubled in 2002 and grew to exceed 1 million tons in 2010/2011, making Ghana the second-largest producer of cocoa in the world. Cocoa productivity also grew significantly, but area expansion accounted for the bulk of the growth in production. Continuing to control the quality of cocoa exported, Ghana retained its reputation as a producer of high-quality cocoa, which earns a premium for its beans in the global market. It is now celebrated as a successful case of development through reforms in Africa, as it has increased production and productivity while maintaining the quality that gives it a certain amount of power in the global value chain (Williams 2009; Kolavalli and Vigneri 2011).

Ghana is considered a star economic reformer (Leecher 1994; World Bank 1993, cited in Aryeetey and Harrigan 2000). Although it benefited from growth immediately after implementing the reforms, growth failed to materialize in the medium term, which led policymakers to wonder whether it made sense to continue the reforms (Aryeetey and Harrigan 2000). In sectors such as agriculture and manufacturing, the growth rate could not restore the production levels achieved in the early 1970s (Aryeetey and Harrigan 2000). However, the reforms had succeeded in revitalizing a moribund economy (Fosu 2012). In the decades since the economic liberalization program began, the economy has performed significantly above average by African standards, although the performance has been below expectations (Aryeetey and Kanbur 2008). This continued growth is attributed to economic reforms that took place in the 1980s, and to the political reforms of the 1990s.

The growth record of the agricultural sector was modest in the decade following the reforms. While the economy grew at an average rate of 5.73 percent

between 1984 and 1989, agriculture grew at a rate of 3.6 percent, with much of the growth coming from cocoa (Nyanteng and Seini 2000). From 1990 to 1995, the economy grew at a rate of 4.3 percent, and agricultural growth came down to 2 percent. The cocoa component of the growth did much better during this time. Unlike in the cocoa sector, the productivity of non-cocoa crops did not grow significantly in the following decade (Diao 2005; World Bank 2007). However, there has been greater liberalization of product and input markets in the non-cocoa part of the agricultural sector even though there have been some reversals in the form of reintroduction of subsidies and state involvement in service provision (Benin et al. 2015).

Cocoa continues to be important to the economy, despite Ghana's efforts to diversify its exports since independence. Its share in gross domestic product (GDP) has declined to around 2 percent, but the share in the agricultural GDP hovers around 10 percent. And the export of cocoa beans and products accounts for 20 to 25 percent of total exports, behind exports of gold.

Objectives

This book seeks to understand the apparent success of a sector that was not liberalized and in which productivity growth and some power in the global value chains have been achieved by using some of the interventions typical of marketing boards, including the control of export quality. It also seeks to identify the opportunities to improve the performance of the sector, particularly in the operation of the parastatals that manage it.

In addressing these broad issues, this book attempts to answer the following questions:

- How has Ghana been able to increase the producer share of export prices without market liberalization? More specifically, does the stakeholder-advised process adequately take care of producer interests? What other factors might have played a role in increasing the producer share of export prices? More broadly, what does Ghana's experience say about the appropriateness of Washington Consensus–based reforms that required market liberalization as part of economic reforms?
- How effective has the Cocoa Board been in using a portion of producer revenues to enhance productivity on smallholder farms, and what has been the impact of its interventions on private sector development? Has the service provision been critical in ensuring the supply response, which has

failed to materialize elsewhere because of a breakdown in non-price support to smallholders?

- How does Ghana benefit from centralized marketing and the maintenance of export quality? What is Ghana's strategy to move up in the global cocoa value chain?

To gain an understanding of these issues, the book provides insight into the history, management, and political economy of COCOBOD, alongside a detailed analysis of smallholder production, domestic marketing, and the global cocoa value chain. The book also identifies potential areas for improvement in the management of the sector and examines whether there are lessons to be learned for other states undertaking reforms. It pays attention to political considerations that have influenced the way the sector was managed historically and continues to be managed today.

This research is relevant to policymaking as Ghana is updating its cocoa sector development strategy. With support from the World Bank, the board organized, on April 9, 2015, the second phase of a scenario-building exercise with the participation of stakeholders to feed into the strategy. The final draft of the Cocoa Sector Development Strategy II (2015) notes that improved professionalism, transparency, and efficiency of COCOBOD were some of the key issues raised in the new scenario-building strategy. But the document does not identify aspects of COCOBOD's management that could benefit from improved efficiency. This book contributes to the filling of this void.

Additionally, the resources that COCOBOD retains to offer services to producers are as large as, and often larger than, the budget of the Ministry of Food and Agriculture (MoFA), and these expenditures account for a significant portion of total agricultural sector expenditures. Making COCOBOD expenditures more effective would also potentially have spillover benefits for other crops and significantly increase returns to expenditures in the entire agricultural sector.

The book will contribute to three broad issues in the literature: (1) marketing boards, market reforms, and their outcomes; (2) the potential role that the state can play in supporting smallholder agriculture through activities that were typically undertaken by marketing boards, and the implications of this role for private sector development; and (3) the state's role in maintaining quality of exports. The following brief literature review relates to the three issues.

Literature Review

Political economy of marketing boards

Since the 1930s, developed and developing countries have used crop marketing boards to intervene in the trading of agricultural products. Typically, governments have used monopolistic boards to give producers prices above the market level for food crops in internal markets, or they have used monopsonistic boards to keep producer prices of export commodities below international prices (Barrett and Mutambatsere 2008). The raising of prices and farm incomes is usually the objective in establishing the first type of board. The second type, which is designated to buy produce for export, was established in British West African colonies during World War II, ostensibly to stabilize prices (Bauer 1991). These statutory monopsonies were established in 1947 and 1948 to buy and export all major agricultural commodities (cocoa, groundnuts, palm oil, palm kernels, and cotton) from West Africa (Nigeria, the Gold Coast, Sierra Leone, and The Gambia) and later on from the rest of British Africa (Bauer 1954a). Marketing boards are of British origin; the French and the Belgians replicated them (Jones 1987).

The West African marketing boards were the largest statutory export monopolies in the colonies of the British Empire, and their financial resources exceeded those of the West African colonies (Bauer 1954b). Because as monopolists they could set prices unrelated to market prices and influence the direction of production, their operations greatly influenced the well-being of farmers in these territories (Bauer 1954a). They had extensive powers over intermediaries and processors. Possession of large amounts of funds also gave the parastatal organizations strategic importance in the economies (Bauer 1954a).

The rationale, in British-controlled West African countries, for state involvement as the world war began was to prevent the collapse of cocoa prices and to encourage the export of other produce. However, most of the boards were established to serve the interests of expatriate farmers and traders, and to generate revenues for the public sector (Bates 1989). In many cases, falling prices were a concern as well (Harris 1981, cited in Lele and Christiansen 1989). During the war and the early postwar years, merchants bought the produce on behalf of the boards. Marketing boards were often confined to export crops produced by numerous local small producers but marketed by European trading firms.

After becoming independent, countries often retained these institutions as governments came to see them as instruments of agricultural

development to ensure food security, to perform development functions, and to stimulate agricultural production (Lele and Christiansen 1989; Akiyama et al. 2001). Boards were a prominent part of the administrative apparatus, and they were seen as engines of growth, perhaps in the interest of self-perpetuation (Jones 1987). Importantly, marketing boards helped the countries maintain political control over strategic commodities and provided them with sources of political patronage (Lele and Christiansen 1989). The importance of patronage to parties in power made the boards' abolition difficult (Jones 1987).

Ideology too played an important role. An inward and state-oriented development paradigm driven by pervasiveness of market failures and export pessimism peaked a quarter century after the end of the World War II (Kanbur 2009). It provided the rationale for import substitution and motivated independent African countries to set up state marketing boards to protect producers from wild fluctuations in world prices and exploitative middlemen. And monopsonistic boards were used to tax exports and often divert resources for general development, a practice that was carried over from the colonial administrations.

It was not uncommon for governments in developing countries to transfer resources from agriculture to develop other sectors, but the monopsonistic marketing boards that had been established by colonial governments gave African countries an advantage over others in doing this so conveniently (Bates 1981). Such transfers out of agriculture were perceived to be feasible because of urban bias: urban populations presumably were more able and willing to organize themselves to influence government choices at the expense of rural populations (Bates 1981). The newly independent countries were keen to industrialize rapidly to catch up with the rest of the world, and the dominant view then was that agriculture was backward and could not be depended on to stimulate overall growth. Industrialization and social service provision were therefore encouraged (Eicher 1999). Until the early 1970s, given the perception of inelastic demand for commodity exports, both donors and external policy advisers encouraged the taxing of agriculture to raise the resources needed to modernize and industrialize economies (Lele and Jain 1989, cited in Lele and Christiansen 1989).

The outcome of state-managed marketing was usually insolvency of parastatals, combined with the decline of the sectors managed by them. West African boards, for example, were characterized by misuse of funds, inefficiency in their performance, and the depressing effects on farm production of their policies (Jones 1987; Oya 2007).

Market reforms in Structural Adjustment Programs

The elimination and attenuation of marketing boards began with Structural Adjustment Programs (SAPs) that many African countries undertook in the early 1980s. They were based on a set of recommendations referred to as the Washington Consensus. The key elements of this consensus were economic stabilization, privatization, and liberalization—elements that were routinely followed by a generation of technocrats (Rodrik 2006). The Washington Consensus postulated that trade liberalization would get the "prices right" and that when liberalization was combined with privatization and deregulation, growth would be achieved in the presence of macroeconomic stability (Noman and Stiglitz 2015). The removal of price distortions was expected to unleash the production potential of otherwise exploited and overtaxed producers (Oya 2007). The neoliberal package for agricultural reform included liberalization and deregulation of markets through, among other measures, abolition of parastatals and withdrawal of input subsidies to farmers (Scoones et al. 2005).

Agricultural market reforms were at the forefront of the SAPs because of the importance of agricultural sectors in the region, and these reforms were intended to reduce or eliminate bias against agriculture. These reforms usually included the removal of subsidies, the realignment of domestic and international prices, a reduction of distortions in foreign exchange, the elimination of pan-seasonal and pan-territorial pricing, the easing of regulatory controls in input and output markets, a restructuring of public enterprises, and the withdrawal of marketing boards (Kherallah et al. 2002).

The extent to which the operations of marketing boards were curtailed by the SAPs is not clear. At least until the end of the 1990s, a significant number of boards had retained some of their critical functions. In a sample of 14 marketing boards devoted to grain, only 1 was liquidated, while buying and selling monopolies were abolished in 8, but administered pricing was maintained in 8 (van der Laan and van Haaren 1990). Of the 21 marketing boards devoted to raw materials, 6 were abolished (5 of them in Nigeria alone), monopoly was maintained in 10 (of 15) of them, and a producer price system was maintained in 13 of them (for cocoa, coffee, cotton, and tea). Protecting farmers and avoiding the domination of exports by foreigners were the key arguments offered for retaining the role of boards.

Although countries in Africa south of the Sahara adopted a substantial portion of the Washington Consensus policy agenda by diminishing the role of marketing boards, reducing inflation, opening up trade, and privatizing to a significant extent, their economies failed to take off (Rodrik 2006).

In fact, Africa's severest period of decline, between 1980 and 1995, coincided with many of the reform programs (Noman and Stiglitz 2015). Foreign direct investment into the countries remained low outside of the natural resources sector, deindustrialization took place, and a disproportionate share of employment continued to be in informal activities. In addition to countries in Africa, many of the countries in Latin America that opened their trade and relied on markets did not benefit from growth to the extent expected (Kanbur 2009). Noman and Stiglitz (2015) also note that those who attribute positive performance to Washington Consensus policies ignore the effect of booms in commodity prices and the performance of countries such as Ethiopia, Rwanda, and Botswana, which adopted only some of the Washington Consensus policies.

Crop-specific reforms produced a range of outcomes, from failures to successes depending on the crop and the nature of previous interventions (Akiyama et al. 2001). The reforms' consequences varied from being patchy to being completely absent (Scoones et al. 2005). Producers, particularly of some important grains, faced increased volatility as domestic prices were linked to world prices. Some suggest that the reforms' diverse outcomes were because the reforms were not always carried out in full and in many cases were reversed (Jayne et al. 2002). There are also doubts that reforms, even when fully implemented, generated adequate incentives for producers (Anderson and Masters 2008). Farmers lost the support they once received from parastatal marketing boards and government research and extension systems but did not gain adequate new support from alternative sources (Scoones et al. 2005). While an increasing share of prices was transferred to farmers, the failure to develop alternative sources for the supply of services previously provided by marketing boards decreased input use (Dorward, Kydd, and Poulton 1998, 2011). Structural and institutional constraints contributed to uneven and weak supply responses to incentives following reforms (Kherallah et al. 2002).

Dorward, Kydd, and Poulton (2011) argue that there is need to get not only prices but also institutions right; markets cannot be expected to work if the coordination is weak and institutions are missing. Agricultural successes of the past two decades are also not associated with "pricist" reform packages (Oya 2007). The emphasis on "good governance" may be a limited agenda in the sense that it limits government to enabling only the private sector rather than developing its overall capability to become the direct agent of development that has played an important role in many of the economically successful developing countries (Noman and Stiglitz 2015).

State interventions, most notably in subsidizing inputs, fertilizer in particular, reemerged following the 2006 Africa Fertilizer Summit held in Abuja, Nigeria. Fertilizer subsidies were reintroduced following increases in the prices of both food and fertilizers, to achieve food security in the short term. Fiscally sustaining subsidy programs, and intervening in markets without crowding out the private sector, have been challenges associated with subsidy programs (Jayne and Rashid 2013).

Market reforms and quality

Another aspect of market liberalization is what it does to the quality of commodities traded. One of the issues is whether the quality of commodities supplied declines following reforms and whether such a decline is a good or a bad thing. Quality control, one of the key functions performed by commodity boards, was either abandoned or severely curtailed by the reforms of the 1980s and 1990s. The speed and extent of the withdrawals from maintaining quality control varied across countries and crops. And outcomes have been mixed. In some cases, such as that of Nigerian cocoa, quality deteriorated drastically, while in others, such as coffee in Uganda, the decline may have been only marginal. There are also cases where the private sector appears to have been able to deliver the quality demanded and be rewarded in the markets (Kherallah et al. 2002).

In the cocoa sector, market liberalization has generally contributed to a decline in the quality of beans coming into the market (Varangis and Schreiber 2001; Fold 2001; Ponte 2002). This decline is reflected by the increased practical difficulties associated with fulfilling contracts and meeting contract specifications, as well as increased arbitration in the industry (LMC International 2000). Côte d'Ivoire and Nigeria are examples of countries where reform was associated with declines in quality. In Côte d'Ivoire, the key problems that emerged were an excessive mixing of beans of different quality levels and the high content of free fatty acids in insufficiently dried beans that were brought to market. Intense competition for beans in the absence of quality checks up-country led to a decline in the quality of beans brought to market. Similarly, in Nigeria cocoa buyers purchased beans at high prices with little regard for quality, and much of the bean supply was exported before it was fully fermented and dried (Masters and Abbott 2000).

Gilbert and Tollens (2002) argue that any quality reduction following market liberalization may be because the level of quality supplied prior to liberalization was suboptimal in the sense that parastatals were delivering higher

levels of quality than demanded by the market. An extension of this argument is that the private sector will deliver the quality that is demanded by the market, and hence there is little rationale for state involvement.

The source of demand for quality in value chains is tied to chain governance. Governance is the exercise of control along the chain through the specification of what type of product needs to be supplied, by whom, in what quantity, and when it should be produced, how, and at what price (Bolwig et al. 2010). Chain governance can be understood by examining relationships among firms in value chains to see if any of the actors play a lead role in dictating the terms of production and exchange, with implications for the distribution of benefits among various actors (Gereffi and Korzeniewicz 1994). The lead firms are those that exercise such power, organize activities, and dictate the terms of participation to their immediate suppliers; they are also capable of transmitting the demand upstream all the way to producers. Such power may make some players capable of imposing rules that make them gatekeepers to participation in value chains (UNIDO 2011). What the lead firms demand would obviously be influenced by the changing nature of their operations, processing technologies, and consumer preferences.

Commodities often develop geographic-source-related reputations for quality. In the absence of any state regulation to maintain such reputations, competition could lead to a race to the bottom. Private companies may not necessarily have the incentive to build regional or national reputations. In deregulated markets, voluntary coordination to build reputations may also be hampered by the large number of actors (Ponte 2002). There is evidence to suggest that companies and individuals would have incentives to benefit from reputation by freeriding—supplying products of lower quality, thereby undermining the reputation. Therefore, a system of regulation is required, particularly if the commodity cannot be traced back to the supplier. If the commodity is traceable, others would know who is cutting on quality (Winfree and McCluskey 2005). Additionally, transnational companies may optimize their operations over several country markets in which they function, either choosing to source quality commodities from wherever it is convenient for them or specializing in bulk trading, depending on the strategy of the individual firm. A country cannot depend on transnational firms to build the reputations of the commodities it exports. The challenge of building a national reputation falls on the countries themselves.

State intervention would also be justified if there is externality in the sense that poor quality produced by one farmer may affect the price obtained by others if the beans are bulked together (Gilbert 2009). If a private agent does

not set up a system of buying in grades, producers will have no direct incentive to maintain crop quality.

Value addition, which is a major concern of commodity-exporting countries, relates to "upgrading" value chains to improve the competitiveness of an entire value chain or the position of one or more actors in the value chain. Improving a value-chain actor's position might involve enabling producers to move up the value chain by shifting to more rewarding functions or products that have more value added to them (Gereffi 1999 cited in Bolwig et al. 2010). The moving up could be improving the efficiency of processes, producing more sophisticated products, or simply increasing the volume of whatever is being produced. In the context of agriculture, improving productivity through technology adoption could be viewed as improving processes, while improving the quality of outputs could go under the category of product improvement (Riisgaard et al. 2010).

Data Sources

The book uses several datasets to analyze productivity and technology adoption. The Ghana Cocoa Farmers Survey (GCFS) is a unique farmer-level, five-year panel collected every other year since 2002. The data were constructed using a stratified random sample of farmers, geographically representative of the cocoa-farming population across 25 villages in the Ashanti, Brong-Ahafo, and Western Regions of Ghana.

The survey was designed and managed by the Centre for the Study of African Economies in collaboration with COCOBOD. The first round of the panel referring to crop year 2001/2002 was sampled to be representative of the cocoa producers' population, and it included 500 individuals drawn from the 1998/1999 Ghana Living Standards Survey (GLSS), with sampling weights based on the number of individuals who reported cocoa as the most important source of annual revenue for their household. Subsequent rounds of the panel were invariably subject to an attrition rate that ultimately led to a five-year panel of 179 farmers. In the analysis presented in this book, we have used data for farmers who were surveyed for at least three consecutive crop years. This enabled us to use a minimum of 400 observations for each round of the dataset, and resulted in a total sample size of 1,931 observations.

The impact of various spraying initiatives aimed at protecting cocoa trees from pests and diseases is analyzed through a combination of the above-mentioned panel from Oxford University and also by looking at a

cross-sectional dataset designed and collected by the International Cocoa Initiative (ICI) with reference to the 2013/2014 cocoa season. The ICI survey data included 917 observations of cocoa farm managers and were collected in late 2014 in the Ashanti and Western Regions for a Labour Market Research Study (Vigneri and Serra 2016). The sampling frame of the ICI data was purposely designed to include districts from the GCFS by Oxford University but also to cover the Boako and Bosomoiso cocoa districts in the northwestern part of Western Region.

Organization of the Book

The book examines the cocoa sector at three levels: the producers, the sector in the country, and the sector as part of the global value chain. These topics are organized into seven chapters. We begin with sector-level analysis in Chapters 2, 3, and 4, which provides the institutional background for the rest of the chapters. Chapters 5 and 6 present producer-level issues: development of cocoa in virgin forests to benefit from one-off fertility intensification technologies, recent productivity growth from intensification, and the impact of some of COCOBOD's programs. Chapter 7 examines global value chain issues, how Ghana has strengthened its position by continuing to maintain the quality of exports, and the concerns about the welfare of producers. Chapter 8 presents conclusions.

Chapters 2, 3, and 4 present, respectively, the decline of the sector by the early 1980s, by which time production had fallen to almost half of the levels Ghana had reached in the early 1960s; the reforms of the sector that led production to more than double and to exceed 1 million tons by 2010; and an assessment of whether the current set of institutions will continue to offer adequate incentives to producers.

Chapter 2 discusses the decline of the cocoa sector and covers three issues: the use of cocoa reserves and revenues for broader development purposes, which includes the question of whether this was a result of urban bias or a consequence of the dominant development ideology that existed then; the erosion of the producer share due to an overvalued exchange rate and inflation; and the dependence on cocoa revenues that led to urban bias.

Chapter 3 presents the nature of the reforms undertaken, including the reasons for not liberalizing internal and export marketing. It discusses the details of how producer prices are determined through the stakeholder-advised process, and the modification made to the process to withhold revenues for

offering services is discussed. Finally, it looks at the outcomes of reforms in terms of growth in producer share in export prices and real producer prices and producer supply response.

Chapter 4 examines the key issue of whether the stakeholder-advised process for determining prices can be expected to control marketing costs to offer adequate incentives to producers. With a review of trends in the share of producers, marketing costs, and export taxes on export revenue, the chapter examines whether producers exercise considerable political power and what other factors might influence the government to continue to offer incentives to producers. It also examines the trends in the costs for the parastatals engaged in marketing, including the patterns in the parastatals' expenditures on provision of services to producers.

Chapters 5 and 6 present the microeconomic analysis of cocoa production. Chapter 5 begins with a discussion of the trade-offs between cocoa production and the environment that result from cocoa production exploiting the one-off fertility and microenvironment offered by virgin forests. It then examines the patterns and factors associated with intensification using the GCFS data.

Chapter 6, using two other sets of data, examines the yield impact of intensification programs managed by COCOBOD and a non-private spray initiative. Quantitative analytical tools are employed to estimate the impact of public and non-private spraying and fertilizer use. The coefficients from these estimates are then used to model various policy options. This analysis addresses the issues of who benefited from this program and what might be the outcomes if the cocoa revenues allocated to services such as public spraying were instead given to producers in the form of higher prices.

Chapter 7 continues the examination of COCOBOD's role in the sector, particularly its role in maintaining the quality of exports. The chapter begins by discussing the organization of the global value chain, attempts by local players to participate in activities downstream, value addition at various stages, and Ghana's reasons for choosing to export beans instead of processed intermediates. It discusses the process that Ghana employs to maintain quality, the premium it earns, and the costs and benefits. Finally, it explores the incomes of cocoa producers, who produce an input for a luxury consumer product, and poverty reduction among producers relative to non-cocoa-producing households.

Chapter 8 concludes by considering some implications of the study's findings and offering recommendations to improve the effectiveness of COCOBOD. The implications include the notion that market liberalization is not the only option for reforming the agricultural sector; a few

points should also be considered when examining various alternatives to liberalization, including the appropriateness of setting up a marketing board where there isn't one. The recommendations focus on increasing transparency to improve decisions on the use of cocoa revenues for delivery of industry services, and selective use of the private sector to improve service delivery effectiveness.

Chapter 2

THE DECLINE OF THE COCOA SECTOR IN GHANA

Using savings from other enterprises, capitalist farmers cleared virgin forest land to develop the cocoa sector in Ghana. The farmer's goal was to benefit from access to global markets. The access was provided by merchants who both imported goods into Ghana and exported local commodities. Because of market interventions established by the colonial government, cocoa sector development led to the accumulation of substantial reserves that became available to the independent government for embarking on an ambitious but unsuccessful development agenda. With cocoa continuing to be a major source of government revenue as the economy plummeted, raising government revenues took priority over offering remunerative prices to producers. By the early 1980s, as the share of export prices received by farmers fell below one-fifth, production fell to one-half of the peak Ghana had achieved in the 1960s.

This chapter provides an overview of how the cocoa sector developed in Ghana and how it came under the control of the government and eventually collapsed. It begins with a description of who initiated the development of cocoa in the country, where the developers obtained the technologies, and whether the necessary factors of production were available that facilitated the development of the sector. It discusses the circumstances that led to government interventions in the market and the political and ideological context in which the first postindependence administration used cocoa reserves and revenues for broader development. And it discusses the decline in producer share because of overvalued exchange rates and inflation, despite the efforts of some of the subsequent administrations to maintain incentives. Finally, the chapter notes cocoa's role in distorting the size of the public sector and the urban bias that developed as a result.

Development of the Sector

Overview

The availability of virgin forests and presence of capitalist farmers who wanted to establish a new export crop were the keys to the development of

cocoa in Ghana. Although a single Ghanaian farmer is often credited with introducing cocoa in the country, several workers who returned from employment in Nigeria and Cameroon, where they came into contact with cocoa cultivation and found it similar to the oil palm they already produced in Ghana, likely played key roles in establishing cocoa (Green and Hymer 1966).

By the early 1900s, indigenous farmers in the Akwapim area in the future Eastern Region decided to grow new cash crops such as cocoa and coffee on a large scale in the neighboring forests using the profits they had accumulated from palm oil and rubber production (Amanor 2010). The possibility of acquiring imported consumables, services, and housing motivated the farmers' expansion into the production of another export crop (Killick 2010). They did not have the required land but found chiefs willing to sell scarcely used forest lands farther west across the Densu River in Akim country (Hill 1961). The investors used the prospect of gaining access to land to attract labor from other regions and neighboring countries. Most of the cocoa that was produced up until 1911 was grown on land bought outright by stranger-farmers for the sole purpose of cultivating cocoa (Hill 1961). Cocoa establishment was rapid: exports increased from almost zero in 1892 to 50,000 tons, valued at 2 million pounds free on board (FOB) in 1914. By 1911 Ghana had become the largest producer of cocoa in the world (Hill 1961).

Cocoa expansion, which lasted until the early 1940s, took place largely through land expansion supported by migrant laborers attracted with the prospect of acquiring their own land (Amanor 2010). The migrant investors, often in groups either of extended family members or companies, were capitalists who bought land, parcels as large as 2–3 square miles, specifically to produce cocoa. Members of land-buying companies, usually not related to one another, shared the land in strips in proportion to their contribution to the company. Many migrants invested in cocoa using the profits generated from other economic activities such as oil palm cultivation, rubber trading, and craftsmanship (Hill 1961). Subsequently, they reinvested their earnings into more land to expand their cocoa production. They did not employ paid labor until they had enough fruit-bearing trees to share the produce. Instead, they often installed relatives at each plot to locate more land for expansion. They also invested in infrastructure. By 1914, for example, migrants had built three bridges across the Densu River and recouped their investments by charging tolls to cross (Hill 1997). The migrants, however, were a stratified group depending on how much capital they brought into the enterprises (Arhin 1988).

The bulk of the investments in cocoa development in the form of capitalization of labor took place between 1891 and 1911 with little social cost;

because many of the men who entered the cocoa labor force were previously unemployed (Killick 2009; Teal 2002). As a result, exports of palm oil did not decline significantly until cocoa had been established for 20 years (Hill 1970). However, Austin (2012) argues that the "vent for surplus" explanation is not accurate and that labor shifted to cocoa from less productive activities, rather than just from unemployment.

Favorable factor markets

The supply of planting material and a market for outputs, the other requirements for establishing a new crop, were also in place: coffee and cocoa seeds and seedlings were available in the Aburi botanical gardens, and there were exporters based at the ports. Mercantile houses played a big role in developing the industry by providing the initial market, offering crop advances, and eventually establishing a system of up-country buying (Green and Hymer 1966). The traders were interested in expanding West African exports to create a larger market for the goods they imported from Europe.

The factor markets were also favorable to cocoa development. Cocoa investors faced a private market for land. Labor was not a limitation, as the initial development was done using only family labor and the labor needs could be met without affecting their production of food crops. But the investors were not supported with infrastructure (Bates 1980). Colonial systems were often designed to benefit foreign nationals, including the purchasers and shippers of cocoa. The railways and ports that were developed to support the mining industry did not favor cocoa production (Bates 1980). Purchasers of cocoa and larger growers offered sources of capital for expanding cocoa production (Bates 1980). The bulk of the development took place without substantial government support: expenditures by the state on providing services to the sector were insignificant compared to the revenues generated (Beckman 1976).

Land tenure, however, became insecure for latecomers, as title could not be registered, although land transactions could be (Rimmer 1992). Nevertheless, tenancy rights were strong enough for farmers both to pledge them as collateral when borrowing and to lose them to moneylenders. After independence, the government initiated a program to free the lands from moneylenders. As land become scarcer, outright purchases became less common (Awanyo 1998). Outsiders who bought land had less than full rights; they engaged in both "inclusion strategies" and "exclusion strategies" to strengthen their property rights. Inclusion strategies included annual payments over and above what they thought was the sale price of the land and regular tribute to gain social inclusion. An exclusion strategy that they adopted was to get all parties to

sign on-the-ground plans and to invest annually in cocoa planting to ensure that the full area they had negotiated for was planted with cocoa. They did this without regard to the prices they expected to receive. When land became scarce by the second half of the 1960s, sharecropping arrangements increasingly replaced land sales, until all existing cocoa frontiers within the forest zone had been colonized by the end of the 1970s.

Attempts to establish large estates under Western management systems using modern methods and equipment were not successful. Regular planting, heavy weeding and maintenance, and mechanized drying under European management systems did not yield enough of an increase in productivity to pay for the additional labor, at the wage levels that African farmers paid for labor, required for these activities (Green and Hymer 1966). Large capital investments are required for processing, and skilled management doesn't necessarily lead to higher yields (Wood and Lass 1992). One example of such a failure was the United Africa Company's attempt in 1930 to establish an estate (Hancock 1942, cited in Killick 2009).

Austin (1996a) argues that in the unstable price environment, survival of cocoa farms required the capacity to rapidly adjust costs downward. African producers could adjust their costs as some of them moved to opportunities in mining when cocoa prices were down, or abandoned planting, weeding, and even harvesting in areas with high transportation costs. Locals also simply left weeds to overgrow where there was capsid attack, which cleared the immediate area of the pest attack in a few years.[1] Local practices of fermenting in heaps were also more effective than labor-intensive fermentation in boxes. Labor inputs on estates were higher. Even large farms that practiced extensive indigenous farming practices were able to survive. They usually reduced all labor when cocoa prices were down except for that for harvesting.

Origins of Control and Resource Transfer

Rationale for market intervention

A network of agents, usually large-scale farmers and traders who represented foreign merchant firms that exported cocoa from the country, competed with one another to buy cocoa from farmers. The foreign merchants felt that there was excessive competition among themselves and that the

1 Capsids are sap-feeding insects that destroy young shoots and leaves, leading to complete defoliation.

middleman agents were exploiting them and the producers. They announced in 1937 a market-sharing arrangement that resulted in a producer holdout. The Nowell Commission, which was appointed to look into the dispute, felt that European merchants, who competed intensely, paid adequate commissions to the African agents who acted as middlemen, but the middlemen did not pay decent prices to producers. African middlemen were blamed for simultaneously victimizing cocoa growers and cheating exporters. The European merchants also claimed that cocoa buying was not profitable by itself but was essential to complement their trade in imported merchandise. However, there were several major firms that engaged in the export of cocoa alone. The Nowell Report, published in 1938, recommended the establishment of collective marketing organizations. But war broke out in 1939 before any action could be taken.

Because of the threat of losing the market due to the war, the British government announced in 1939 that it would buy all the cocoa at seasonally fixed prices through the cocoa control section of the Ministry of Food. In 1940 the West African Cocoa Control Board (WACCB) took over cocoa purchasing; two years later it was renamed the West African Produce Control Board (WAPCB) to include control over the export of groundnuts and palm oil. There were three objectives for wartime control over exports: to deny supplies to the enemy, to prevent a collapse of the local price of cocoa (there was a threat of price collapse because of the expected difficulties in securing transportation space and the disappearance of certain markets, primarily Germany), and to expand the export of groundnuts and palm oil after 1942. There were also three principal elements of control: licensing of exports to direct them to certain destinations, a statutory monopoly in the handling of exports, and a system of quotas in the purchase of export produce (Bauer 1954a). The merchant firms would participate under a quota system based on their past performance.

Export merchants involved in the cocoa trade were appointed as agents to buy the produce from the growers. During the prewar and postwar period, they purchased cocoa in accordance with official quotas based on prewar performance. These quotas turned out to be an extension and enforcement of prewar market-sharing arrangements of merchants to safeguard their profits. Although a statutory monopoly on exports was not necessary to achieve the objectives, it may have been favored by the association of merchants and seen as an effective way to enforce quotas. WAPCB sold all the produce to the ministry, but it received lower prices than other bulk suppliers to the ministry did.

The justification to stabilize prices and incomes emerged from a confluence of events and opinions from the previous decade: the belief that middlemen are socially unproductive and attempt to restrict competition; the formation of export control boards during wartime, which created influential administrative positions, the perpetuation of which was an incentive to argue for the boards' continuation; and a perception that compulsory saving could be an instrument for the development of backward areas (Bauer 1954a). Finally, in 1947 the Gold Coast Cocoa Marketing Board took over the WAPCB. Marketing boards were established in both the Gold Coast and Nigeria to buy cocoa from producers; in 1947 a joint marketing company was also established in London to sell cocoa from both countries (Bauer 1991).

In the 1940s, it was also believed, particularly after the analysis of West African trade by the Nowell Commission, that price stabilization was desirable, although how it would be done was never addressed. There was advocacy for direct investments in underdeveloped countries and also for a large measure of socialization of peasant savings, in which forced peasant savings are invested in national development, in these countries. And there was a clear link between the desire of the merchants for a quota system and the establishment of statutory control over exports. These factors may have influenced the policies of marketing boards more than did price stabilization. The boards exercised close control over producers, traders, and processors that was not necessary for price stabilization.

Substantial surpluses accumulated by the boards were seen as a sign of their success in trading operations. British civil servants who managed the boards derived prestige from the achievement of surpluses. The surpluses accumulated before the establishment of boards were strangely offered as an argument to continue with the boards. The impracticability of returning to producers the surpluses that had been accumulated and the need to organize the spending of these funds to benefit the communities were presented as reasons for establishing representative boards. Cocoa was taken over by a marketing board in the Gold Coast in 1947 (Bauer 1954a).

There was never any clarity on how prices or income would be stabilized. Bauer and Paish (1952) proposed a formula for the Gold Coast marketing board for setting producer prices that smoothed prices while maintaining contact with market prices. Friedman (1954) argued that such a price-setting formula was not needed because individuals would achieve the same result on their own. The greater political effectiveness of boards relative to farmers contributed to the boards' perpetuation (Bauer 1991).

The boards accumulated considerable revenues. The Gold Coast Cocoa Board received 21 million pounds sterling of reserves from WAPCB in 1947 and increased the reserves to 76 million pounds sterling by 1951. As a percentage of producer prices, the surplus ranged from 60 to 180 percent from 1947/1948 to 1950/1951, but in 1948/1949 there was a small withdrawal from the reserves (Bauer 1954b). Statutory marketing affects producers in three ways: by building up surpluses among marketing organizations, by imposing duties, and by creating differences between commercial values and actual sales proceeds. The last process could be referred to as "underrealization." From 1939/1940 to 1950/1951, surpluses were 59 percent, the export duty was 15 percent, and total levies were 81 percent, including 6 percent underrealization. Total levies increased to nearly 95 percent by 1951, with duties as high as 39 percent. From 1939 to 1961, Killick (1966, cited in Bauer 1991) estimates that nearly 44 percent of producer revenues were withheld by the board in Ghana.

Cocoa was sold mainly to the Ministry of Food, but it went as well to other destinations, primarily the United States. The prices received from the Ministry of Food were 10 to 15 percent less than what the board received from sales to the United States. Because the board could determine the producer prices, it withheld about three-eighths of FOB from producers between 1939 and 1947 (Bauer 1954b). The prices paid for other products by the Ministry of Food bore no resemblance to market prices, because the ministry just added transportation costs to whatever was paid to the producers. There was little evidence that statutory marketing organizations paid better prices by eliminating middlemen. That accumulated reserves could not be returned to individual farmers was used as a rationale for continued statutory marketing. Official statements did not discuss questions such as whether stabilization would be of prices or incomes and over what period stabilization would take place. The best arrangements for the board's procurement would be left vague. Although price stabilization was the primary objective of establishing marketing boards, it was not mentioned in the ordinances.

Cocoa revenues were invested in UK securities and local investments. The operations of boards accounted for one-third of the net increase in West Africa's sterling balances (Hawkins 1958). Some of the reserves were put into initiating research on controlling cocoa pests and diseases, swollen shoot disease in particular, which were threatening the sector. Loans were made to producers to free themselves from indebtedness to moneylenders. The colonial government was not averse to using cocoa revenue for general development. Even before independence, cocoa revenues were used to support general

development, such as the creation of an agricultural college (Arhin 1985). The colonial government also set up a commission to look into the feasibility of taxing cocoa to raise revenue for the development of railways (Amoah 1998).

Use of cocoa reserves

Although the Ghanaian economy was the second richest on the continent when Ghana gained independence, social amenities were still in short supply. Kwame Nkrumah, who was the first president, treated the cocoa revenues as a strategic resource in the effort to transform the Ghanaian economy (Killick 2009). He believed that rapid industrialization rather than agricultural development could improve living standards. He also felt that an economy dependent on a single export crop would be vulnerable, sharing a widely held belief that the terms of trade would turn against primary commodities. At the time, the prevailing school of thought on economic development was pessimistic about the extent to which international trade in primary commodities could stimulate growth in poor countries (Alderman 1994). Diversifying away from cocoa had been a policy of the colonial government since 1919, when Governor Gordon Guggisberg first pushed for it (Anyemedu 1991).

The preference for industrialization was a result of a mixture of nationalism and socialism, which associated industrialization with development (Leith and Lofchie 1993; Gyimah-Boadi and Jeffries 2000). Nkrumah's strategy to industrialize was consistent with the Marxist and nationalist ideas of the mainstream development economists in the early 1960s (Killick 2009). A number of leading economists advised Nkrumah, and political radicals and development economists worldwide were excited by Ghana's plans (Gyimah-Boadi and Jeffries 2000; Austin 1996b). African governments' emphasis on industrial development is reflected in their public investment policies (Aryeetey and Harrigan 2000). In Ghana nearly 20 percent of the budget was devoted to the development of industry and trade in the Seven-Year Development Plan (1963/1964 to 1969/1970). The share went beyond one-half in the two subsequent plans.

Additionally, the inclination to avoid incurring transaction costs when developing new sources of revenue also explains Ghana's choice of industrialization using cocoa taxes (Leith and Lofchie 1993). Because collecting taxes and distributing transfers is a complex process in poorer countries and involves transaction costs, Ghana may have found it expedient to continue with the economic system already in place rather than introducing new sources of taxation and revenue (Killick 1994, cited in Kherallah et al. 2002). Cocoa taxes also came to be seen as a surrogate for agricultural taxes (World Bank 1981).

The strategy in many countries, including Ghana, to focus on industrialization, particularly through the transfer of resources from the agricultural sector, is often attributed to urban bias (Bates 1981). In Ghana's politics at the time, there were some elements of urban bias because the party that was in power, the Convention People's Party (CPP), drew its support primarily from the urban population, mostly returned servicemen, unemployed school dropouts, and low-wage workers, and its policies benefited the urban population (Gyimah-Boadi 1989). Urban workers benefited from the high degree of protection offered to import-substitution industries.

Ghana's foreign reserves enabled the administration to initiate an aggressive modernization program that was incongruent with the weak structural base of the economy; Ghana was in the peculiar position of being underdeveloped while having considerable financial resources (Frimpong-Ansah 1992). Improving the delivery of welfare services was also a major concern of the new administration, although economic growth through industrialization was presented as the principal objective of the country's economic policy (Rimmer 1992). A substantial portion of the initial postindependence expenditures went into building economic infrastructure and social infrastructure, with little attempt to alter the structure of production.

Ghana's eventual failure in its early development policy partly discredits the "big push" and import substitution industrialization theories of development (Roemer 1983). Ghana may not have been different from other developing countries in attempting to develop through industrialization, but the implementation of its strategy was poor: a vast range of industries were targeted without any economic basis, the protection offered was not simple, and import substitution was pursued through state-owned organizations rather than the private sector (Leith and Lofchie 1993). The failed "big push" left the country with debt and inappropriate productive capacity, as well as institutions and beliefs that hindered performance over the next few years (Rimmer 1992).

Although Ghana's industrial policies may not have resulted from urban bias, they were sustained by the network of interests that such bias created. The import substitution strategy led to a range of highly protected industries and the emergence of a political economy that favored an expanded civil service and a political class that benefited from it (Leith and Lofchie 1993). Taxes from the rural sector went into financing wage bills and import-dependent consumption by public sector personnel, party functionaries, and urban consumers. Restructuring this urban bias posed a major challenge for subsequent administrations (Coffey International Development 2011). Urban bias alone

does not explain the heavy taxation of agriculture, however, because urban interests also should have realized that higher taxation could not be sustained in the long run and would eventually be self-defeating (McMillan 2001).

Politics of Extraction

Nkrumah's policies

The Nkrumah administration did not find it politically difficult to tax cocoa producers, although the CPP came to power in 1951 partly by supporting the producers' opposition to the accumulation of cocoa revenues by the Cocoa Marketing Board (CMB). The party manifesto had suggested it would help cocoa farmers gain greater control over the board (Coffey International Development 2011). After being reelected in the 1954 elections, however, the CPP government introduced the Cocoa Duty and Development Funds (Amendments) that pegged producer prices at the preexisting level for four years. An opposition emerged in cocoa-growing areas in the form of the National Liberation Movement (NLM), which demanded greater autonomy for the regions, particularly to gain control over cocoa revenues. The party used a slogan that translated literally into "whatever you buy is from cocoa."

To placate the opposition that developed, Nkrumah's administration raised the producer price in 1955/1956 and maintained it, despite falling global prices, the following year (Coffey International Development 2011). Consolidating his position in the following elections in 1957, however, Nkrumah did not have political difficulties in taxing cocoa farmers, because the bulk of the opposition he faced came only from the cocoa-growing areas (Killick 2009). The administration also abolished a constitutional scheme to share power with the regions (Gyimah-Boadi 1989). Even during the period when farmers were believed to be taxed heavily, between 1958/1959 and 1964/1965, farmers received nearly 60 percent of the export prices because price shares tended to favor producers vis-à-vis the government and the board whenever larger crops were sold at lower global prices (Rimmer 1992).

To undermine the opposition that had developed in the cocoa-growing areas, the government established a farmers' organization, United Ghana Farmers' Council (UGFC), to organize cocoa farmers; it recognized the council as the only organization entitled to represent the country's farmers, thus forcing other farmer cooperatives to merge with the council. It also made UGFC the sole buyer of cocoa, largely to gain control over cocoa producers

(Beckman 1976).[2] The government also denied subsidized inputs to nonmembers of UGFC, thus eroding support for the NLM, because farmers' dependence on the state prevented them from organizing against it (Bates 2005). The UGFC made it politically expedient for the government to use cocoa resources for broader development. It volunteered on behalf of cocoa farmers that they would accept a 17 percent reduction in cocoa prices as their "voluntary contribution" to intensified development efforts through the second development plan. As a distributor of critical agricultural inputs, UGFC may have helped the CPP win the 1956 elections (Gyimah-Boadi 1989).

Granting sole rights to the UGFC was also part of an effort to gain control over sectors that were dominated by foreign traders. All foreign firms that were engaged in cocoa buying were expelled from Ghana, and numerous local "middlemen" who had been buying on behalf of the foreign firms were also put out of business.

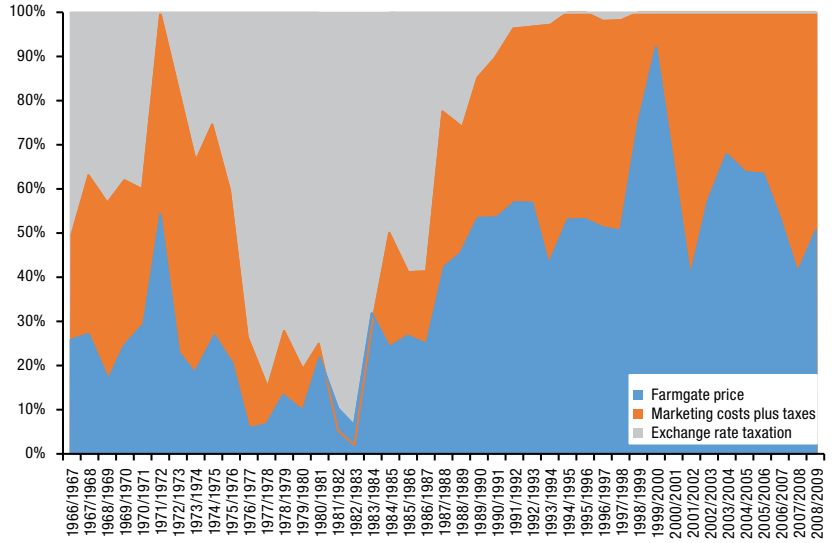
In the 1950s, while redirecting income from cocoa, the administration also focused on stabilizing production (Beckman 1976). Cocoa production reached a record 567,000 tons in 1964/1965. In the second half of his administration, however, Nkrumah shifted his attention from cocoa to food crop production and the supply of raw materials for industries (Beckman 1976). A decline in cocoa prices that began in the 1960s emphasized the need for diversification. By 1961 much of the liberal policies of the earlier plan had been replaced by the belief in the importance of state production. Hence, there was also a reorientation of investments away from the infrastructure that had supported small-scale export agriculture in the 1950s to large-scale state-owned agricultural enterprises that could substitute for imports (Stryker 1990).

Continuity in post-Nkrumah policies

Following Nkrumah's overthrow, various administrations were ambivalent about replacing the Nkrumah model with market-oriented policies. As a result, there was a great deal of continuity in the late 1960s and the 1970s as the role of the state remained large (Killick 2008). The attitude of various administrations toward industrialization, particularly state-led industrialization, and agriculture may have differed in varying degrees from that of Nkrumah's, but the administrations did not change the policies substantially.

2 At this stage the name of the organization may have changed to the United Ghana Farmers Cooperative Council (UGFCC). We have used UGFC and UGFCC interchangeably to be consistent with the sources we have cited.

FIGURE 2.1 Direct and indirect taxation of cocoa producers, 1966/1967 to 2008/2009



Source: Authors' calculations using Bank of Ghana (2017), IMF (2017), COCOBOD (n.d.), Pick (various years).

Note: The area colored gray below the line that represents 100 percent of the revenue at the market exchange rate and above the areas colored blue and orange, which represent farmgate price and marketing costs plus taxes, respectively, represents producer losses from a distorted exchange rate. Official exchange rates were so distorted from 1981/1982 to 1983/1984 that farmgate prices at official exchange rates exceeded the price of cocoa at official exchange rates.

Some administrations tried to offer attractive prices to farmers but could not influence farmer incentives through price policy alone, because they could not adequately offset the huge distortions caused by high inflation and fixed exchange rates (Brooks, Coppenstedt, and Aggrey-Fynn 2007).

Exchange rate distortions ate up a significant share of export prices between 1966/1967 and 1992/1993. The loss to farmers from overvalued exchange rates increased from 1972/1973 to reach more than 80 percent of the revenues in 1982/1983 (Figure 2.1). Between 1969/1971 and 1981/1983, the cedi appreciated in real terms by 90 percent (Commander, Howell, and Wayo 1989). These distortions were eliminated by 1996/1997.

The subsequent administrations did not offer much benefit to cocoa producers regardless of whether or not they drew political strength from them. The National Liberation Council (NLC), which followed Nkrumah's administration and governed during 1966–1969, did make some improvements to cocoa marketing by devaluing the currency, thus increasing the nominal prices received by farmers. It abolished the UGFC and created the Produce Buying Company (PBC) to buy cocoa from farmers. It also permitted LBCs to buy

on behalf of the CMB. The subsequent Busia government (1969–1972) came to power with notable support from the Ashanti and Brong-Ahafo Regions, which were the principal cocoa-growing regions. The administration was committed to liberalization on ideological grounds, and it also viewed people in rural areas, particularly cocoa growers in the Ashanti and Brong-Ahafo Regions, as its political constituency (Gyimah-Boadi and Jeffries 2000). However, it did not increase producer prices; instead, it used the revenues from high world cocoa prices in 1970 to increase imports and public expenditures. Gyimah-Boadi (1989) suggests that although the party appeared to be agricultural and pro-rural, it was dominated by social groups engaged in the nonagricultural sector. The short life of the administration may have also been a reason for not doing much for the cocoa producers. The Aliens Compliance Order that the administration introduced, which required non-Ghanaian small traders and laborers to leave the country, disrupted agriculture in general and cocoa in particular (Adomako-Sarfoh 1974).

Subsequent administrations, which became even more dependent on cocoa revenues, intervened occasionally to maintain or increase production but did not increase prices. During the tenure of the National Redemption Council (NRC)/Supreme Military Council from 1972 to 1979, the tripling of global cocoa prices did not benefit Ghana commensurately, as output had begun to decline. The regime also refused to raise producer prices (Gyimah-Boadi 1989). However, the NRC administration made some improvements in the internal marketing of cocoa by abolishing the chit system, under which farmers were paid through promissory notes, and by taking measures to reduce the misuse of funds by licensed buying agents. It also began to subsidize inputs, including labor, by requiring the Crop Production Division of the CMB to take gangs of laborers to farmers to assist in production. Finally, the NRC extended the cocoa rehabilitation project.

The overthrow of the Busia regime following a substantial devaluation of the cedi, which highlighted the political sensitivity of exchange rate policy to a civilian regime, made subsequent regimes unwilling to touch the exchange rate policy (Nugent 1991). Dependence on cocoa for government revenues, combined with the overvalued exchange rates, resulted in declining shares of export prices for the producers. The governments extracted rent by paying producers prices below global prices using the overvalued exchange rates (Stryker 1990). Cocoa taxes that often exceeded the optimal export tax continued to be a major source of revenue for the government (Brooks, Coppenstedt, and Aggrey-Fynn 2007). By the early 1980s, farmers were receiving less than one-fourth of export prices. In addition, high levels of

inflation dramatically reduced the real prices received by cocoa producers in Ghana over the years.

To maintain revenues, subsequent governments increased taxes on cocoa exports as production halved between 1970 and 1983. The smuggling of cocoa to neighboring countries became rampant. The People's National Party regime (1979–1981), a civilian administration, committed to making agriculture the bedrock of economic policy but at first resisted increasing producer prices (Gyimah-Boadi 1989). Then it increased producer prices above international prices at the official exchange rate, but the prices did not benefit farmers because the government did not do anything about the overvalued currency. Between 1973 and 1981, "There was no economic policy but only a stream of inconsistent slogans, of temporary expedients and of increasingly frantic scrambling to salvage personal and narrow sub-class interests out of a steadily shrinking pot" (Green 1988, 8).

Between 1947/1948 and 1983/1984, pricing policies (with the exception of those policies pursued in 1956/1957) favored meeting the needs of administrations that increasingly sought to promote the industrial sector (Amoah 1989). Governments made efforts to increase production, but their price policies did not help. Two cocoa projects in the Eastern and Ashanti Regions that focused on rehabilitating cocoa farms were successful in replanting nearly 28,000 hectares with new hybrids, but farmers were reluctant to take over the farms at the end of the project due to the poor cocoa prices (Amoah 1989). By the early 1980s, cocoa production had bottomed out. Nearly half of the decline in official production figures may have been due to the diversion of cocoa produced in Ghana to Côte d'Ivoire, where prices were higher, because there is little evidence of short-term substitution of cocoa with other crops (Bulir 1998).

Between 1958/1959 and 1964/1965, production grew despite falling producer prices because of effective spraying against capsid infestation and the delayed effects of planting that had been done earlier under higher prices (Amoah 1989). After 1965 the supply of chemicals and machines became more erratic. As non-Ghanaians constituted an estimated 45 percent of rural farm workers, the Aliens Compliance Order of 1969 reduced the labor supply to cocoa farms; the overvaluation of the currency also made remittances difficult for migrants. In 1976 the Ministry of Cocoa Affairs introduced a labor subsidy (Amoah 1989).

Cocoa production continued to grow from planting motivated by favorable real prices in the 1940s and 1950s even though the share farmers received began to decline soon after independence. Overvaluation of the currency was the major source of implicit taxation of cocoa (Bateman et al. 1990). The

terms of trade, however, did not go against Ghana during the worst of the decline in the cocoa sector (Rimmer 1992).

Dependence on "public cocoa income"

Governments used various mechanisms to extract cocoa surpluses to support general development. Until 1948 there was a flat tax, which was made ad valorem. In 1951 the export duty was graduated to require payment of 50 percent of realized export prices in excess of 100 pounds sterling. After 1954 the duty was 100 percent above 260 pounds sterling. Initially, the board was allowed to hold reserves but without any clarity about how they could be used. During the Nkrumah era, the rules were changed to require the board to pass on any surpluses to the exchequer. After 1966 the CMB was not permitted to hold any reserves (World Bank 1981).

Cocoa taxes, which accounted for a significant share of government revenues even before independence, became and remained a key source of revenue. Ghana's economy, including the agricultural sector, was highly dependent on the foreign exchange generated by exports. Because agricultural exports provided, to a considerable degree, the foreign exchange and the taxes that sustained Ghana's commitment to import substitution, state-owned enterprises (SOEs), currency overvaluation, inputs for SOEs, and the rents to consolidate political systems, the incentives to tax remained high (Leith and Lofchie 1993). By the mid-1930s, about 9 percent of government revenue came from cocoa, which increased to more than 50 percent in the 1950s (Beckman 1976). Between 1947 and 1965, the government collected almost one-third of cocoa revenues through export levies; this amounted to 40 percent of cocoa sales when the CMB's net surpluses were included (Beckman 1976). Foreign exchange earnings from cocoa exports constituted 60 percent of the country's total earnings from the early 1900s to the 1960s. Beckman (1976) refers to this dependence as "public cocoa income," because both the cocoa taxes going to the government and the surpluses of the CMB were used to finance the government.

The expropriations from cocoa encouraged the development of a service-oriented public sector that was highly dependent, directly and indirectly, on the cocoa trade (Beckman 1976). As the board was politicized, cocoa marketing jobs were used to reward political loyalty. By 1985 more than 100,000 government employees worked in the cocoa sector with a significant share of them being "ghost workers" (Williams 2009).

Cocoa taxes continued to be a major source of government revenues, although the extent varied considerably; the government became more dependent on such taxes in the 1970s. Many administrations tried to balance the

need for maintaining government revenues with offering attractive prices to farmers, but the farmers often lost these battles. Prices also failed to be effective policy instruments in the presence of overvalued exchange rates and inflation (Bateman et al 1990). Because cocoa revenues were the primary source of foreign exchange, import-dependent consumption was affected by limited foreign exchange.

Corruption was so rampant in the CMB that during its three-month rule in 1979, the Armed Forces Revolutionary Council established a committee to investigate the board's affairs (Ghana 1979). Following the release of the findings, the government decided to replace the board with a Cocoa Council. It dismissed some of the staff, abolished the Ministry of Cocoa Affairs, sought to recover the funds due from many of the buying companies, stopped payment of bonuses to CMB staff, and recommended that cocoa scholarships should be primarily for children of cocoa growers.

The steady decline in real producer prices, the deterioration of the transportation system, the lack of insecticides and spare parts for machines, the spread of pests and diseases, and the inefficiency of the marketing board contributed to a decline in production to less than 200,000 tons by the early 1980s (World Bank 1983; Ghana 1984). Mismanagement, short-sighted revenue goals, and exchange rate imbalances had eroded an essential economic sector and undermined the fiscal solvency of the government (Frimpong-Ansah 1991; Stryker 1990).

Chapter 3

REFORMS, RECOVERY, AND GROWTH

By the early 1980s, along with the dramatic decline in cocoa production, Ghana experienced a general collapse of the economy to the extent that per capita incomes were down to one-half of what they had been at independence. The undemocratic and left-leaning administration that came to power on December 31, 1981, soon implemented reforms that led to recovery. Whether for pragmatic or ideological reasons, there was a deliberate attempt to reduce urban bias through a shift in macroeconomic policy. Macroeconomic reforms removed the distortions that had brought down the cocoa sector. These reforms had limits: the new administration reformed the cocoa sector without liberalizing domestic and export markets. However, increasingly higher shares of export prices were passed on to farmers, and marketing board interventions and increasing prices led to a dramatic recovery of the cocoa sector.

This chapter covers developments from the initiation of these reforms, which led to high production levels that ultimately exceeded past highs to reach 1 million tons in 2010 and stabilize around 800,000 tons annually since then. The first part of the chapter focuses on the reforms, beginning with economic and political conditions that were conducive for otherwise politically unattractive corrective measures. It explains the nature of the reforms that were implemented, including how liberalization of domestic and export cocoa markets did not feature among them. The first part ends with a brief description of the outcomes. The second part of the chapter focuses on the operationalization of pricing processes in Ghana, in which the concept of "net FOB" was introduced to enable COCOBOD to withhold a portion of the revenues to offer services without seeming to reduce the producer share in export prices. The chapter ends with a discussion of how increasing the producer share in cocoa exports and the real prices of cocoa exports led to cocoa production reaching 1 million tons.

Economy-wide and Sector Reforms

Favorable conditions

After the December 31 coup in 1981, Jerry Rawlings's populist Provisional National Defense Council (PNDC) inherited an economy that was bankrupt, with unsustainable levels of government expenditure, an overvalued exchange rate, inflation at nearly 80 percent per year, and declining production in all sectors. The economy had reached that stage as a result of macroeconomic instability, the increasing currency overvaluation, strict controls in the agriculture sector and other parts of the economy, and ineffective state interventions (Stryker 1990). Ghana had no option but to undertake economic reforms because the situation became unmanageable. Drought, bushfires that destroyed cocoa farms, and the repatriation of nearly 1 million Ghanaians from Nigeria added to Ghana's problems.

By the early 1980s, there was nothing left to hold a rent-seeking political regime together (Leith and Lofchie 1993). There was also social disgust with what the previous administrations had done. By 1980 Ghana's forests were one-third the size they had been at independence as farmers began to rely on shifting cultivation due to shortages of inputs and fuels in the country (Leith and Lofchie 1993). All these crises helped make radical change acceptable to people, but the reforms were not without political risk for the administration.

Taking power from an unsettled civilian administration as a popular, although undemocratic, administration, the PNDC was provided with an opportunity to introduce unpalatable reforms. The perception that the new administration was independent of established interest groups also gave it some room. Groups that would otherwise have opposed economic liberalization were politically weak, and, importantly, critical groups such as businesspeople or the middle class had not benefited from the policies of the short-lived previous administrations (Jeffries 1991). Even before the adjustment program began, the population was already going through the hardships associated with adjustment: for example, food was scarce in urban areas. The prospect of accessing resources and foreign exchange also helped make reforms acceptable to the population (Herbst 1993).

At the same time, the PNDC wanted to build a rural constituency by shifting its policies in favor of the rural sector. Addressing the Federation of Agricultural Cooperatives, Rawlings recognized the economic contribution of cocoa farmers and promised that he would bring back the wealth of the country to "where it belongs"—the rural areas (Jacobeit 1991). The PNDC

therefore initiated a program of political reform that in turn aimed to "get the politics right" (Chazan 1991). The PNDC adopted a longer-term political strategy of building a rural base, in contrast to the longstanding urban bias of governments in Ghana and throughout the region (Bates 1981; Martin 1993; Stryker 1990).

Unsuccessful in obtaining support from the Soviets, the leftist regime had no option but to turn to the International Monetary Fund (IMF) and World Bank and accept structural reforms. Although the liberalization policies were externally mandated by the World Bank and the IMF, significant reforms to reduce rent seeking and to put the economy on a growth path were consistent with the ideology and political ambitions of the PNDC regime (Herbst 1993). Ghana owned the reforms to a considerable degree (Tsikata 2001). The adjustment program is believed to have been largely designed by the Ghanaian government, led by the finance minister, Dr. Kwesi Botchway, rather than by the World Bank and IMF. Citing Jeffries (1989), Leith and Lofchie (1993) suggest that Rawlings himself also adopted liberal economic ideas, with the University of Ghana acting as an intellectual influence on him.

Economic reforms

In April 1983, the PNDC began implementing the Economic Recovery Program (ERP), the first phase of which included macroeconomic measures to address the key causes of Ghana's economic situation. These measures were reducing the government budget deficit and changing the exchange rate to restore export incentives and eliminate rents from foreign exchange (Leith and Lofchie 1993). The government was able to substantially reduce inflation and the deficit in the overall balance of payments by 1985. In consultation with the IMF and the World Bank, the government shifted the emphasis of the ERP toward structural adjustment in 1985. The objective of the SAP was to establish an incentive framework that would stimulate growth and improve resource use, particularly in the public sector (World Bank 1992). The World Bank supported Ghana's SAP through Structural Adjustment Credits (SACs) I and II. The objective of SAC I was to improve the incentive framework for growth and included passing on a higher share of FOB prices to cocoa producers, which would be financed primarily by cost cutting in COCOBOD.

The key aim of cocoa reforms was to increase the producer share of export prices by shrinking the inflated cocoa public sector (Osei-Akom 2001; Commander, Howell, and Wayo 1989). This was to be achieved by trimming

the operational expenses of the COCOBOD to avoid undue pressure on fiscal revenues. Cocoa sector reform measures included the following:

- An increase in producer prices
- Reorganization of the CMB
- A reduction in CMB costs, through privatization and the introduction of multiple buying systems (World Bank 1983)

PRODUCER PRICE ADJUSTMENT

There was some disagreement over how the targets would be set. COCOBOD disagreed with the idea that the producer price target should be a ratio of the FOB price and thought that marketing costs should be taken into account. The government was reluctant to commit to passing on a specific share of the export prices to producers, but it eventually agreed to pass on 55 percent of the export prices to producers, as a part of the Agricultural Services Rehabilitation Project. The government then committed, in the Cocoa Sector Development Strategy, to increase producers' share to 70 percent, thus institutionalizing producer price increases over time (Ghana, Ministry of Finance 1999; Bawumia 1998; Herbst 1993; Varangis and Schreiber 2001). In order to increase producer share, it was anticipated that COCOBOD's share of cocoa revenues would have to come down from 30 percent to 15 percent of the FOB price.

Beginning in 1984, the government began to set producer prices and establish costs for the services provided by other actors in the sector on the recommendations of the Producer Price Review Committee (PPRC), which comprised representatives of major actors in the sector including producers, transporters, LBCs, the Ministry of Finance and Economic Planning (MoFEP), COCOBOD, and local research organizations. The PPRC recommended shares in FOB that should go to all the agents involved in production and marketing, including a combined share for COCOBOD and the government. COCOBOD then claimed its share through a budget that it submitted to the MoFEP for approval.

REORGANIZATION OF THE CMB

Another aspect of the cocoa reforms was to restructure and "corporatize" the Cocoa Board from an instrument of patronage to an efficient supplier of services. First, the staff and costs of COCOBOD were drastically reduced by closing a number of produce-buying stations and eliminating nonessential roles, such as building roads, processing cocoa, and running plantations

(Jacobeit 1991). Transport of cocoa was shifted to the private sector after 1984, while responsibility for cocoa feeder roads was given to the relevant ministry. Other retrenchments eliminated tens of thousands of ghost workers and unnecessary staff, as well as some high-ranking officials (Gyimah-Boadi and Rothchild 1990).

In an effort to restructure its operations and reduce its operating costs, COCOBOD laid off 12,000 staff members, reduced its transportation costs, ceased production on 52 of its 92 plantations, and sold off majority ownership of its insecticide plant. As a result of this massive divestment policy, COCOBOD's wage roll reduced from more than 100,000 employees in 1985 to about 60,000 in 1986. It continued to reduce staff, to 10,400 in 1995 and 5,140 in 2003, and has maintained its trimmed structure ever since. In addition, a corporate plan involving further restructuring through 1990 was agreed on between COCOBOD and the International Development Association (IDA), and a performance agreement between the government and COCOBOD was signed (World Bank 1992).

However, COCOBOD was slow to divest plantations and implement the privatization of input supply and transportation. Producer share came at the expense of tax revenues.

MULTIPLE BUYING SYSTEMS

As had been done in the past, albeit without much success, the purchase of cocoa through licensed buyers was reintroduced in 1993. The LBCs were required, as had been the practice previously, to pay at least the prices set by the PPRC and deliver cocoa to the three ports that the board maintains, in return for a margin determined by the PPRC. It also revived the practice of giving the companies funds to procure cocoa, the amount of money being determined on the basis of cocoa delivered in the previous year. The funds were given on the assumption that the LBCs would be able to "recycle" the seed funds 2.2 times within the 33-week main crop season: the amount is determined by multiplying expected bean delivery by the declared producer price and dividing by 2.2.

In addition to the reforms, the government invested in the cocoa sector. With donor support, COCOBOD initiated the Cocoa Rehabilitation Project (CRP) in 1987 to stabilize cocoa production at approximately 300,000 tons per year. The board supplied seedlings to encourage farmers to replace old trees. The plan was to rehabilitate existing farms through the adoption of improved practices and to encourage new planting on 300,000 hectares over the project's life (1989 to 1996). The project also built feeder roads in

cocoa-growing areas. The IDA supported an export rehabilitation project that provided foreign exchange for the cocoa sector, built infrastructure, and imported chemicals and equipment (Ghana 1984).

The PNDC paid immediate attention to harvesting and bringing to market cocoa that had been left on the trees due to the low producer prices at the time. "Mobisquads" of mainly youth were sent to cocoa farms to help the producers. Elderly farmers whom they helped fed and paid them; the practice may have become institutionalized in the form of crop sharing. As the administration tried to diversify agricultural exports, policies transitioned from rural disengagement to agricultural reconstruction (Mikell 1989a).

Market liberalization missed

Under the Export Rehabilitation Technical Assistance Project, the World Bank identified high marketing costs and institutional weaknesses of COCOBOD as some of the key factors contributing to the decline in cocoa exports (World Bank 1992). It noted that the reduction of board operating costs would require the divestment of inefficient plantations and cocoa processing factories, a reduction in overstaffing, greater reliance on private haulage services, and the introduction of corporate planning and a management information system. It also proposed research on alternative systems for marketing cocoa in Ghana, but such studies were never actually carried out because the Ghanian government felt that there were no cases of cocoa being managed better, and such studies were not likely to be beneficial (World Bank 1992).

At the design stage of SAC I, the World Bank and COCOBOD disagreed on how cocoa marketing should be reorganized, and there was insufficient research to provide a basis for any discussions. Although agreements had been reached on what should be achieved in the cocoa sector, they were done without examining the technical details. The negotiations on these issues were also affected by tensions created by differences in opinion between the World Bank and COCOBOD on the costs of retrenchment and the consequences of withdrawing COCOBOD's agricultural extension services (World Bank 1992).

The SAC II that followed did not pay as much attention to the cocoa sector, with the understanding that it would be dealt with in the CRP. Again, in the absence of a study on the reform of cocoa marketing, opportunities for further dialog on reducing COCOBOD's operational costs were missed. The CRP, which should have complemented cocoa price policies by promoting improvements in domestic marketing, was slow to get underway (World Bank 1992).

The World Bank's review of the programs (1992) faulted the World Bank for failing to convince Ghana's government on market reforms. The World Bank was unconvincing because of a lack of adequate economic and sector work in cocoa marketing, and the Bank review suggested that the Bank should pay greater attention to adjustments involving changes in institutions, improvements in skills and staffing, and the streamlining of procedures. In its early structural lending packages, the World Bank was more likely to call for restructuring marketing boards than recommending that they be eliminated (Akiyama et al. 2001).

Hutchful (1995) suggests that while the government of Ghana was quick in making initial macroeconomic reforms, it hesitated in enacting structural and institutional reforms as well as in privatizing the key sectors of the economy. He argues that this was because macroeconomic reforms can yield substantial fiscal benefits to the state without displacing the state by the market.

A 1996 independent study by UK-based LMC International, which was commissioned by the government and financed by the World Bank, recommended the continuation of the state monopoly of cocoa exports. This recommendation was based on the assumption that removal of the export monopoly carried risks for quality control, reliability of deliveries, forward sales, and the predictability of export proceeds and taxes. The government agreed that it would nevertheless reassess options for eliminating the Cocoa Board's export monopoly once the privatization of domestic marketing was complete (IMF 1998a).

Following pressures for market reforms from the World Bank, the government began the process of formulating a medium-term development strategy in 1998. The MoFEP set up a three-member committee. The analytical work was done by a task force that was headed by a deputy finance minister and composed of stakeholder representatives. Broken into several working groups, the task force worked on different aspects of the industry. The technical recommendations were discussed in a seminar in 1998 that was attended by all actors in the sectors. A three-person committee synthesized the reports into a reform strategy for discussion at a national workshop chaired by the finance minister in early 1999. A majority of those who attended the workshop opted for liberalization as the best way to become competitive (Harnack et al. 2000).

The strategy called for the privatization of the PBC and, until privatization occurred, equal access to COCOBOD's warehouses and financing for all the buying companies. The PBC was privatized in 1999. The monopoly of the cocoa marketing company was to be phased out beginning in 2000/2001 by allowing qualified LBCs to export 30 percent of their purchases. The strategy,

which was adopted by the cabinet in 1999, reflected the principle that the public sector should withdraw from marketing (Harnack et al 2000).

The document on the Enhanced SAP facility (a mechanism through which the IMF provides low-interest loans to poor countries) that was signed that year noted that a medium-term strategy to foster development in the cocoa sector was adopted by the cabinet in March 1999 (IMF 1999). The program entailed decisive structural reforms, with a focus for the next three years on enhancing competition in the cocoa sector by allowing private agents to export cocoa while also ensuring equal access to crop financing and warehousing for all the LBCs, including COCOBOD's subsidiary, the PBC (IMF 2009). There was pressure on the government to take the final steps in liberalizing the cocoa sector by allowing free export of cocoa. Although the government began developing the regulatory framework, it did not declare when it would make the policy operational (Tiffen et al. 2004). The next administration, which came to power in 2000, did not follow through with implementation.

By 1999 the reforms had come to an end. In 1983 the PPRC was established to set producer prices. A decade later, buying by licensed private agents was introduced. Following the development of a medium-term development strategy in 1999, COCOBOD privatized its subsidiary that was competing with LBCs, but the new administration that came to power in 2000 did not permit the LBCs to export as the medium-term strategy envisaged (Table 3.1).

Reduced taxes on cocoa

Governments may be under less pressure to tax commodities when other sources of finance, particularly from extractive industries that produce foreign exchange, become available (Bates 1984). Faced with the dilemma of offering adequate incentives to producers so as to continue to earn foreign exchange versus maintaining government revenues through increased taxation, the government chose to offer the incentive of drastically reduced taxes even before developing other sources. By 1981 government revenues had fallen to less than 5 percent of GDP as public revenues had nearly collapsed (Chazan 1983, cited in Prichard 2009). Because the government nearly tripled the producer prices after the reforms, even while world prices were declining, cocoa's contribution to the government revenue in 1981 and 1982 was almost zero (Kusi 1991; Prichard 2009). Producer shares were increased largely by reducing taxes rather than through any reductions in marketing costs as had been planned (World Bank 1992).

TABLE 3.1 Timeline of key cocoa events and reforms

Year	Events or reforms
1983	Implementation of the Economic Recovery Program begins.
1984	The Producer Price Review Committee (PPRC) is established, and stakeholder-advised administrative setting of producer prices and margins for other services is initiated.
1984	The Structural Adjustment Program begins.
1993	Licensed buying companies (LBCs) are introduced.
1996	A study commissioned by the government with the support of the World Bank suggests that Ghana benefits from centralized marketing.
1999	A medium-term development strategy is developed. It calls for even playing fields, privatization of the Produce Buying Company (PBC), and permission for LBCs to export by 2000; the PBC is privatized.
2000	The new administration that comes into power does not follow the recommendation to permit LBCs to export.
2004	A Hi-Tech program is initiated; the concept of net FOB is introduced and results in the retention of a share of net FOB revenues to offer services to producers.

Source: Authors.

The PNDC raised taxes dramatically and undertook major institutional reforms in 1985–1987 to build an institutional structure for tax collection (Terkper 1998, cited in Prichard 2009). Ghana's experience in increasing tax collection was the most dramatic and prolonged in Africa south of the Sahara (Prichard 2009). The Ghanaian government's performance on the tax side always exceeded what was required by conditions, both with regard to collection and the policy changes that were made. These new tax policies were externally mandated but were consistent with the ideological commitments and political ambitions of the PNDC (Herbst 1993; Martin 1993, cited in Prichard 2009).

The composition of tax revenues changed by 1991, when they were around 12 percent of GDP. The shares of export and corporate taxes in tax revenues were significantly reduced in 1988 and 1989, replaced by sales taxes, import taxes, and fuel duties (World Bank 1992). The share of export duties in tax revenues was reduced from 28.6 percent in 1983 to 6 percent by 1993. The reduction resulted from a combination of falling cocoa prices on the world market and the government's policy to pay and maintain a realistic producer price for cocoa farmers (in particular, duties' share in tax revenues fell dramatically in 1981/1982 and after 1987).

The government took advantage of opportunities to raise taxes. An analysis by Bateman et al. (1990) suggested that the government seek other sources

of revenue, primarily from consumer goods such as gasoline and cars. Having increased the fuel prices alongside global petroleum prices in 1990, the government maintained the higher prices even after prices came back down in 1991, capturing the difference as taxes. These taxes amounted to as much as 47.8 percent of the prices in mid-1991 (Prichard 2009).

However, the tax policy came under political pressure after the transition to democracy in 1992. Under pressure to raise revenues, the newly elected National Democratic Congress (NDC) government increased petroleum taxes again in 1993 just before the inauguration, but the value-added tax (VAT) it introduced later on was eventually repealed. The government reintroduced the VAT at a lower rate in 1997, during its second term. Due to political opposition, the NDC government wasn't able to keep increasing petroleum prices during this second term.

The New Patriotic Party (NPP) administration, which came to power in 2000 inheriting fiscal imbalances, had some political room to introduce unpalatable policies. The NPP government dealt with fiscal problems by accessing Highly Indebted Poor Countries (HIPC) assistance, sharply increasing petroleum prices, and introducing the national reconstruction levy, a levy on businesses that would eventually be repealed, in 2007. It could sharply raise the petroleum prices, which were lower than global prices, to meet the requirement of HIPC to align petroleum prices with global prices. The public, however, was often not able to see the difference between prices and taxes as local prices were adjusted to global prices. Nevertheless, the goodwill with which the NPP administration came to power, combined with its ability to blame the previous administration for the fiscal problems, enabled it to raise petroleum prices significantly.

At more than 5 percent of GDP, cocoa was the most significant single commodity revenue earner in the 1970s. Introduced in 1985, petroleum taxes replaced cocoa as the primary source of taxes in 1991 at 3.6 percent of GDP (Terkper 1998).

Implementing the New Pricing Process

Every year, COCOBOD announces pan-seasonal and pan-territorial prices before the season begins in October—the season is split into a major season that runs from October to April and a light season, from June to September—and occasionally revises the prices upward in the middle of the season. The LBCs are required to pay producers a price that is equal to or greater than the announced prices.

Forecasting the revenues in the coming season and deliberations of the PPRC are the two steps in producer price determination and preparation of a budget before the beginning of the season. The technical committee of the PPRC obtains forecast FOB prices in US dollars, the exchange rate of the cedi to the dollar, and the crop size in the following year; these data come from the Cocoa Marketing Company (CMC), the Bank of Ghana, and the Research, Monitoring, and Evaluation Department (RMED) of COCOBOD. By the time CMC offers an estimate of prices, it has forward sold 60 to 70 percent of the projected main crop. The RMED projects crop size on the basis of pod counts taken from 25 trees at 150 different sites in the cocoa-growing area. It estimates the pods by categorizing observed pods into ripe, large, medium, and small pods and assuming they will survive to maturity at the rates of 100 percent, 95 percent, 60 percent, and 30 percent, respectively. Using the ratio between pod counts and actual crop sizes from the previous years, the department estimates the next year's crop size. It also reviews its forecasts during both seasons. The projections made by the PPRC for the years 1996/1997 to 2014/2015 are presented in Table A.2 of the Appendix.

Predicted production, exchange rates, and prices are usually conservative estimates, and as a result, COCOBOD has rarely fallen short of the projected revenues. Production, exchange rates, and price forecasts have been unfavorable in only 4 years, 5 years, and 5 years, respectively, in the past 17 years. The margins of error in overestimating production were 8 percent, 21 percent, 14 percent, and 10 percent shortfalls in production in 1996/1997, 2001/2002, 2004/2005, and 2009/2010, respectively (Table 3.2).

However, COCOBOD obtained higher-than-projected prices in those years. Export prices were lower than projected in five years, but the differences were marginal. The exchange rates tend to be close to or higher than projected, often leading to higher-than-projected revenues in the local currency, the Ghanaian cedi. COCOBOD uses mechanisms such as bonuses to pass on some of the surpluses to producers. COCOBOD documentation suggests that in the past, bonuses were passed on to producers of higher-quality cocoa, but it is not clear whether such targeting is actually feasible under the current marketing system in which cocoa is purchased by numerous buyers.

The PPRC has changed the criteria that it uses in setting prices. Initially, it set prices that offered reasonable returns to producers and service providers. This is no longer the case, because the PPRC now prioritizes achieving a certain share for the producers. Between 1986/1987 and 1997/1998, it estimated costs of production and marketing functions and set prices and compensation that yielded 20 percent returns on investment. The concern was that a share

TABLE 3.2 Accuracy of projections used by the PPRC (ratio of actual to projected)

Year	Crop size	GH¢/US$ exchange rate	Gross FOB/MT (US$)
1996/1997	0.92	1.09	1.09
1997/1998	1.17	1.00	1.15
1998/1999	1.14	0.95	0.99
1999/2000	1.04	1.66	0.98
2000/2001	1.08	1.08	1.15
2001/2002	0.79	1.01	1.23
2002/2003	1.27	0.99	1.10
2003/2004	1.47	0.99	0.95
2004/2005	0.86	0.99	1.02
2005/2006	1.35	1.01	1.03
2006/2007	1.02	1.00	1.11
2007/2008	1.05	1.07	1.26
2008/2009	1.09	1.07	1.17
2009/2010	0.90	0.97	1.22
2010/2011	1.46	1.00	0.97
2011/2012	1.03	1.16	0.97
2012/2013	1.04	1.00	1.04

Source: Authors' estimations using IFPRI/COCOBOD (2014).

Note: GH¢ = Ghanaian cedi; MT = metric tons; PPRC = Producer Price Review Committee.

of a declining price may not provide adequate incentives to farmers (Amoah 1989). It also presumably tried to achieve producer share targets simultaneously. The implicit understanding was that any residual after covering all the costs would go to the government as taxes. Following persistent complaints that the costs and yields assumed in the process were arbitrary, the board abandoned this approach (see Masdar [UK] Ltd. 1998, for the 1992/1993 to 1997/1998 period). Since then producer prices and charges for various services have been negotiated by various members of the PPRC on the basis of what they have received in the past, cost escalations, and what they consider to be their fair share. Prices are determined in a spirit of "sharing the FOB." Because the share going to producers receives considerable attention, the decision may be two tiered: the first decision tier is allocating what should go to producers, and the second tier is dividing the remainder among the other parties involved.

COCOBOD does take into consideration prevailing prices in neighboring countries as it sets producer prices (COCOBOD 2008, for example). In addition to revising producer prices midseason if the actual prices turn out to be much higher than projected, COCOBOD also revises producer prices to discourage any smuggling that might take place. In October 2010, the government increased cocoa producer prices for the 2010/2011 season to GH¢3,200 per ton, up from GH¢2,400 during the 2009/2010 season, to discourage smuggling (Kpodo 2010). The smuggling of Ghanaian cocoa, particularly to Côte d'Ivoire, can be significant, because Ghanaian cocoa farmers are usually well informed of Ivorian prices. One survey found that 20 percent of farmers knew the selling price of cocoa in Côte d'Ivoire, and 24 percent knew farmers who sold their produce in the Ivorian market (Vigneri, Teal, and Maamah 2004). In addition to matching neighboring countries' prices, the government has devoted resources to policing the borders to discourage smuggling.

The concept of "net FOB"

Beginning in 2001, COCOBOD began estimating producer share in a way that enabled it to achieve the target producer share while retaining some of the revenues to finance what it termed "industry costs." It subtracted estimated industry costs from projected export revenues and divided the difference by the projected production to arrive at the net FOB price. The net FOB was then parceled out to various actors as was done previously. This has enabled COCOBOD to claim to have passed on producer shares that are higher than the actual shares of export prices. In 2013/2014, for example, from nearly GH¢3.7 billion expected from cocoa revenue, about GH¢121.2 million, or 3.3 percent of the revenues, was set aside to meet the industry costs (Table 3.3). Net FOB price, the denominator used for estimating producer share in export prices, in this case is reduced from GH¢4,430.40 per ton to GH¢4,284.33 per ton. When prices were higher in 2010, for example, the share allocated was greater than 10 percent. PPRC recommendations for the years 1996 to 2013 are presented in Table A.2 of the Appendix.

That this method of estimating producer share is a deception is not lost among politicians. When this method was introduced, the opposition party did not point out the deception by explaining to farmers the difference between net and full FOB. Instead, it noted in its election manifesto that it would give farmers a 70 percent share of FOB price, excluding public sprays, which are a major service funded by industry costs (NDC 2008). However, this 70 percent promise is now made by both parties, and perhaps it is of little concern because even the shares in net FOB are close to 70 percent.

TABLE 3.3 Derivation of net FOB price in 2013/2014 cocoa season

Revenues, costs, and prices	GH¢	GH¢
Gross FOB value from the crop of 830,000 tons sold at FOB price of US$2,130 per ton and exchange rate of GH¢2.08 to US$		3,677,232,000.00
FOB price (GH¢/ton)		**4,430.40**
Industry costs		
Disease and pests control	41,157,996.05	
Jute sacks and related items	42,025,000.00	
Cocoa fertilizer application/Hi-Tech	36,054,500.00	
Child labor program	2,000,000.00	
Total industry costs		121,237,496.05
Net FOB value		3,555,994,503.95
Net FOB price (GH¢/ton)		**4,284.33**

Source: COCOBOD (2013)
Note: FOB = Free on Board; GH¢ = Ghanaian cedi.

Producer Share and Response

We first examine whether the introduction of licensed buying has benefited producers because of competition among buyers to maximize the volumes traded.

It was only before the World War II that traders competed with one another to buy cocoa from producers. After the creation of the CMB in 1947, the foreign firms that previously purchased from producers continued to do so, but with the CMB setting a minimum price that they had to pass on to farmers. This arrangement brought price competition to an end, and pan-territorial and pan-seasonal prices became the norm. The board granted licenses to any buyer capable of handling a minimum tonnage and paid them a fixed allowance per ton, which included a profit margin that varied with prices (Beckman 1976). These practices went through several changes, beginning with granting sole authority to UGFC and culminating in procurement done solely by the PBC, a unit of the board, at the time of reforms.

After the reintroduction of competitive licensed buying in 1993, the number of licensed companies steadily increased from 4 to 27 over an 18-year period. The number, however, has varied and not all LBCs have been consistently active; only a small number account for the bulk of the cocoa procured. Between 2001/2002 and 2009/2010, 11 of the 27 LBCs accounted for 96.4 percent of the cocoa delivered to the ports. The top three LBCs delivered more than half of the cocoa beans over the same nine-year period. Locally owned LBCs now purchase nearly two-thirds of the cocoa from producers.

The LBCs do not compete on price to buy cocoa from farmers. They claim that their margins are too small to generate sufficient savings to pay producers higher than declared prices. Only one firm offered producers GH¢1 (Ghanian cedi) per bag more than the announced price, but it discontinued the practice after one season. In fact, the LBCs may even get away with paying producers less than declared prices. A survey suggested that nearly 50 percent of the farmers who sold cocoa during October 2009, when the government announced higher prices, still received the lower prices from the previous season (Hainmueller, Hiscox, and Tampe 2011).

Although producers do not benefit from price competition among LBCs, they benefit in other ways from buyers competing with one another to maximize their volumes. Producers can now choose among several buyers at most locations. They indicate that they appreciate the denser network of cocoa buyers that resulted from the introduction of licensed buying (Knudsen and Fold 2011; Vigneri 2005; Zeitlin 2006). As expected, buyers prefer to conduct their operations in areas with significant production (Zeitlin 2006). For example, in the high-production district of Juabeso, Western Region, most of the LBCs have opened cocoa-buying sheds, not just in the larger settlements but also in the small hamlets in production areas (Knudsen and Fold 2011). Some of the large-scale farmers sell to several different LBCs during the cocoa season. Small-scale producers, on the other hand, may sell their produce to one LBC to improve their chances of obtaining loans or advance payments. More than 75 percent report selling to only one buyer (Hainmueller, Hiscox, and Tampe 2011).

LBCs also offer credit to their regular cocoa suppliers. Depending on the relationships of clerks to cocoa producers, they may offer loans with the understanding that cocoa would be sold to them. A significant portion of loans may go in the form of COCOBOD-subsidized fertilizers. Producers may receive fertilizers by paying only a portion of the price at the beginning of the season. LBCs' distribution of fertilizers to attract buyers has dramatically expanded the use of COCOBOD-subsidized fertilizers. COCOBOD initiated Hi-Tech, a program to supply fertilizers and other subsidized inputs to farmers on credit, but it was scaled down after a couple of years because of poor recovery. Now the LBCs are supplying fertilizers to farmers on full or partial credit through their community-based purchasing agents, who appear to be able to recover credit effectively.

About 40 percent of producers reported receiving token gifts, such as notebooks, cakes of soap, and salt, as well as credit, to a limited extent, from buyers (Hainmueller, Hiscox, and Tampe 2011). Ninety-four percent of producers

also reported receiving immediate cash payment, which also may have been a result of the increased competition.

However, cheating on weights, which has been observed in the industry for a long time, has not disappeared. Producers can avoid buyers whom they suspect of cheating on weights, but underweighting cocoa seems to be a standard practice in the industry. In one survey, producers indicated that being cheated on weights was one of top three "severe" risks that they faced in production (Ricketts, Turvey, and Gómez 2014). The district managers of LBCs appear to meet some of their costs by routinely deducting 2 kilograms (kg) from every bag of 64 kg. Many buyers claim that farmers are aware and choose to give up the 2 kg per bag for not delivering cocoa that is properly dried and sorted. All of this suggests that any additional tightening of the margins for the LBCs would result only in producers being cheated to a greater extent.

We examine both recommended and actual gross and net FOB shares received by farmers (Table 3.4). The actual share in gross FOB is what is comparable to other situations, but the differences between these suggest something about how larger-than-anticipated revenues are used. The actual share of producers in FOB might fall below the PPRC recommendation if the FOB realized is higher than projected and the surpluses are not passed on to producers as bonuses. Recommended and actual shares may also vary when the proportion of total revenues spent on industry costs is higher than the recommended proportion of the projected revenues. Detailed information on actual revenues and expenditures in the sector in the format compatible with PPRC recommendations is presented in Table A.1 in the Appendix for the years for which the authors were able to obtain both budgeted and actual expenditures.

The recommended share in net FOB has increased from 1996/1997 to reach 83 percent in 2012/2013. Although the share recommended has varied, it has been 65 percent or greater since 1999/2000. The actual share of prices received by farmers in net FOB has reached 80 percent. The actual share of gross FOB was higher than the target of 70 percent set by the government in only two of the last 10 years.

Real prices and supply response

The benefits of liberalization are often measured in terms of the share of export prices going to producers, as an indicator of marketing efficiency. However, increasing shares alone may not necessarily provide adequate incentives for a positive supply response. Also, liberalization could potentially have a direct effect on lowering world prices, benefiting consumers rather than producers (Gilbert and Varangis 2004).

TABLE 3.4 Producer shares as a proportion of gross FOB and net FOB, PPRC recommended and actual, 1996/1997 to 2012/2013

	PPRC recommendation		Actual	
	Gross FOB	Net FOB	Gross FOB	Net FOB
1996/1997	0.508	0.508	0.426	0.426
1997/1998	0.540	0.540	0.473	0.473
1998/1999	0.561	0.561	0.602	0.602
1999/2000	0.740	0.740	0.451	0.451
2000/2001	0.621	0.670	0.510	0.522
2001/2002	0.644	0.671	0.739	0.829
2002/2003	0.649	0.681	0.563	0.593
2003/2004	0.652	0.690	0.666	0.701
2004/2005	0.688	0.730	0.679	0.740
2005/2006	0.687	0.727	0.670	0.712
2006/2007	0.670	0.722	0.588	0.724
2007/2008	0.618	0.710	0.566	0.652
2008/2009	0.628	0.705	0.492	0.590
2009/2010	0.630	0.711	0.578	0.747
2010/2011	0.683	0.752	0.702	0.807
2011/2012	0.611	0.648	0.631	0.684
2012/2013	0.788	0.832	0.738	0.802

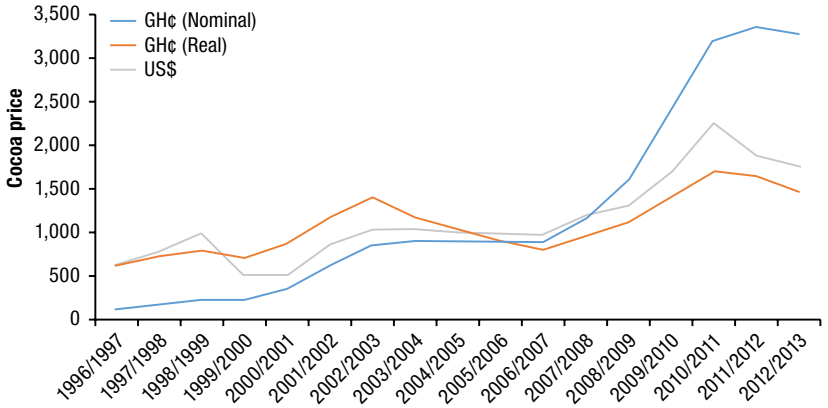
Source: Authors' estimates using IFPRI/COCOBOD (2014).

Note: PPRC = Producer Price Review Committee; Gross FOB = Producer price as a share of Free on Board prices obtained; Net FOB = Producer price as a share of Free on Board price obtained minus the contribution toward industry costs.

Following liberalization, farmgate prices have been more closely correlated with global prices (ICCO 2010). However, this has resulted in greater fluctuation of farmgate prices in most cocoa-producing countries over the past 20 years. These fluctuations reflect, among other things, changes in international cocoa prices, variations in the international value of the domestic currency, and specific local market structures and conditions, including taxation, competition, distance from port, and quality. Because world market prices in real terms were 86 percent higher in 2009/2010 than they were in 2000/2001, real farmgate prices increased in all producing countries that have fully liberalized (ICCO 2010).

The producers in Ghana benefited from correction of the overvaluation of the exchange rate. Cocoa producers also benefited from early investments in infrastructure and rehabilitation, because the initial recovery enabled the importation of machinery for rehabilitation. Real cocoa producer prices

FIGURE 3.1 Nominal, real, and US$ prices received by Ghana cocoa producers, 1996/1997 to 2012/2013



Source: Authors' calculations using IFPRI/COCOBOD (2014).
Note: GH¢ (Real) (2005 = 1).

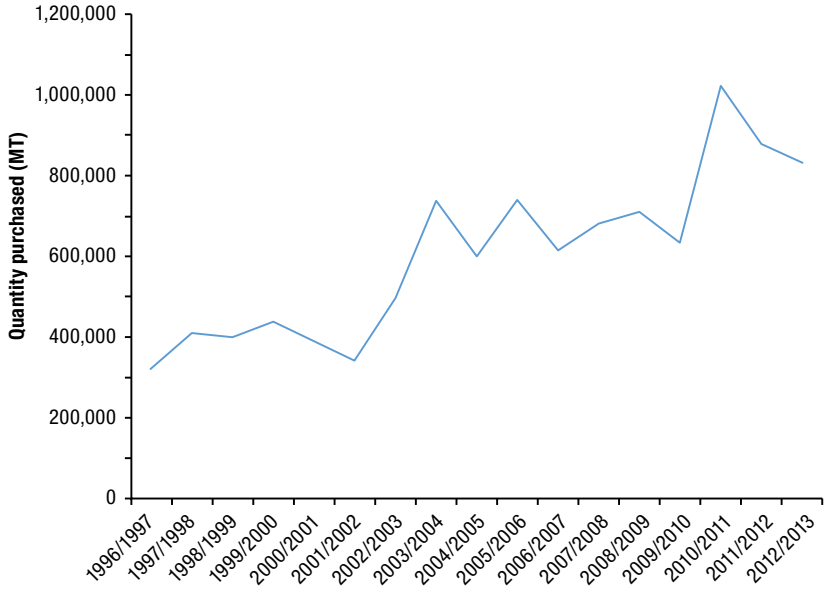
tripled between 1981 and 1988. The cedi depreciated in real terms by over 90 percent between 1982/1983 and 1987. The devaluation of the overvalued cedi and reduced inflation shifted the domestic terms of trade in favor of tradable sectors such as cocoa (Jacobeit 1991).

More recently, nominal prices increased sevenfold during the 16-year period 1996/1997 to 2012/2013, growing at nearly 16 percent, with rapid growth between 2006/2007 and 2010/2011. In dollar terms too, producer prices more than quadrupled during the period, declining only marginally in 2012/2013 (Figure 3.1). Real producer prices and producer prices in dollar terms also grew beginning in 2006/2007, but at lower rates than nominal prices. When the growth of nominal prices declined in 2010/2011, both the real cedi and dollar prices received by farmers declined due to the considerable depreciation of the cedi beginning in 2011/2012.

As price incentives improved immediately after the reforms, cocoa growers expanded plantings and improved their husbandry, thus increasing production. Agricultural surveys carried out in 1988 showed strong evidence that cocoa farmers were beginning to respond to these improved incentives (World Bank 1992).

Cocoa production in Ghana appears to be closely related to movements in real producer prices, although short-term fluctuations in production may also be due to other factors. The first jump in production took place between

FIGURE 3.2 Quantity of cocoa purchased by COCOBOD (tons), 1996/1997 to 2012/2013



Source: COCOBOD (2014).
Note: MT = metric tons.

2001/2002 and 2003/2004 following gradual increases in both real prices in local currency and dollar prices from 2000/2001 to 2002/2003 (Figure 3.2). This increase in production was possibly driven not just by growth in real producer prices but also by a set of interventions initiated by COCOBOD to increase cocoa productivity. These interventions included mass spraying to control pests and diseases, and subsidies to promote higher and more frequent applications of fertilizer. Following a steady increase in prices again between 2006/2007 and 2010/2011, production increased in excess of 50 percent from 2009/2010 to 2010/2011. However, some of the growth could also have resulted from cocoa smuggled into Ghana from Côte d'Ivoire: an estimated 120,000 to 150,000 tons were smuggled in from Côte d'Ivoire in 2003/2004, for example (Brooks, Coppenstedt, and Aggrey-Fynn 2007). Likewise, the recent drop in production could also have resulted from cocoa being smuggled out of Ghana, as Ghanaian producer prices fell below those of neighboring countries (Dzamboe 2015).

Chapter 4

EFFICIENCY OF CURRENT INSTITUTIONS

The key objective of cocoa reforms in Ghana, to pass on a higher share of export prices to producers, was achieved without liberalization of domestic or export markets, although the former practice of using licensed companies to buy from farmers was reintroduced. A defining aspect of cocoa reforms was the commitment of the government to increase producer shares of the export prices. The institution that it employed to achieve the objective is a committee of stakeholders with technical support that advises the government on producer prices and other margins in the sector. While this process has led to increasing shares for producers, the Cocoa Board has, particularly in the last decade, expanded its role by withholding producer revenues to offer services, some of which are associated with significant increases in productivity. Can the current set of institutions be expected to strike the right balance and continue to offer adequate incentives to producers?

This chapter examines whether the administered pricing mechanism will continue to deliver results that are favorable to the sector. We begin by presenting broad trends in the shares of producers, marketing agents, and taxes in export prices from 1996/1997 to 2012/2013. This is done using detailed data on revenues and costs in the cocoa sector, developed as part of an institutional review of the sector (Kolavalli et al. 2012; IFPRI/COCOBOD 2014).

This discussion of trends will serve as a background for the rest of the chapter, which addresses three issues: (1) Do producers exercise political power, and if not, what other factors might influence COCOBOD and the government to continue to offer adequate incentives to producers? (2) Has the introduction of buying through LBCs reduced the costs of procurement, and what might be the implications of squeezing those margins, which are also determined administratively? (3) What do the patterns of expenditures by the three parastatals in the current marketing system suggest about their drive to reduce costs? The trends in the share of industry costs will be an important aspect of the third question.

Trends in Marketing Costs

After decreasing continuously until 2000, the share of marketing costs in FOB has remained more or less the same, despite growth in the sector. Marketing costs can be broken down into direct and indirect costs: Direct marketing costs include the margins paid to LBCs to procure from producers; costs of haulage, storage, and shipping incurred by the CMC; costs of grading and quality control of the Quality Control Company (QCC); and expenditures on crop finance, scale inspection, phytosanitary concerns, and the stabilization fund. Indirect costs consist of COCOBOD's operational costs (see Table A.1 in the Appendix). COCOBOD expenditures include the costs of maintaining its head office and the costs of various services and programs that it operates: the Cocoa Swollen Shoot Virus Disease program, the Seed Production Unit, the Cocoa Services Division, the Cocoa Research Institute of Ghana (CRIG), the Bunso Cocoa College, and the Cocoa Clinic.

The share of marketing costs in total revenues averaged 31 percent during the first 7 of the 17 years examined. The average for the next 5 years declined to nearly 25 percent of the revenues but increased by 1 percentage point in the next 5 years (Table 4.1). This increase is largely due to increases in the direct marketing costs, while the share of COCOBOD expenditures (indirect marketing costs) has hovered around 8 percent of FOB. Experience from other countries suggests that the total marketing costs could be reduced to about 10 percent of FOB prices (Leite et al. 2000).

An analysis of producer share in FOB in major producing countries in 1995 and 2005 suggests that the share of marketing costs is lower in countries characterized by a more liberalized cocoa sector (Indonesia), or one with a more limited government presence (Cameroon) compared to Ghana (Figure 4.1). The structure of the cocoa marketing chain in Cameroon is one where producers can either sell directly to approved buyers, sell to *coxeurs* (collectors working for an approved buyer), or deliver their cocoa to a producer organization that then sells the crop to the approved buyers. These buyers then resell cocoa to three exporters, who control almost all the cocoa produced.

In Indonesia the cost of production for cocoa smallholders has traditionally been among the lowest in the world, with a highly competitive marketing system featuring limited government intervention, low distribution margins, and a free pricing system. Producers in Indonesia have also benefited from good transportation infrastructure in major producing areas (which has meant relatively low transportation costs) and relatively small export taxes and

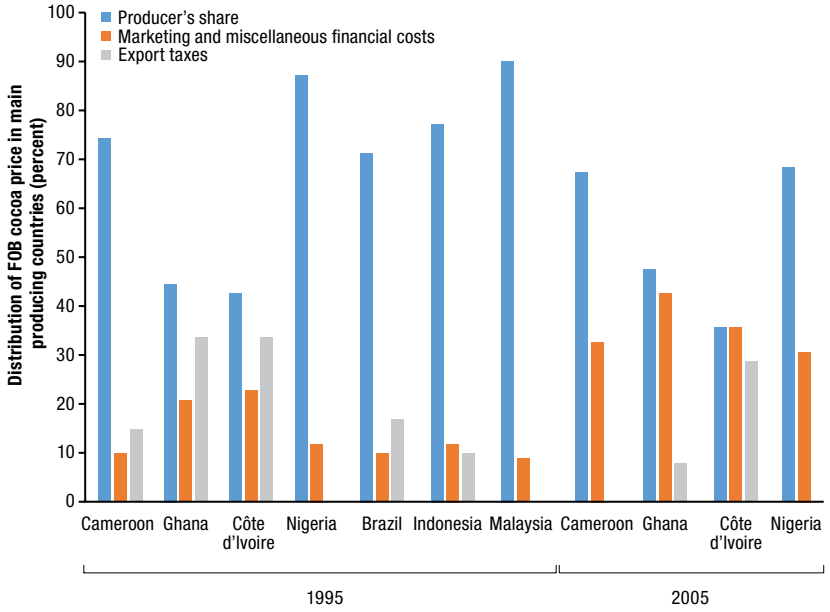
TABLE 4.1 Share of producers' proceeds and other costs in FOB (period averages)

Year	FOB ($/MT)	Percentage share of FOB					
		Producers' proceeds	Direct marketing	COCOBOD expenditure	Total marketing	Industry costs	GoG tax
1996/1997–2002/2003	1,406	54	19	12	31	2	16
2003/2004–2007/2008	1,658	61	16	8	24	9	7
2008/2009–2012/2013	2,826	61	17	8	25	13	3

Source: Authors' estimates using IFPRI/COCOBOD (2014).

Note: FOB = Free on Board; GoG = government of Ghana; MT = metric tons. Total marketing is the sum of direct marketing and COCOBOD expenses. The shares do not add up to 100 because of unaccounted-for balances in most years.

FIGURE 4.1 Distribution of FOB cocoa price in main producing countries (percentage)



Source: Authors' estimates using ICCO (2010, 2012).

other government levies. In 1995 cocoa farmers in South Sulawesi received 90 percent of FOB prices.

In Ghana the producer share of FOB increased from 54 percent to 61 percent during the periods 2003/2004 to 2007/2008 and 2008/2009 to 2012/2013 (Table 4.1). The share of industry costs also increased to 13 percent during the last period. This share was as high as 20 percent in

2010. What has dramatically decreased is the taxes paid to the government on exports. These costs have come down from nearly 16 percent to approximately 3 percent in the years 2008/2009 to 2012/2013.

Having examined this background on trends in shares of producers, direct and indirect marketing agents, and government taxes in export prices, we now examine the factors that might influence these shares.

Political Economy of Producer Pricing

In liberalized markets, producer share would be influenced by the competition among marketing agents that would give the agents incentives to reduce marketing costs. Reducing marketing costs would allow agents to pass on higher prices to producers and thereby to attract larger volumes. In the absence of such competition, how can producers expect to maintain or increase their share of cocoa export prices? What is the source of government commitment? Is it rooted in power that producers exercise collectively? We begin with how organized producers have been.

Do cocoa farmers collectively influence policymakers to maintain or increase farmers' share of the export prices? Cocoa farmers were more effective in collective action during the colonial period than in independent Ghana. Two examples are their use of cocoa holdouts to protest against collusion by traders to fix prices in 1930/1931 and 1937/1938. However, the cocoa holdouts were under the leadership of a small group of Ghanaian businessmen and prosperous farmers who wanted to engage in the type of business that the Europeans were undertaking. Chiefs, wealthy farmers, and cocoa brokers were key to the boycott, along with smallholders (Howard 1976). Their holdout was also more successful in 1937/1938 than in 1930/1931 because in 1937/1938 the brokers also joined the protest (Southall 1978).

Without adequate political clout to influence the prices paid to them, producers have historically exited the local cocoa market when policies are unfavorable by smuggling the crop to neighboring countries, diversifying to other crops, or migrating to other countries. Some of the reasons proffered for their political weakness are the high costs of organizing themselves because of their dispersion over a large area, the distance from the capital, Accra, and the high levels of social differentiation among them (Leith and Lofchie 1993). The concept of a cocoa farmer may itself be elusive because for some cocoa producers, it is a secondary occupation and regular cocoa growers engage in other activities such as agricultural labor or have other business interests (Hill 1956, cited in Leith and Lofchie 1993).

As noted in Chapter 2, cocoa growers' efforts to organize themselves immediately after independence in the form of the NLM were quashed by the Nkrumah administration. Although the Rawlings government did much to benefit the cocoa growers, it did not organize them as an interest group, and a farmers' movement never emerged (Austin 1993; and Herbst 1993, cited in Austin 1996b). In the 1992 elections, Rawlings received greater political support in rural areas than in urban areas, but the support did not necessarily come from cocoa producers (Austin 1996b). Growers who came predominantly from the Ashanti ethnic group benefited the most from the cocoa reforms, while the Rawlings government, which was dominated by members of the Ewe ethnic group, may have been reluctant to become politically dependent on the Ashanti people (Herbst 1993).

Strengthened democracy

As democracy has taken root in Ghana and elections are won by thin margins, the estimated 800,000 cocoa households could be expected to exercise considerable influence in Ghanaian elections. Bates and Block (2013) suggest that the introduction of competitive presidential elections has altered political incentives, leading to reforms that are favorable to farmers in democracies. The importance given to cocoa producer pricing in policy debates in Ghana would suggest that something similar may be happening. Cocoa producer price announcements are widely treated as a major policy event that elicits responses from other political parties and receives media coverage.

The two major political parties challenge each other in their election manifestos and hold each other accountable for the commitments made to increase the producer share of export prices. In 2003 the NDC, which was then in the opposition, urged the NPP government to increase producer prices from the 49 percent share that NPP claimed at the time to at least 60 percent of export prices. The two parties both made specific promises about cocoa prices in their 2008 election manifestos: the NPP, in addition to taking the credit for doubling production, claimed that it had paid bonuses to producers in more years than did the previous NDC administration (NPP 2008); the NDC, on the other hand, promised to increase yields to 700 kg per hectare (ha) and pay cocoa farmers at least 70 percent of the gross FOB price rather than of the net FOB price (NDC 2008).

More recently, in 2014/2015 when real prices declined due to the depreciation of the local currency, Dr. Akoto, a ranking member on the Select Committee on Food, Agriculture, and Cocoa Affairs, suggested that the depreciation of the cedi had ended the long-held government policy of

awarding cocoa farmers 70 percent of FOB prices (Akoto 2014). In 2015 the government announced a more than 60 percent increase in nominal prices that brought the producer share of dollar prices to previous levels.

The two parties also challenged each other over effective ways to discourage smuggling. COCOBOD invested in patrolling the borders in the early years of the NDC administration, while the NPP has argued that border patrol is not an effective policy (GhanaWeb 2010). Instead, the NPP has argued that offering price parity is a superior strategy and suggested that huge differences between prices in Ghana and Côte d'Ivoire encouraged smuggling. It also claimed that its strategy of offering Ghanaian farmers prices comparable to those in neighboring countries, a policy that successfully discouraged smuggling, has been abandoned by the NDC.

Cocoa pricing does offer a clear policy issue for each political party to question the other's commitment to supporting agriculture. Cocoa pricing is also widely discussed because the targets are well known and anyone who knows the international prices can make the simple calculations. Cocoa producer prices are routinely examined by the press because the policy is explicit, and it is not too difficult to calculate a ratio. However, stakeholders often lack accurate information on the prices obtained by COCOBOD because the CMC, the marketing unit of COCOBOD, is not transparent about its sales of cocoa beans and the prices obtained. There is often considerable disagreement about the shares being passed on to producers, because stakeholders use prevailing global prices. These global prices may differ considerably from the prices obtained by Ghana primarily through advance sales. Political stances and media coverage would suggest that votes matter, but many cocoa producers have long been NPP supporters for other reasons, and in some cases cocoa growers are not among the swing voters who are usually seen as potentially vital.

WEAK PARTICIPATION AND REPRESENTATION

Although participatory processes have been set up for pricing in particular and the board is governed by members that represent various stakeholders, the management of COCOBOD is dominated by the chief executive officer. Cocoa farmers are represented in the PPRC, but members may not be able to influence decisions. Farmers' representatives do not feel that they are in the PPRC to have a say in how producer prices are determined. When asked about the key objective of the Ghana Cocoa, Coffee, and Sheanut Farmers' Association (GCCSFA), the key institution that represents farmers, the chief cocoa farmer said that it was to "receive any of the things that COCOBOD

may want to distribute to producers." Farmers' view of the PPRC was confirmed by a representative of the LBCs, who noted that members of the PPRC have to simply rubber stamp what is brought to them by COCOBOD. The PPRC recommendation for 2014/2015, for example, has specific recommendations for the rates paid to all other agents (LBCs, QCC, and so on) but leaves the producer price for the finance minister to determine. The situation is to some extent an extension of what was practiced in the Gold Coast: the CMB then consisted of nine members appointed by the minister of commerce, industry, and mines. The producer prices it prescribed had to be approved by the minister, who also had the authority to direct the board in its management of funds. Export duties collected depended on surplus revenues available to the board (Bauer 1954b).

THE GOLDEN GOOSE

Given that decision making in the cocoa sector is largely top-down, why would it be in the interest of the president or the finance minister not to manage the sector wisely? McMillan (2001) asks why a country would want to "kill the goose that lays the golden eggs" by taxing a sector into extinction. Ghana has occasionally starved or come close to killing its goose in attempts to exploit the sector because of the government's dependence on the sector for revenues, but it recognizes that the goose lays golden eggs. Various administrations, even those that taxed the cocoa sector heavily, took measures to keep the sector growing. However, the policies also demonstrated that many administrations did not believe that Ghana's future can rest on cocoa alone (Bateman et al. 1990).

Various administrations since independence have sought to increase production and have supported measures to limit the spread of swollen shoot disease by compensating farmers for removing diseased plants and replanting with improved varieties and for controlling black pod and capsid infestation. After the reforms of the early 1980s, the sector has benefited from policy continuity. As ruling political parties have changed, they have accepted the strategies laid out by their predecessors. An exception may be the NPP administration's shelving, after it came to power, of the proposal to allow LBCs to export, but it is not clear whether NDC would have permitted that to happen. Both parties have similar views on how cocoa rents should be exploited without alienating smallholders (Throup 2011).

A combination of interlinked factors offer incentives for administrations to adopt pro-growth policies for the cocoa sector. One incentive is that cocoa is still a major source of foreign exchange for Ghana. Ghana now raises the

funds it requires to purchase the beans through a syndicated loan from an international consortium of banks. Ghana takes pride in this ability to raise resources globally to purchase cocoa from producers. In 2014, for example, Ghana raised US$1.8 billion. These funds offer liquidity to the government, and a portion is often used by the government for other purposes. Foreign exchange flows from the syndicated loan that the government raises, and the Eurobonds it floated were considered to be critical to stabilizing the cedi in 2014; the finance minister noted that the country was in a position to stabilize its currency because of these two cash flows.

Another incentive is that although Ghana has been able to raise funds globally at low interest until recently, cocoa loans are raised against collateral, so raising funds depends critically on Ghana's ability to advance sell cocoa. Nearly 70 percent of the cocoa crop is believed to be advance sold by the time Ghana declares producer prices and raises funds globally. The ability to advance sell is dependent on the reputation Ghana has developed to reliably deliver large quantities of uniform-quality cocoa, which is derived from its centralized marketing and quality-control measures. Having advance sold cocoa, COCOBOD also has strong incentives to ensure that cocoa is not smuggled out of the country so it can avoid defaults on delivery and costly renegotiations.

Another incentive is that a growing sector also benefits regional leaders of cocoa farmers and the bureaucracies that are managing the sector. At a microeconomic level, apart from the producers, a number of other parties benefit from a thriving cocoa sector. These parties may include producer representatives such as the regional chief farmers, COCOBOD, and the government.

Finally, for whichever party is in power, cocoa revenues are a source of patronage. This is because government accountability and transparency continues to be low, and clientelism still plagues politics in Ghana (Gyamah-Boadi and Prempeh 2012). The executive branch of government benefits because it gains access to resources that enable it to offer all kinds of services and programs that it can take credit for. Many free or heavily subsidized services are offered to producers without the government ensuring that they are entitled to them. COCOBOD funds are also used to support a range of programs, from housing support to distribution of mosquito nets.

The strategies and practices that COCOBOD has followed would seem to suggest that it uses both direct and indirect instruments to influence production in the country. It incentivizes production indirectly through appropriate producer prices and subsidized inputs. It influences production directly by undertaking functions such as spraying that may not be undertaken by

producers on their own. The supply of free fertilizers to selected farms from which higher returns to fertilizer application may be obtained is an extreme example of intervention that unfairly taxes all producers while benefiting a select group, primarily to increase production. The criteria COCOBOD used were to select well-maintained farms that had trees 8 to 30 years old that were not affected by swollen shoot disease. Its strategy states that it will continue to engage in such practices until farmers begin to adopt them on their own (COCOBOD 2011). There is a state interest in keeping the sector growing.

While the target of a 70 percent share going to producers is well known and closely monitored, it is not clear whether or not the political grandstanding on cocoa producer prices turns into electoral benefits for the political parties. It would seem that not wanting to antagonize more than 800,000 cocoa households is the key reason for governments to portray themselves as friendly to cocoa producers. Without any doubt, any administration would be taking a huge risk by not increasing producer prices, at least in nominal terms. The threat of smuggling can expose a government to the risk of not delivering on a contract, as well as accusations of economic mismanagement. Smuggling therefore gives the government incentives to maintain parity with producer prices in neighboring liberalized markets, and thus in a way creates conditions that mimic a market. The sector offers foreign exchange earnings and resources to whichever party is in power to spend on the sector and get credit for it, and these amenities also provide incentives to maintain policies favorable for growth in production. However, significant increases in the producer share of export prices and real producer prices were achieved during a period when global prices rose steadily.

Costs of Buying through LBCs

The introduction of licensed buying, in addition to benefiting producers, appears to have reduced the cost of buying from farmers and transporting the beans to ports. The share of buyers' margins of FOB has come down by 4 percentage points over the years, although it is not clear whether the PBC, which had the monopoly over purchases prior to liberalization, and the LBCs, after the sectoral reform, perform comparable functions. The share of buyers' margin in total revenues was more than 9 percent in the three years before the introduction of licensed buying as compared with 6 to 7 percent in recent years (Table 4.2). It stayed around 10 percent until 2001 and has been around 6 to 7 percent since then. The per-ton costs in both nominal and constant terms, however, have been increasing in recent years.

TABLE 4.2 Procurement costs before and after the introduction of licensed buying in 1993

	Buyers' margin (thousands of GH¢)	Share of total revenue (%)	Purchases (thousands of tons)	Cost (GH¢/ton)	Constant cost/ton (1989 GH¢)
1989/1990 to 1991/1992	1,294,500	10	276.33	4.75	3.56
1993/1994 to 2000/2001	11,051,325	9	358.85	29.09	3.90
2001/2002 to 2005/2006	59,364,680	7	578.52	99.88	4.07
2006/2007 to 2010/2011	139,363,450	6	652.21	211.67	4.12

Source: IMF (1998b, 2000, 2005, 2011).

Note: GH¢ = Ghanaian cedi. No 1992/1993 figure is available on buyers' margin from IMF reports; averages for 1991/1992 to 1995/1996 do not include this year.

The business model for buying from producers to deliver to COCOBOD has changed, which might account for lower costs since the introduction of licensed buying in 1993. Prior to market interventions, merchants employed brokers or purchasing clerks to buy cocoa from farmers; the brokers or clerks then transported it to up-country depots to deliver to secretary receivers or district managers, who may have been paid staff. This continued until the introduction of the CMB.

Between 1947 and 1962, under the CMB, licensed buying agents were employed. They were paid a margin to purchase the beans, store them if necessary, and transport them to COCOBOD depots at the ports for export. The business model remained unchanged. Between 1962 and 1966, when the UGFC became the sole buying agency, purchasing clerks and secretary receivers became permanent staff, who were paid even out of season.

Between 1967 and 1977, after the overthrow of the Nkrumah government, which had supported the UGFCC, licensed buying was again introduced, but it was restricted to Ghanaian organizations. The LBCs continued the practice of buying through paid staff. Between 1977 and 1992, the PBC, a subsidiary of COCOBOD, became the sole buyer of cocoa beans. The PBC also adopted the permanent staff business model, absorbing some of the staff of the former licensed buying agents (Amoah 1998).

Following the reintroduction of licensed buying in 1993, in which both national and foreign companies were permitted to participate, all the buyers, including the PBC, switched to using only staff on commission (Sakyi-Bediako 2011; Ton et al. 2008). The buying company employs a district manager on a commission basis, who in turn hires a number of purchasing clerks on commission to purchase cocoa beans from cocoa-growing communities (Poku and Lamptey 2015).

Cocoa beans are purchased by clerks under the control of district managers, and the clerks are compensated by a margin on each bag bought. The LBCs bear only the costs of the infrastructure required for purchase operations. The district managers, who are responsible for the purchasing clerks, recruit them from the communities in which they expect to buy on the basis of recommendations from opinion leaders. The clerks are required to get one or two individuals to guarantee their debt because they receive cash advances to purchase as many as 50 bags at a time. The clerks, who work only seasonally, purchase about 250 bags annually. The commission they receive for purchasing a bag of cocoa (64 kg) is usually the equivalent of the value of a kilogram of cocoa (GH¢3.50), and their annual income is the equivalent of the value of four to five bags of cocoa—what may be produced on three-quarters of a hectare by a farmer obtaining median yields.

Inefficient operation of COCOBOD and its subsidiaries may be adding to the cost of procuring cocoa, because inefficiencies cause considerable delays in certification and transportation of cocoa from LBC depots to ports and in the payment for cocoa delivered by LBCs. These inefficiencies hinder the LBCs' ability to turn around funds as expected, subjecting them to higher costs. In most cases, the LBCs are unable to turn over the funds more than twice, as assumed by COCOBOD. They report having to borrow from other sources at much higher costs. Depending on the company, the interest on additional borrowing from non-COCOBOD sources could be as much as the total interest paid to COCOBOD. Some of the LBCs claim that the finance costs they incur may therefore account for as much as one-third to three-quarters of the margins they earn from COCOBOD. Hence, the only privatized component of the marketing system is subject to inefficiencies from the public side.

The likely effect of squeezing LBC margins

The margins LBCs receive may have implications for producers, although cheating producers through scale adjustments was problematic even in a competitive purchasing environment. Cheating has not been abated by changing the marketing systems (Amoah 1998). The famous Gold Coast cocoa hold-ups were partly motivated by a perception of being cheated by traders (Rhodie 1968; Grier 1981). The UGFCC lobbied to be made the sole buyer of cocoa beans in 1961 to put an end to cheating of farmers (Young, Sherman, and Rose 1981), but the organization failed to curb it (Amoah 1998). The deGraft Johnson Committee of Inquiry that was instituted in 1967 to investigate these malpractices by the UGFCC found that its purchasing clerks too had adjusted the weighing scales downward.

Some of the changes in marketing practices may have prompted an increase in the extent of cheating. The switch, in 1952, from zone-based pricing that accounted for differences in transportation costs to pan-territorial pricing offered an opportunity for some buyers to justify scale adjustment in distant areas to cover transportation costs (Acquah 1999; Amoah 1998). Similarly, buyers have recently claimed that the cocoa market reforms are pushing the cost of maintaining cocoa quality onto them, and therefore they need to cover their costs somehow (Baah et al. 2012).

Purchasing clerks claim that they adjust the scales to offset the poor quality of cocoa delivered by producers, which then needs to be "reconditioned" through drying and grading. The quality delivered is alleged to be particularly poor in Western Region. Some LBCs, such as Federated Commodities, give the district offices an additional GH¢1 per bag to cover the costs of reconditioning cocoa. The district manager of an LBC suggested that licensed buyers often pay farmers for only 62.5 kg, even when they deliver 66 kg. Some buyers are of the opinion that calibrating the scales is fair because farmers also cheat by supplying poor-quality cocoa and often do not repay the loans they have taken out.

The extent of cheating can be substantial: a survey in Eastern Region found the scales to be adjusted downward by 5 kg to 12 kg per bag (Dormon 2006); a survey in 20 cocoa communities sampled from the Western, Ashanti, and Volta Regions of Ghana found the scales to be adjusted downward by as much as 15 kg per bag (Baah et al. 2012). Anywhere from 8 percent to 24 percent of cocoa delivered may not be paid for due to scale adjustments.

In recent years, successive governments have funded the Ghana Standards Authority to organize routine inspection of weighing scales. In 2014 COCOBOD reported distributing 2,400 standardized weighing scales and 100,000 test stones of 30 kg to producers. The extent to which producers are cheated on weights and how these adjustments come to be expected would suggest that squeezing of LBCs on their margins would result only in some of that being recovered from producers through further adjustments in weights.

Costs of Parastatal Marketing Organizations

The pressures on the government to continue to offer a 70 percent share of FOB to producers should also lead them to reduce marketing costs incurred by parastatal marketing organizations because the producer share can be increased only by reducing taxes and/or marketing costs. As noted, Ghana has increased the producers' share primarily by reducing taxes.

Both the nominal and the real costs per ton of marketing have grown considerably. Total real marketing costs per ton incurred by LBCs, the CMC, and the QCC have nearly doubled from GH¢411 in 1996/1997 to GH¢752 in 2012/2013, growing at 4 percent per year (Table 4.3). Real per-ton costs increased as the total revenues from both higher production and prices grew considerably in 2010/2011 and have continued to grow. Of the three components, the costs of quality control by the QCC grew by 15 percent, while that of procurement by LBCs and the CMC grew by 5 percent and 3 percent, respectively. There are substantial year-to-year variations, partly due to allocations for capital expenditures that are made in some years. In the last five years of the period examined, real total marketing costs per ton have increased by more than 50 percent. While costs of procurement through LBCs have more than doubled, costs incurred by the CMC have increased by more than 75 percent. Both the QCC and COCOBOD, on the other hand, have held down their costs.

Trends in expenditures of quasi-public cocoa marketing organizations—the CMC, the QCC, and COCOBOD—suggest that the current pricing mechanism and the oversight of these organizations may not adequately pressure them to strive for efficiency. The organizations expect a proportionate share in any increase in cocoa sector revenues from either higher prices, larger production, or both because prices are determined by the PPRC in the spirit of "sharing the FOB." The share of marketing costs in export prices has not been reduced despite significant growth in revenues due to higher prices. Their share in the prices should not increase their costs unless the costs are inflating faster than price increases. Maintaining constant or even increasing shares while revenues increase dramatically is likely to hide inefficiencies, particularly if some of the operations benefit from economies of scale. While there may be political pressures to tighten the belt in order to pass on a significant share of export prices to producers during years when global prices are low, various administrations have lacked the political will to improve the efficiency of quasi-public marketing organizations.

Despite increasing costs, the marketing infrastructure appears to have become less efficient as cocoa volumes have grown. The inefficiencies include considerable delays in certification and handling of cocoa at the depots and in the payment for cocoa delivered by LBCs. There are also high levels of congestion in the cocoa value chain, which raise costs (Ecobank 2014a).

Following the initial market reforms, no serious effort has been made to change the three marketing organizations. The organization and overall functioning of the CMC, which should benefit from considerable economies of

TABLE 4.3 Trends in marketing costs, (GH¢) per ton, 1996/1997 to 2012/2013

		Marketing costs (GH¢ per ton)						
		1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003
Nominal	Total marketing	79.60	80.20	88.30	349.00	198.20	226.20	307.20
	Procurement	42.80	49.80	54.00	179.90	98.80	113.30	188.20
	CMC	7.70	3.30	3.50	3.30	9.30	13.70	13.20
	QCC	0.70	0.80	0.90	5.70	9.30	12.70	8.90
	COCOBOD	28.40	26.30	29.90	160.10	80.80	86.50	96.90
	CPI (2005 = 1)	0.19	0.25	0.28	0.32	0.40	0.53	0.61
Real	Total marketing	418.95	320.80	315.36	1090.63	495.50	426.79	503.61
	Procurement	225.26	199.20	192.86	562.19	247.00	213.77	308.52
	CMC	40.53	13.20	12.50	10.31	23.25	25.85	21.64
	QCC	3.68	3.20	3.21	17.81	23.25	23.96	14.59
	COCOBOD	149.47	105.20	106.79	500.31	202.00	163.21	158.85

Source: Authors' estimates using IFPRI/COCOBOD (2014).

Note: CMC = Cocoa Marketing Company; CPI = consumer price index; GH¢ = Ghanaian cedi; n.a. = not applicable; QCC = Quality Control Company.

scale, for example, is not transparent. How it markets cocoa, when it sells, the quantities it sells, and the prices it receives are not transparent. Having operated in London before being brought back to the country, the CMC maintains a certain amount of mystique about its activities, and hence the reluctance to interfere in its operations.

Industry costs: Spending on behalf of producers

An important aspect of the performance of the parastatals, particularly that of COCOBOD, is the effectiveness with which they spend the resources retained from producers to meet industry needs. The current price-setting process leaves COCOBOD with substantial surpluses at the end of the year because the production, price, and exchange rate projections used in setting prices are usually conservative. Between 1996/1997 and 2010/2011, actual revenues were 26 percent higher than projected, with actual revenues falling below projected revenues in only two years, 2001/2002 and 2004/2005 (Table 4.4). Surpluses have resulted from higher-than-projected prices and production. Clear rules on how the surpluses should be used do not exist. Beginning with the functioning of the PPRC, any windfall revenue from higher-than-predicted prices or more favorable exchange rates was to be put in a compensation account at the Bank of Ghana and shared between the government and producers in the

Marketing costs (GH¢ per ton)									
2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013
301.10	392.70	327.50	399.30	496.90	689.60	1050.20	944.60	1456.30	1686.30
186.80	251.60	193.60	211.90	244.30	328.90	512.80	545.60	830.00	1071.00
10.70	11.60	13.30	14.70	31.30	55.70	30.10	45.10	120.80	154.50
14.30	12.50	20.00	24.40	38.00	57.40	71.10	62.60	34.70	73.00
89.30	117.00	100.60	148.30	183.30	247.60	436.20	291.30	470.80	387.80
0.77	0.87	1.00	1.11	1.23	1.43	1.71	1.89	2.05	2.24
391.04	451.38	327.50	359.73	403.98	482.24	614.15	499.79	710.39	752.81
242.60	289.20	193.60	190.90	198.62	230.00	299.88	288.68	404.88	478.13
13.90	13.33	13.30	13.24	25.45	38.95	17.60	23.86	58.93	68.97
18.57	14.37	20.00	21.98	30.89	40.14	41.58	33.12	16.93	32.59
115.97	134.48	100.60	133.60	149.02	173.15	255.09	154.13	229.66	173.13

proportions of 40 percent for the government and 60 percent for producers (Amoah 1998). But the guidelines are not transparently followed.

These funds are more likely to be spent on expanding existing services or initiating provision of new services than on being passed on to producers as bonuses. Expenditures on industry costs have been higher than budgeted every year except 2000/2001. Between 2008/2009 and 2011/2012, they were more than double the budgeted costs, but have been as low as only 50 percent higher in 2012/2013. The share of industry costs in industry revenues grew from 4 percent in 1996/1997 to 25 percent in 2009/2010 but declined to 15 percent in 2010/2011. These services were provided through COCOBOD budgets until 2000, which was when the PPRC began to employ the net FOB concept in setting prices.

The role of COCOBOD in service provision was significantly expanded during the 2000s, when global prices increased dramatically and an increasing share of them was passed on to producers. Revitalizing cocoa, getting farmers to adopt improved practices, and giving them access to credit were part of the rural redevelopment plan of the Kufuor administration, which came to power in 2001 (Kufuor 2011). The incoming administration was sympathetic to the plight of the sector. President Kufuor, who came from a cocoa-growing area and whose political party had some of its roots in cocoa struggles, had an

TABLE 4.4 Projected and actual revenues from cocoa (thousands of GH¢), 1996/1997 to 2010/2011

	Revenues		Surplus		Surplus from higher than projected	
Year	Projected	Actual	Difference	Ratio of actual over projected	Price	Quantity
1996/1997	82,688	90,922	8,235	1.10	14,734	–6,500
1997/1998	116,725	155,777	39,052	1.33	19,256	19,796
1998/1999	140,333	148,700	8,368	1.06	–10,788	19,155
1999/2000	127,754	217,844	90,090	1.71	84,936	5,155
2000/2001	198,900	266,935	68,035	1.34	51,586	16,448
2001/2002	292,486	285,909	–6,577	0.98	54,258	–60,836
2002/2003	540,540	752,513	211,973	1.39	63,884	148,089
2003/2004	726,000	998,491	272,491	1.38	–71,597	344,088
2004/2005	915,566	794,204	–121,362	0.87	10,325	–131,687
2005/2006	720,940	998,500	277,560	1.38	27,908	249,652
2006/2007	819,000	929,504	110,504	1.13	90,668	19,836
2007/2008	998,660	1,405,656	406,996	1.41	359,704	47,292
2008/2009	1,689,350	2,311,314	621,964	1.37	464,356	157,609
2009/2010	2,452,800	2,627,355	174,555	1.07	412,743	–238,188
2010/2011	3,280,200	4,668,907	1,388,707	1.42	–132,092	1,520,799

Source: Authors' estimates using IFPRI/COCOBOD (2014).

interest in developing the sector, even apart from the fact that no government can survive without support from farmers.

Industry costs per ton of cocoa purchased increased dramatically beginning in 2008/2009, reaching more than GH¢593 in 2010/2011 (Table 4.5). Using yields observed in GCFS, revenues withheld from producers for industry costs worked out to nearly GH¢270 per ha in 2010/2011. Using household production observed, approximately GH¢1,036 was withheld from a median cocoa farm.

The services that COCOBOD offers fall into two broad categories: those designed to directly enhance the welfare of producer households and those that aim to sustain and develop cocoa production. The welfare programs include the scholarship scheme, which has been in existence since 1951, and recently initiated programs including social security, farmer housing, and efforts to reduce the worst forms of child labor in the cocoa sector. COCOBOD also maintains a welfare fund under COCOBOD law to fulfill

TABLE 4.5 Growth in industry costs (GH¢), 2002/2003 to 2010/2011

	2002/2003	2004/2005	2006/2007	2008/2009	2010/2011
Per ton	76.1	109.3	282.4	537.8	593.3
Per hectare	16.2	14.5	19.6	69.5	269.5
Per median farm	75.7	71.6	95.3	253.0	1,036.7

Source: Authors' calculations using IFPRI/COCOBOD (2014); Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010).

its commitment to social responsibility. In recent years, it has distributed 1 million insecticide-treated mosquito nets to farmers, supplied 3,000 solar water pumps and 9,000 solar streetlights to cocoa-farming communities, and distributed 200,000 solar torch lights to farmers at discounted prices.

The interventions to sustain production have both short- and long-term objectives. The short-term programs include the Hi-Tech, or fertilizer subsidy, program; the Cocoa Diseases and Pest Control Program (CODAPEC), or public spraying program; and cocoa extension services. The longer-term programs include the program to control swollen shoot disease, cocoa research, cocoa college, and cocoa replanting and rehabilitation. The costs of longer-term programs are included in COCOBOD budgets. CRIG, which is primarily funded by COCOBOD, is one of the largest producer-funded research organizations in Africa. CRIG received about 4 percent of revenue, down from approximately 8 percent as industry revenues have grown significantly in the past few years.

Some of the expenditures go into supplying public goods: cocoa research, efforts to reduce the worst forms of child labor, and cocoa roads are examples. Less than 7 percent of the funds goes into research and welfare programs, such as farmer housing and scholarships. The rest (93 percent) goes into supporting increased production and productivity in the short and long term. The total expenditure on behalf of farmers in 2011, when the share of industry costs peaked, amounted to more than GH¢450 (US$231) per ha. While some public goods are necessary, it is important to consider whether productivity objectives would be more effectively met, at least in the long run, by giving producers prices that are 20–25 percent higher. The draft strategy states that industry costs will be capped at 10 percent of export prices, much higher than observed in recent years (COCOBOD 2015).

Nearly all of the services that are provided through industry costs are directly or indirectly managed by COCOBOD, except for cocoa roads, which are built by the Ministry of Roads and Highways. COCOBOD's swollen

shoot disease control unit assists farmers with disease-infected farms in replanting their farms with early-bearing, high-yielding, and disease-tolerant trees in about 41 cocoa districts. In 2010 the unit began a cocoa rehabilitation program. Designed to increase productivity and quality of cocoa, the program cuts down cocoa trees that are more than 30 years old and replants them with hybrid varieties in areas that are disease free; removes parasitic plants (mistletoes) from infested cocoa trees nationwide; and, in collaboration with the cocoa Hi-Tech unit, promotes fertilizer use on depleted soils in high-cocoa-producing districts.

Various reasons are offered for providing these services. Some services, such as cocoa research, are public goods, while others aim to overcome the externalities of individual farmer decisions, particularly in relation to controlling pests and diseases. The expenditure on cocoa roads is an attempt to ensure that the revenues of cocoa growers go into benefiting them exclusively. However, some of these funds do go into developing roads in other areas. Some people believe that these services are necessary because small farmers would not undertake these activities. So a combination of factors—including opportunities for patronage, desire to achieve certain production targets, and a belief that smallholders cannot be expected to undertake certain practices—drive COCOBOD to withhold a portion of revenues to offer services.

The marketing organizations in Ghana do not have adequate public accountability, and their operations are not transparent enough for the public or the stakeholders to hold their representatives accountable. To some extent, the Ghanaian spirit of "sharing FOB," in which margins are determined, dilutes pressures on marketing organizations to streamline themselves. Marketing organizations expect to maintain their share in prices even when gross revenues expand considerably due to increased production or prices. Administrations that wish to use marketing organizations to dispense patronage would also have limited incentives to be harsh on them.

While there is considerable scope to improve the efficiency of current institutions, the international market prefers the Ghana model over fully liberalized sectors. Processors and consumers appreciate a semi-organized sector that is capable of delivering large quantities of high-quality cocoa, and Ghana's cocoa sector is widely considered to be the best managed in Africa (Gilbert 2007; Ecobank 2014a). Historically, buyers, including the chocolate manufacturers who were directly buying from producers, were not opposed to the establishment of boards. Cadbury, for example, felt that production needed to be stabilized in West Africa and that the boards could play a meaningful role

by overcoming reduced planting, poor maintenance, and increasing incidence of swollen shoot disease (Killick 2009).

Reversing the reforms

By expanding industry activities, COCOBOD is reversing the reforms that streamlined the operations of COCOBOD to reduce its costs. Additionally, state interventions have curtailed private sector development in the input supply sectors and made producers increasingly dependent on the operations of the parastatal. COCOBOD's efforts to encourage private sector development have been halfhearted.

The CRP phased out subsidies to introduce private sector competition in the procurement, distribution, and retailing of all inputs. Privatization, however, did not take place under the CRP because the Cocoa Services Division (CSD) of COCOBOD continued to engage in supplying inputs until 1993/1994, when, as required by the terms of the World Bank's Agriculture Sector Adjustment Credit, competition had to be introduced. To transfer input supply services to the private sector, the GCCSFA was set up. The establishment of a Cocoa Input Company (CIC) under the GCCSFA was an attempt to convert a division of COCOBOD into a private sector entity. Even this transfer was initially merely symbolic because the association used CSD premises and its retrenched staff to distribute the inputs. Subsidies were drastically reduced only in June 1997, when the Cocoa Input Supply Company was established, which initiated sales along commercial lines.

COCOBOD has made only half-hearted efforts to support the development of the CIC as a commercial entity. It initially distributed fertilizers through the company, but later the regional directors of the MoFA were also brought in as distributors. CODAPEC was implemented in earlier years by supplying insecticides directly to producers through the CIC. Eventually, the board moved toward spraying organized by the districts. Following major restructuring, the CIC was close to bankruptcy, particularly when COCOBOD supplied fertilizers free in 2014/2015.

There are no systems in place to ensure that services of COCOBOD are distributed equitably. Supplies that often fall short of demand make equitable distribution even more difficult. "The items are lodged in district offices of GCCFSA for farmers to go collect them," said a regional chief farmer. Distribution processes are also complex, particularly in the absence of important information. All materials are centrally purchased and sent to districts for distribution. For example, a single district may receive as much as 50,000

liters of fuel that needs to be allocated to labor gangs at the rate of 9 liters per day. The fuel was initially distributed in the villages, but then it was taken back to the district level to reduce the risk of theft. Opinion leaders select the members of labor gangs, but there are political overtones because membership changes with administrations.

Chapter 5

ENVIRONMENT, INTENSIFICATION, AND ATTRACTIVENESS OF COCOA

Because cocoa is a forest-based crop that benefits from the nutrients and microenvironment that forests offer, cocoa production has always shifted to take advantage of virgin forests. Intensification, or the adoption of practices that aim to increase production by increasing yields on existing farms rather than by extending cultivated land, is desirable both from an environmental perspective and from a perspective of sustainably raising incomes and competitiveness. Producers in Ghana have intensified cocoa production, leading to a green revolution of sorts. Where intensification has taken place, the factors that have driven this intensification—including the positive effect it might have on farmers, the youth in particular, by encouraging them to continue to produce cocoa—are important considerations for sustainably developing the sector.

This chapter examines recent trends in intensification of cocoa production and productivity growth, including the role played by virgin forests in cocoa production; the labor requirements, which might discourage intensification; and technologies that offer some trade-offs between intensification and protection of the environment. The first part of the chapter addresses two issues: shifting production of cocoa, and trade-offs between producing cocoa and protecting the environment. Cocoa production has expanded by exploiting the one-off fertility offered by forests. The labor requirements to establish cocoa in particular were met by using unpaid family labor, which may have been substantial because of the prevailing gender relations at the time. The discussion of the trade-off between production and environment examines the technologies available for intensification and the incentives to adopt them.

The second part of the chapter begins with the extent and nature of intensification that has taken place in Ghana and the reversal of declining productivity seen between the late 1990s and the early 2000s. The chapter employs econometric analysis to identify the determinants of intensification. It then analyzes differences in intensification and productivity among farms of different sizes. Finally, the chapter looks at competitiveness of cocoa with other

crops and the potential appeal of its cultivation to youth. We estimate gross margins per household and per capita, although cocoa incomes are always complemented with income from other sources.

Geography of Production

The estimates of the area under cocoa production in Ghana are not reliable. Production amounts, on the other hand, may be more accurately captured due to centralized marketing, although they too may be biased without reliable estimates of smuggling into and out of the country. The 2010 population census suggests that cocoa is planted on 928,169 hectares, or nearly one-quarter of the gross cropped land in the country (GSS 2012). However, international sources suggest that cocoa area is closer to 1.8 million hectares (FAO). Cocoa is produced by nearly 800,000 households. The GSS (2008), using data from Ghana Living Standards Survey (GLSS) 5, estimated that there were 725,480 cocoa households, of which 57,000 were in coastal areas and 18,000 were in savannah ecological zones.

Information on COCOBOD purchases of cocoa from LBCs suggests that cocoa production has moved westward in the past decade, with Western Region doubling its production, producing 175,000 additional tons, and increasing its share of production from 53 percent in 2002 to 56 percent in 2011. Although Eastern Region's output increased by 20,000 tons, its share fell from 12 percent to 9 percent, despite the fact that it used to be the center of cocoa production in the country. The highest growth in production is observed in the southern part of Western Region, in Enchi District in particular.

The geographic shift can be explained by the role of the natural environment, particularly soil fertility and the shade offered by tropical forests in cocoa production. The shifts are prompted by changes in the availability of what Ruf (1995) refers to as the "forest rent," or the fertility and suitable microenvironment that forests offer (Clarence-Smith and Ruf 1996). The rent may be measured as the difference in unit costs of production on a farm replanted with cocoa as compared with one planted on freshly cleared forest land—the fragile soils in the forest offer a one-off fertility bounty for cocoa production (Austin 2008). As frontiers age, they trigger diversification to other crops that are less demanding than cocoa on the environmental conditions offered by newly cleared forests (Ruf 1987; Léonard and Vimard 2005; Schroth and Ruf 2013). Cocoa prices too have similar effects. When cocoa

TABLE 5.1 Characteristics of cocoa farms in three regions

Region	Observations	Household size (mean)	Total land under cocoa cultivation (ha) (median)	Age of trees (years) (mean)	Yields (kg per ha) (median)	Share of land (%) under hybrid trees (mean)
Ashanti	187	5	3.24	19.98	193.05	47
Brong-Ahafo	179	5	4.03	21.79	270.27	48
Western	336	5	4.05	19.44	381.55	51
Total	**702**	**5**	**3.96**	**20.29**	**289.57**	**49**

Source: Authors' calculations from Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010).
Note: ha = hectares; kg = kilograms.

prices in Ghana did not offer adequate incentives during the 1970s and 1980s, producers diversified into citrus and oil palm without completely abandoning cocoa (Michel-Dounias et al. 2013). Other tree crops such as rubber and oil palm that offer year-round incomes compete with cocoa.

The GCFS survey conducted in three regions—Ashanti, Brong-Ahafo, and Western—suggests that the average age of trees is similar, close to 20 years in all three regions, with nearly 50 percent of the trees being hybrids (Table 5.1). This suggests that there has been replanting in all regions in the past two to three decades. Median holdings are larger in the Brong-Ahafo and Western Regions than in Ashanti (4 ha compared to 3.24 ha). Median yields are significantly different, ranging from 193 kg per ha in Ashanti to 270 kg per ha in Brong-Ahafo and 382 kg per ha in Western Region. These differences are largely a reflection of the westward shift of cocoa cultivation into more fertile virgin forest lands and more intensive cultivation in Western Region, which will be discussed in the following sections.

Shade manipulation is a key aspect of the management of cocoa cropping systems; the level and type of shade managed, however, may be influenced by social, economic, and agroecological factors. The composition of trees maintained for shade is important for both cocoa intensification and biodiversity conservation. In Ghana 28 percent of cocoa is planted under the no-shade system (i.e., full sun), 42 percent has less than 30 percent canopy coverage, 25 percent has between 30 percent and 60 percent canopy coverage, and the remaining 5 percent has more than 60 percent canopy coverage. Although regional breakdowns are not available, Western Region is believed to have the highest proportion of its area under the full-sun system (Gockowski and Sonwa 2007).

Labor requirements

Establishing and maintaining cocoa farms is labor intensive. By 1910 there were as many laborers as farmers in the new cocoa areas, most of them coming from the Volta Region in the east (Hill 1961). In 1930 the estimated annual labor input for maintaining a farm was 25 person-days per acre, or 62.5 person-days per ha (Beckett 1944). Labor was then used for brushing and weeding, primarily in August and September, and for harvesting from September to November. Brushing was done again from March to May before the midyear crop was harvested. The migrant farmers who established new farms used only family labor in the initial stages, keeping their cash expenditures to a minimum while the farms were being established. Wives, children, and junior kin worked, expecting to gain rights, even though they were not directly compensated. Producers did not begin to hire labor until the cocoa started yielding steady enough income to support a laborer (Berry 1993; Hill 1961).

The gender relations prevailing at the time also played a significant role in giving investors access to the labor required for establishing cocoa. In pre-capitalist African societies where land was abundant, labor was scarce, and technology was simple, gaining control over labor was central to social and political organization (Grier 1992). Cocoa was established by men who migrated to buy land. Wealthy men lent money to poorer farmers to buy land, frequently with a female relative serving as a pawn or collateral. Female labor was also the main source of permanent labor. A survey in a cocoa village in 1948 showed that 39 percent of the cocoa farmers were female, but women's holdings were much smaller than those of men. The size of a woman's farm was limited by her own labor capacity and what her family would willingly contribute, unlike a man who could call upon the labor of many female relatives (Grier 1992). Cocoa, marriage, and access to land and labor were tied together because marriage gave women access to land, and men access to labor (Duncan 2010).

The importation of labor from outside the cocoa-growing areas appears to have been essential for cocoa production. The Busia administration's introduction of the Aliens Compliance Order, which led to the forceful removal of many foreigners from the country, is reported to have devastated Ghana's cocoa production (Mikell 1989b). By that time, many non-Ghanaians had replaced the young Akan people who had migrated away from the cocoa areas. Thus, the Order further deprived cocoa-growing areas of needed manpower. A 1951/1952 study by the CMB found that hired workers contributed 40 percent of the labor in all sample farms and 60 percent on cocoa farms

(Berry 1998). In 1951–1953, the Gold Coast labor department reported 3,391 cocoa farmers employing 30,000 laborers in addition to family labor (Killick 1966, cited in Berry 1998). After 1945 when the labor shortage had become severe, laborers did not accept annual contracts, favoring tenancy agreements instead. As a result, producers modified the *abusa* ("sharecropper") contracts to retain as much control over sharecroppers as they had had over laborers earlier.

Recent estimates suggest that 178 person-days are required for the major tasks associated with cocoa production for a representative cocoa grower in Ghana producing a total of 940 kg (Abenyega and Gockowski 2001). The busiest months for maintaining a cocoa farm are August to November, during which farmers spend as many as 34 hours per week on cocoa. The least-busy months are January to May, during which they might spend 15 hours per week on their cocoa farms. About 40 percent of farmers do paid work outside the farm (Hainmueller, Hiscox, and Tampe 2011).

Evidence is mixed on the extent to which cocoa producers have actually depended on hired labor in recent years. A recent baseline survey suggests that farmers use primarily family labor as labor costs have gone up. Around 71 percent reported hiring day labor in the past 12 months, but the reported median total labor cost suggests that they hired for only 15 days (Hainmueller, Hiscox, and Tampe 2011). The GCFS survey used in the following section suggests that hired labor still plays an important role, though household labor use is dominant at all levels of analysis (at different thresholds of land size and yield outcomes, as well as for both male and female cocoa farmers).

Cocoa's labor requirements, which may rise proportionately with the level of intensification and yields achieved, discourage intensification and encourage a search for virgin forests for extending cultivation. However, the combination of limited opportunities to expand into virgin forests and fairly high prices in recent years may continue to offer incentives for at least limited intensification.

Cocoa versus the Environment

The expansion of tree crop production, including cocoa, has contributed significantly to deforestation. In Ghana the increase in area under oil palm, robusta coffee, rubber, and cocoa from 1996 to 2005 may have contributed to deforestation at the rate of 2.0 percent per year (Gockowski 2007). Cocoa is cultivated in West Africa on more than 5 million ha that were once mostly

part of the West African Guinean forests. Cocoa is the most widespread land use system in the Guinean rainforest, and the increase in the area harvested over the past 20 years has resulted in the deforestation and degradation of approximately 2.3 million ha of Guinean forests (Gockowski 2007).

The environmental impact of cocoa cultivation depends on the land use prior to establishing cocoa, the diversity and extent of the forest canopy maintained for permanent shade, and the way in which the farms are established. In Ghana with a population density of 78 persons per square kilometer, the predominant land type prior to conversion of forests to cocoa farms was bush fallow, followed by forest. To a more limited extent, savannah lands were converted to cocoa farms in the forest-savannah transition zones of Western and Brong-Ahafo Regions. The Sustainable Tree Crop Programme (STCP) baseline survey suggests that in Western Region, only 16 percent of cocoa farms were established through selective thinning of forests, a method that leaves behind tree species with local utility (Abenyega and Gockowski 2001). The predominant practice was to fell and slash the forest, burn the biomass, and then cultivate food crops along with cocoa for the first few years after establishment.

Intensification technologies

Intensification offers the potential to reduce the environmental impact of cocoa expansion. The critical elements of intensification are the level of shade under which the cocoa trees are grown, the genetic material used for cultivation, and the levels of application of mineral fertilizers and plant protection. Without intensification yields gradually decline due to nutrient exhaustion, erosion of soils, and the increasing incidence of pests and diseases; 20 to 30 years after planting, farmers are typically forced to uproot and replant the trees, improve the soils, or move to a new area (Binam, Gockowski, and Nkamleu 2008).

The level of shade with which cocoa is cultivated is the important variable. Young cocoa plants need some shade in the nursery and also during the first two to three years in the field. The shade is needed to reduce light intensity and to buffer the microenvironment so that young plants are not subjected to excessive moisture stress. The need for shade decreases when the trees develop their canopies sufficiently to provide some self-shading and when the canopies of neighboring trees meet. Yields are usually higher when trees are grown with little or no shade because the larger leaf area and the higher photosynthetic activity of unshaded cocoa can be maintained only when trees are adequately provided with nutrients (Wood and Lass 1992). Hence, fertilizer

application is needed in lightly shaded or unshaded cocoa. However, it is difficult to maintain the high yields achieved through compete removal of shade. Yields decline because of nutritional stress, unfavorable changes in the environment from the removal of forests, greater damage from insects involving dieback (death of terminal branches and leaves caused by capsid bugs feeding on shoots), and deterioration of the general condition of trees (Ahenkorah et al. 1974). Shade is therefore an effective means of controlling conditions that lead to a premature decline of yields (Wood and Lass 1992).

On poor soils or without fertilizers, cocoa gives highest yields under shade, but on fertile soils or with adequate fertilizer, well-established cocoa trees yield most with little or no shade. Removing shade improves yields, and yields can be raised further with fertilizer applications. But after about 10 years, the yield of the unshaded cocoa begins to decline, while the yield of the shaded cocoa begins to turn upward.

Growing cocoa in shade is considered to provide biodiversity benefits, because this approach is better than clearing forests to cultivate other crops. When shade is removed to increase productivity, the trade-offs between achieving yields and maintaining diversity begin. Growing under full sun or no-shade with fertilizers to increase productivity might be seen as a way to cut down less forested area—the "fertilizer for forests strategy"—but the economic life of trees is reduced considerably (Franzen and Borgerhoff Mulder 2007).

One could argue that an earlier adoption of full-sun technologies could have potentially saved some of the forests in Ghana. The average yield of 400 kg per ha obtained in the mid-2000s is less than one-fifth of the average yields that could be obtained under the full-sun plus fertilizer treatment at CRIG in trials conducted in the 1960s. Even if Ghanaian producers had only partially adopted the no-shade plus fertilizer management systems already available in the 1960s, the yield gap could have been closed by about 50 percent, and over half the 2.2 million hectares of Ghanaian forest presently devoted to cocoa would have been spared (Mayaux, Archard, and Malingreau 1997).

Full-sun systems appeal to producers because they offer higher levels of income. Shade systems, however, may not be environmentally superior because they require more land than sun systems to produce the same quantity of cocoa. A comparison of intensive (full-sun) production with a Rainforest Alliance model of shaded cocoa reveals that full-sun systems offer producers higher incomes; according to Gockowski and Sonwa (2007), the intensified full-sun system offers 148 percent to 161 percent higher returns than the extensive shaded system, depending on the price policy regime (with or

without tax and fertilizer subsidy). This would suggest that Ghana could potentially have used 200,000 fewer acres to achieve its target production of 1 million tons (Gockowski et al. 2013).

Although the technical superiority of low-shade hybrid cocoa technology has been demonstrated on research stations, its adoption has been limited. Of the three main elements (improved seed, fertilizer, and low shade), only the elimination of shade is practiced by resource-poor farmers, who are either unable to afford, or lack access to, the fertilizers and hybrid trees that are the key factors in the long-term sustainability and productivity of this system. As land has become scarce over time, producers seem to prefer no-shade systems, but they do not accompany these with the complementary practices, such as application of fertilizers and plant protection, necessary for intensification. Cocoa growers have not adequately recognized the negative externalities—pollution and land degradation—resulting from a full-sun system with insufficient applications of fertilizer (Ruf 2007a). In addition, the insufficient applications of fertilizer on exposed soils not only damage the soil but also contribute significantly to the low levels of productivity observed (Obiri et al. 2007). Integrating the adoption of new tree varieties with the use of more organic inputs and intercropping cocoa with other timber trees is a viable option to build a "post–forest rent model" on lands currently under cocoa cultivation (Ruf 2007a).

Intensification

Cocoa growers have been encouraged since colonial times to intensify by adopting improved husbandry practices. At the time, the Ministry of Agriculture was concerned that cocoa growers were expanding their production at the cost of food production and that they were not systematically developing or properly maintaining their cocoa farms through adequate weeding and ditching. The colonial administration tried to discourage specialization in cocoa and promote intensification to produce higher-quality cocoa through improved disease control. Farmers, however, resisted intensive cultivation because they wanted to economize on scarce labor (Green and Hymer 1966). Ignoring recommendations, farmers simply fallowed diseased fields instead of intensively rehabilitating them, because the fields eventually recovered.

Beginning in the 1990s, cocoa producers increased the use of fertilizers, planted hybrid cocoa varieties, and invested in better control of pests and diseases (Boahene, Snijders, and Folmer 1999; Edwin and Masters 2003; Gockowski and Sonwa 2007; Teal, Zeitlin, and Maamah 2006; Vigneri, Teal,

and Maamah 2004; Vigneri 2008). Intensification was quite dramatic in the 2000s. The STCP baseline survey conducted in 2000 showed that nearly 50 percent of the producers were not applying either fungicides or insecticides to control capsids and black pod disease; by 2010 only 10 percent of cocoa producers were not doing so (Abenyega and Gockowski 2001). The share of farmers using mineral fertilizers also increased from less than 20 percent to nearly 40 percent during the same period. These figures are consistent with those from the GCFSs for the period 2001/2002 to 2009/2010, which suggest that the proportion of producers in Ashanti, Brong-Ahafo, and Western Regions applying any fertilizers rose from 9 percent to 57 percent.

The proportion of farmers using fertilizers increased from less than one-tenth to nearly two-thirds over the survey's nine-year period 2001/2002 to 2009/2010 (Table 5.2). Average quantity applied per hectare increased from almost zero to more than 100 kg per ha. The proportion of area planted with Amazonian varieties and hybrids reached close to one-half. In Western Region, less than 4 percent of land was left with the old Tetteh Quarshie varieties. There was not much change in the quantity of plant protection chemicals used, because plant protection has always been practiced as required to protect yields rather than to enhance yields.

The pace of intensification, however, varies across regions, and there is room to intensify further. Another baseline survey, conducted at the end of the 2000s, indicated that only 21 percent and 37 percent of producers reported applying fertilizers and pesticides, respectively, across all regions (Hainmueller, Hiscox, and Tampe 2011). The highest level of intensification was observed in Western Region, where 39 percent and 48 percent of producers reported applying fertilizers and taking plant protection measures, respectively.

Nearly 50 percent of the area under cocoa cultivation in the older growing regions is estimated to have been replanted with recently released hybrids, despite the significant labor required, as well as the fact that using hybrids takes longer to generate economic benefits to farmers than planting cocoa in newly cleared forests (Masdar [UK] Ltd. 1998). The prevailing land tenure system in Ghana also encourages clearing new land, because cultivating a perennial crop remains an important way to establish permanent usufruct rights on land in traditional tenure systems (Amanor 2010; Vigneri 2005; Berry 2009; Takane 2002).

Farmers do not, however, consistently adopt intensification practices, and some even "dis-adopt" the practices. Explaining dis-adoption by farmers participating in a group lending scheme known as the Cocoa Abrabopa

TABLE 5.2 Indicators of intensification within a decade, 2001/2002 to 2009/2010

Indicators	2001/2002	2005/2006	2009/2010
Observations	435	512	786
Proportion of area under Amazonians (%)	34	44	48
Proportion of area under hybrids (%)	57	50	48
Proportion of area using fertilizer (%)	8	40	59
Average kg/ha fertilizer	3.32	37.44	112.63
% using pesticide + fungicide	82	73	86
Liters/ha insecticide + fungicide	2.37	1.36	2.61
Labor/ha (person-days)	51.77	49.58	52.74

Source: Authors' estimates using Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010).
Note: ha = hectares; kg = kilograms.

Association, Zeitlin (2012) finds that although the average returns to intensification may be high, the yields are also heterogeneous, making adoption nonprofitable for the bottom quarter of the yield distribution. The high variability in the expected returns from fertilizer applications often causes farmers to revert to insufficient application of chemicals, even when the farmers are offered knowledge, training, and credit (Opoku et al. 2009).

Using GCFS data, we examine the changes in the proportions of farmers that fall into various technology adoption levels as defined by CRIG. They define technologies by the yields and the levels of input application required to achieve those yields: low technology (less than or equal to 400 kg per ha), medium technology (400 to 800 kg per ha), and high technology (800 to 1500 kg per ha).

The analysis suggests that producers are graduating to higher levels of technology as defined by CRIG. For example, the proportion of producers adopting low technology (or obtaining yields associated with low technology) declined from 85 percent of the sample at the baseline (377 out of 440) to 65 percent in 2010 (516 out of 782) (Table 5.3). The use of both labor and nonlabor inputs is substantially higher in higher technology levels, with the exception of fertilizer use per unit of land at the baseline. The few (12) who achieved high levels of yields may have achieved those levels largely through existing soil fertility. Labor productivity (kg cocoa/labor) also increases with technology levels, but on the whole, higher levels of fertilizer and labor application contribute to higher yields.

TABLE 5.3 Input application by technology type

Year		T1: yields ≤ 400 kg/ha	T2: yields 400–800 kg/ha	T3: yields 800–1500 kg/ha
2002	Obs.	377	51	12
	kg fertilizer/ha	2.36	10.28	2.30
	labor/ha	54.04	76.22	89.01
	kg cocoa/labor	6.62	21.94	20.52
2004	Obs.	386	96	16
	kg fertilizer/ha	29.94	48.97	102.73
	labor/ha	122.48	182.03	317.05
	kg cocoa/labor	4.70	9.30	10.76
2006	Obs.	390	100	29
	kg fertilizer/ha	24.20	65.82	91.63
	labor/ha	54.01	75.49	143.69
	kg cocoa/labor	10.42	17.92	17.61
2008	Obs.	502	172	70
	kg fertilizer/ha	31.17	87.69	169.33
	labor/ha	49.67	73.31	92.43
	kg cocoa/labor	10.80	29.83	28.07
2010	Obs.	516	198	68
	kg fertilizer/ha	68.20	176.52	248.12
	labor/ha	49.82	63.22	97.25
	kg cocoa/labor	13.08	22.49	29.72

Source: Authors' estimates using Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010).

Note: ha = hectares; kg = kilograms; labor = person-days; obs. = observations; T1 = low technology; T2 = medium technology; T3 = high technology.

Green revolution

Although yields have increased in Ghana, they are still below the yields in Côte d'Ivoire. FAO data (FAO 2016) suggest that the yields in Côte d'Ivoire were 660 kg per ha compared to 549 kg per ha in Ghana in 2012. Actual yields are also considerably below achievable yields; yields range from 50 to 80 percent of yields achieved on experimental farms, depending on practices adopted by farmers as described in Gockowski (2007). Yields are usually underreported because farmers tend to overestimate the size of their land holdings. One survey showed that average yields were 377 kg per ha when based on measured area compared to yields that were barely above 200 kg per

ha when based on farmer-reported acreage (Hainmueller, Hiscox, and Tampe 2011). There was considerable variation in yields, and they varied more within regions than across regions. Those in the 75th percentile in Western Region, for example, obtained yields of over 800 kg per ha.

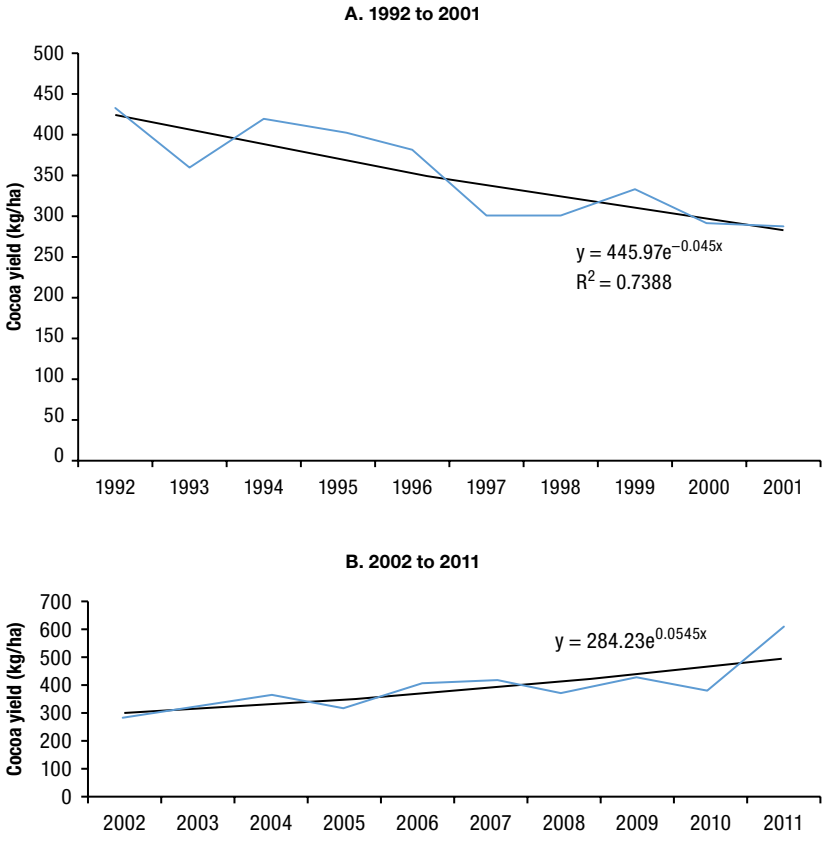
Lower yields in Ghana could be due to other countries having adopted policies to increase productivity earlier and the time lags in cocoa cycles (Ruf 2007b). As new forest lands became scarce in the 1970s, Côte d'Ivoire encouraged growers to adopt more intensive methods of cultivation such as the use of new seed technologies, higher fertilizer applications, and technical innovations to increase production. These methods increased yields above 500 kg per ha, in some cases reaching 1,000 kg per ha. Although increased taxation of cocoa since 2003/2004 has reversed this trend, the current productivity levels can be attributed to these earlier policies. Another factor that contributes to higher yields in Côte d'Ivoire may be higher levels of rainfall and better soils; soils in Ghana, in Western Region in particular, are not able to sustain productivity for long.

Aggregate data from FAO suggest that in the 1990s, Ghana's cocoa sector exhibited a curious combination of declining productivity and rapid area expansion. During this period, harvested area expanded at a rate of 9.1 percent annually, while the per-acre yields declined by 4.5 percent annually (Figure 5.1A). Production increased in both Ghana and Côte d'Ivoire from the levels of the 1980s, but the increase was achieved through forest clearing rather than productivity increases (Ruf 2007a). Between 1991 and 1997, output grew through expansion of labor, and land and labor productivity also improved due to increased use of nonlabor inputs and decreased use of labor. From 1997 to 2001, neither yields nor labor productivity showed any significant increases, although nonlabor inputs did increase (Teal and Vigneri 2004).

Recent household surveys suggest that productivity grew significantly over the past decade; a green revolution of sorts has taken place in Ghanaian cocoa (Gockowski 2012; Teal 2013). Unlike in the 1990s, yield growth of 5.5 percent per year (Figure 5.1B) accounted for 80 percent of the growth in output between 2002 and 2011. Although an additional 461,000 ha was brought into production during this period, the absolute increase in cocoa acreage was less than in the previous decade.

Examining yield determinants using the panel data collected by the GCFS, we find that cocoa yields are inversely related to farm size and positively associated with the application of fertilizers and plant protection measures. This relationship is examined by estimating a fixed effects regression in log-linear

FIGURE 5.1 Trends in cocoa yields, 1992 to 2011



Source: Gockowski (2012).
Note: ha = hectares; kg = kilograms.

form between yields (dependent variable) and various explanatory measures of input use and farmers' characteristics.

Table 5.4 shows the findings from estimating a Cobb–Douglas production function using a fixed effects model on the GCFS data. The table displays the results of two separate models; column 1 uses the full five-year panel but does not account for fungicide use, as the question on farmers' use of this chemical was not asked separately at the baseline in 2002. Column 2 shows estimates of the same model from 2004 to 2010, accounting for fungicide. The estimates suggest that cocoa is by and large produced by smallholders, with a number of inefficiencies occurring at the margins.

The first noticeable finding is that higher yields are observed on smaller landholdings.[1] The existence of an inverse relationship (IR) between the size of a farm's cultivated area and land productivity has been at the center of a longstanding debate among agricultural economists (Berry and Cline 1979; Bhalla and Roy 1988; Carter 1984; Feder 1985; de Janvry 1981). The most common explanations are that the IR reflects the failure to properly measure key factors such as land quality or area and that small farmers apply more than the optimum amounts of certain inputs, possibly as a result of imperfections in markets for key factors such as labor and land. The latter explanation is supported by the fact that the relationship generally weakens with technical progress or mechanization. Other possible explanations commonly referred to in the literature include decreasing returns to scale in production and the unobserved effect of one or more variables (such as land quality), which determines an omitted variable bias.

In the context of the specific model estimated, the use of fixed effects rules out the effect of any unobserved difference in the quality of land (or how this is measured). We focus our comments on the results shown in model 2, where the IR shown suggests that a 10 percent increase in land is associated with a 7 percent decrease in yield. This is likely to result from market inefficiencies in other inputs (for example the high cost of paid labor that pushes farmers to overuse more affordable family labor) that will make smaller producers use inputs not at scale. This interpretation is also confirmed by the lack of a statistically significant association between labor and yields, which is indicative of possible inefficiency in the composition of labor used on cocoa farms.

Nonlabor inputs are all significantly associated with higher yields, which model 2 suggests will increase by 1.6 percent, 1.2 percent, and 2.1 percent in correspondence to a 10 percent increase in fertilizer, insecticide, and fungicide, respectively. Finally, the estimates of tree age and farmers' experience in cocoa farming, though negatively and positively associated with yields as one would expect, are not statistically significant.

To further investigate the IR between yields and farm size, we examine levels of input application and yields disaggregating the sample of farmers in four categories of land quartiles based on farm size. The median acreages in the four farm size quartiles across the five years are 1.65 ha, 3.14 ha, 5.24 ha, and 10.12 ha.

1 Land here is defined as all acreage under cocoa cultivation by the same farmer. It can therefore include multiple plots.

TABLE 5.4 Determinants of yield

	(1) Fixed Effect Model (Full Panel)			(2) Fixed Effect Model (2004–2010)		
Dependent var: ln (kgs/ha)	Coef.	Std. Err.	t-test	Coef.	Std. Err.	t-test
ln (land under cocoa; ha)	–0.60	0.06	–10.46	–0.70	0.08	–8.47
ln (labour person days/ha)	0.01	0.01	1.01	0.03	0.02	1.58
ln (kgs fertilizer/ha)	0.13	0.03	4.39	0.16	0.04	3.99
ln (insecticide/ha)	0.14	0.02	6.76	0.12	0.02	4.74
ln (kgs fungicide/ha)				0.21	0.05	3.99
Tree age	–0.01	0.01	–0.95	–0.01	0.01	–1.30
Years experience in cocoa farming	0.01	0.01	0.77	0.01	0.01	1.23
Share ha under hybrid	–0.05	0.08	–0.62	–0.02	0.15	–0.15
Share ha under Amazon	–0.05	0.10	–0.50	–0.09	0.14	–0.66
2002		(omitted)				
2004	0.26	0.09	2.86		(omitted)	
2006	0.43	0.09	4.53	0.16	0.05	3.13
2008	0.46	0.09	4.99	0.17	0.08	2.13
2010	0.40	0.11	3.74	0.12	0.08	1.37
Constant	5.97	0.13	44.94	6.30	0.24	26.44
N. of obs	1839.00			1492.00		
F(13, 32)	40.74					
F(14,32)				29.13		
R-overall	0.17			0.16		

Source: Authors' analysis of the Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010).
Note: ha = hectares; kg = kilograms. Std. Errors adjusted for 33 village clusters.

The smallest landholders in the first quartile apply more fertilizers than the largest landholders in the fourth quartile. Beginning in 2004, the smallest landholders increased fertilizer application to a greater extent than the largest landholders did: the smallest landholders increased fertilizer use by nearly four times compared to the largest landholders, who increased their use by three times. Fertilizer use per hectare by the smallest landholders was nearly 50 percent more than that of the largest landholders in some years. In 2010 the smallest landholders applied 155 kg per ha compared to 105 kg per ha by the largest landholders (Table 5.5). However, there is no significant difference among them in the use of plant protection measures or the proportion of land under hybrids cultivation.

TABLE 5.5 Yields and application of inputs by holding size, 2002 to 2010

Median holding size (quartiles)		2002	2004	2006	2008	2010
First (1.65 ha)	Median yield (kg/ha)	205.92	261.18	308.88	386.09	411.83
	Fertilizers (kg/ha)	2.20	40.84	47.78	82.25	155.24
	Person-days/ha	72.21	117.28	79.42	77.35	81.83
	% hired	51	40	36	42	28
Second (3.14 ha)	Median yield (kg/ha)	184.36	227.11	231.66	261.07	293.43
	Fertilizers (kg/ha)	4.66	36.93	43.18	58.02	92.40
	Person-days/ha	46.47	98.26	58.44	55.80	50.75
	% hired	60	50	45	49	39
Third (5.24 ha)	Median yield (kg/ha)	167.31	228.90	272.54	301.91	283.89
	Fertilizers (kg/ha)	2.76	32.33	40.70	45.77	104.66
	Person-days/ha	42.79	94.09	43.84	47.46	40.25
	% hired	69	56	40	51	40
Fourth (10.12 ha)	Median yield (kg/ha)	138.99	169.71	189.10	186.79	205.92
	Fertilizers (kg/ha)	2.76	32.33	40.70	45.77	104.66
	Person-days/ha	45.34	58.88	28.47	28.37	23.15
	% hired	70	58	59	63	48

Source: Authors' estimates using Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010).
Note: ha = hectares; kg = kilograms.

The smallest landholders also employ more labor per hectare than the largest landholders do. In 2002 the smallest landholders put in nearly double the labor per hectare of the largest landholders. But by 2010, the smallest landholders employed three to four times as much labor as the largest landholders, who decreased their use of labor over the same years. However, there are no significant differences in levels of input use between landholders in the middle two quartiles.

A baseline survey conducted in 2010 (Hainmueller, Hiscox, and Tampe 2011) suggests that a majority (about 71 percent) of farmers hired daily labor (mostly for weeding and farm maintenance). It has become increasingly difficult to find labor due to the migration to urban areas and the reduced inflow of migrant seasonal labor (Barrientos and Asenso-Okyere 2008). More of the children from cocoa families are now in school, which further contributed to the scarcity of farm labor that increased the rural farm wage, which in many areas is now much higher than the prescribed minimum wage, according to data collected in the same study (Barrientos and Asenso-Okyere 2008).

TABLE 5.6 Gross margins in 2009/2010

Median holding size quartiles	Gross margin (GH¢/ha)				Gross margin (GH¢/ha per adult equivalent)			
	Ashanti	Brong-Ahafo	Western	Total	Ashanti	Brong-Ahafo	Western	Total
Q1	508.55	636.28	940.24	745.66	142.35	175.60	266.16	209.00
Q2	348.64	484.08	777.01	539.54	84.72	123.37	224.42	142.30
Q3	245.80	430.40	722.78	539.50	55.97	94.42	183.01	128.07
Q4	272.13	417.38	526.12	394.68	63.37	90.95	126.72	91.65

Source: Authors' estimations using producer price at GH¢2.4/kg, cost of fertilizers at GH¢0.5/kg (Gockowski 2012), cost of insecticide at GH¢14.1/liter (Gockowski 2012), and hired labor at GH¢4/person-day (Hainmueller, Hiscox, and Tampe 2011).
Note: GH¢ = Ghanaian cedi; ha = hectares; kg = kilograms.

Yields on the largest farms were nearly one-half of the yields on the smallest farms. While yields grew on farms of all sizes during the 2000s, on small farms they doubled. Gross margins, therefore, were also higher on smaller farms. In 2009/2010, for example, gross margins of the smallest landholders were around GH¢745 per ha compared to GH¢395 per ha on the largest farms (Table 5.6). Yields and gross margins tended to be fairly close among producers in the second and third quartiles. Gross margins also varied across regions: the smallest farms in Western Region had gross margins of GH¢940 per ha, nearly double those in Ashanti Region. Gross margins per adult equivalent also exhibited similar patterns: the largest holders in Ashanti barely earned gross margins of GH¢63 per adult equivalent in the household.

The rapid growth in yields may have declined after 2010. Table 5.7 shows more recent trends in the evolution of cocoa yields and the underlying changes in labor and nonlabor input use per hectare using the ICI dataset available recently. The data presented pertain to the 2014 production year and to a subset of the area covered by the GCFS panel, including only the Western and Ashanti Regions.

The ICI data suggest that yields have not increased in the selected region after 2010/2011; they have marginally declined from 277.99 to 257.29 kg per ha. Labor input has increased, along with the share that is hired. What is noticeable is that fertilizer application has declined, by a little more than one-third, compared to 2010. Lower application rates may have been caused by a reduced supply of subsidized fertilizers.

Cocoa productivity growth has also corresponded with service provision by COCOBOD and coincided with the recovery of agriculture in Africa south of the Sahara. Nin-Pratt and Yu (2008) note that Ghana was among

TABLE 5.7 Trends in yields in selected districts of Western and Ashanti Regions, 2002 to 2014

		2002	2004	2006	2008	2010	2014
Q1	Obs.	44	40	31	100	108	306
	Yields (kg/ha)	247.10	223.93	355.21	456.29	391.61	338.22
	Person-days/ha	115.20	380.91	59.38	101.65	97.33	139.12
	% hired labor	46	42	26	40	31	48
	Fertilizer (kg/ha)	11.60	78.08	15.80	75.33	157.27	99.97
Q2	Obs.	43	46	51	111	121	216
	Yields (kg/ha)	188.56	301.97	297.84	237.60	302.81	231.56
	Person-days/ha	62.67	165.21	59.56	68.07	58.92	53.73
	% hired labor	56	45	29	44	40	54
	Fertilizer (kg/ha)	4.79	44.04	61.44	30.61	92.95	59.68
Q3	Obs.	60	67	72	87	95	233
	Yields (kg/ha)	159.59	308.88	253.30	247.10	257.40	243.75
	Person-days/ha	52.76	120.01	41.88	49.63	40.55	44.25
	% hired labor	65	51	31	46	44	63
	Fertilizer (kg/ha)	5.10	31.81	29.44	41.02	106.66	47.56
Q4	Obs.	76	92	96	79	95	162
	Yields (kg/ha)	148.73	179.66	208.12	182.65	194.15	204.48
	Person-days/ha	46.51	80.83	38.20	34.22	22.60	34.78
	% hired labor	59	56	42	64	56	67
	Fertilizer (kg/ha)	2.99	23.20	19.68	34.95	82.65	63.47
Total	Obs.	223	245	250	377	419	917
	Yields (kg/ha)	174.46	224.64	251.77	257.40	277.99	257.29
	Person-days/ha	64.86	156.38	46.24	65.63	56.42	76.47
	% hired labor	58	50	34	48	42	56
	Fertilizer (kg/ha)	5.60	38.43	30.53	45.78	110.30	70.72

Source: Authors' calculations using Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010); Vigneri and Serra (2016).

Note: ha = hectares; kg = kilograms; obs. = observations.

the 112 countries that demonstrated Total Factor Productivity growth and sustained increases in labor and land productivity through an increased use of fertilizers per hectare and workers from 1993 to 2003. In Ghana between 2001 and 2005, cocoa contributed to nearly 30 percent of the growth in the sector, although it accounted for only 10 percent of agricultural GDP (World Bank 2007). Some of the growth in the value of production per hectare has come from switching to crops of higher value, such as cocoa, and commodity price increases (Nin-Pratt and Yu 2008).

COMPETITIVENESS WITH OTHER CROPS

The questions of whether cocoa will continue to be more profitable than other crops and whether producers, youth in particular, will continue to produce cocoa are of significant concern (COCOBOD 2015). Cocoa farmers have historically used their cocoa profits to diversify their production to include other crops as well as to engage in nonfarm enterprises. The migrants who initially developed the sector used their profits to build houses in the areas they had migrated from. Many who accumulated profits entered into cocoa buying or invested in trucks while others bought land to expand their cocoa farms, when land was available. The development of cocoa encouraged urbanization and the creation of consumption cities in both Ghana and Côte d'Ivoire (Jedwab 2013).

A 2006 survey of 300 growers across all the growing regions showed that nearly 80 percent had diversified into alternative crops such as oil palm, cassava, citrus, and cocoyam (Aneani et al. 2011). Producers who had older cocoa trees, and therefore potentially declining yields and access to credit, were found to be more likely than others to diversify. For some farmers, diversification meant leaving agriculture because of the limited opportunities in agriculture (Knudsen 2007). Knudsen (2007), however, argues that these diversification processes are crop specific, as his survey of cocoa growers in Bodi and Bonsu Nkwanta settlements found that native cocoa farmers continued to depend on cocoa incomes rather than nonfarm activities. Migrants, on the other hand, were more likely to engage in nonfarm activities due to their more limited access to land.

Cocoa producers do not often invest their cocoa savings in the expansion of cocoa landholdings, because land can be acquired only through inheritance or shared-land contracts (Knudsen and Fold 2011.) As a result, large-scale producers in the Juabeso District in Western Region have diversified into nonfarm activities such as trading in food products from urban areas, sale of agrochemicals and building materials, construction of residential housing, and transportation. Almost all of large-scale farmers' land is presently planted with

cocoa or reserved for future cocoa production; the remainder is used for subsistence production of food crops.

The need for higher levels of capital and labor on larger farms also discourages scaling up. The cultivation practices and routines, including the application of fertilizers and pesticides, carried out on large farms are often just scaled-up versions of practices on smaller farms. Most of the large-scale farmers in Juabeso District that Knudsen and Fold (2011) studied did not consider themselves to be more efficient than other cocoa farmers because their operations are similar to those of smallholders. The availability of family labor may have declined because the role of women as unpaid laborers on cocoa farms has diminished (Duncan 2010; Amanor 2010).

Although they may not be able to maintain or increase production by intensive cultivation, large-scale producers are encouraged to cultivate all their lands to protect them from demands by family members and other farmers. Large-scale farmers seem to earn a higher family income simply because they are able to produce larger quantities, often with easier access to credit from banks than smaller producers. The surplus from cocoa production enables them to make investments in high-return, nonfarm activities that secure an additional income outside the cocoa season (Fold 2001).

Changes in forest rent could also encourage farmers to diversify their production. Rapid expansion in tree crop production is often characterized by quasi-monoculture systems that rely heavily on natural resources inherited from the previous forest, or the "forest rent," which may include relatively fertile soil, low pressure from weeds and pests, and microclimatically protected conditions (Ruf 1995, cited in Schroth and Ruf 2013). Landscapes may become more diversified and less dominated by the pioneer crop as the fertility declines. Those in marginal areas or in the transition from forests to savannah might be affected by further drying of the climate. As a result, farmers may switch to crops that are less demanding of the environment than cocoa, such as rubber, which attracts favorable prices and is more tolerant of degraded environments.

Rubber is the most profitable crop in Ghana and Côte d'Ivoire regardless of the level of technology adoption; it also provides income throughout the year, requires less labor, and is attractive to absentee landlords (LMC International 2014). Cocoa, under medium and high levels of inputs, is the second most profitable enterprise. Meanwhile, oil palm is more profitable in Ghana only under low-technology production. Cocoa remains competitive, though the acreage under rubber is increasing at a higher rate than that of cocoa, and rubber offers higher profits than cocoa or oil palm. Under high

levels of technology adoption, however, cocoa returns per person-day are lower than for rubber but still higher than the wage rate. Labor requirements increase directly in proportion to yields (LMC International 2014). Reduced cocoa prices in Ghana in the 1970s and the 1980s, for example, led farmers to diversify into oil palm and citrus without abandoning cocoa (Michel-Dounias et al. 2013, cited in Schroth and Ruf 2013).

ATTRACTION TO YOUTH

Would the youth in the cocoa households who are expected to take over from their parents have expectations different from their parents' expectations? Cocoa has not just been an economic propellant to Ghana's growth; it has also had an important social effect (Anyidoho, Leavy, and Asenso-Okyere 2012). Largely carried out by smallholders, cocoa remains a labor-intensive crop. While in the past, labor was mainly supplied by the farmer and their family, with increased school enrollment and migration, some of which can be attributed to cocoa incomes, producers do not have adequate family labor. This has pushed up the wages, which are now higher than statutory minimum wages. Low productivity, lack of innovation in the sector, and low incomes are the most recurrent reasons given by young people not wanting to enter into cocoa production.

Perceptions and aspirations of young people toward cocoa farming and their opinions about the gap between the current cocoa farming situation and the circumstances under which they would consider cocoa farming as a primary or secondary occupation are quite revealing. The youth often describe the drudgery of cocoa farming: the physical effort and time that is not compensated for by the profits from cocoa. There is also the question of status, as the aspirations of today's young people in Ghana are embedded in a perceived hierarchy of work within which an occupation requiring manual labor ranks lower than formal or salaried work. Although the majority of young people appreciate that their education and other opportunities came to them because of their families' involvement with cocoa farming, there is also compelling qualitative evidence of their reluctance to do agricultural work of any sort because of its low social status (Anyidoho, Leavy, and Asenso-Okyere 2012).

In a recent labor market study conducted by ICI, Vigneri and Serra (2016) collected qualitative data from focus group discussions with 18–30-year-old males. These young men emphasized that although life would be difficult without cocoa (identified as the only viable economic activity in the village), they also adamantly stated that cocoa farming is losing its appeal among the younger generation: farm jobs are for uneducated people and are not given

respect. This has an important impact on the aspirations of new generations. Some adult farmers did not want their children to become farmers, and some of the young men stated that they were not interested in cocoa farming. Young people also complained that cocoa farmgate prices are too low, that there is no land for them to start their own cocoa trees, and that the cost of renting land is too high.

There are therefore concerns that because young people are not interested in cocoa cultivation, cocoa farms are increasingly falling into the hands of caretakers as cocoa producers age (Barrientos and Asenso-Okyere 2008). However, there is no conclusive evidence of cocoa farms being managed largely by caretakers.

A recent survey of producers shows that 70 percent of them were owners (Hainmueller, Hiscox, and Tampe 2011). There are two main kinds of sharecropping systems: *abunu* and *abusa*. *Abunu* is commonly employed for the development of farms in which migrants work land that they do not own in return for ownership of one-half of the developed farm. *Abusa* is a system used for managing a developed farm in which the caretaker who supplies all the labor usually receives one-third of the production. The landowner whose land is developed under *abunu* may in addition give a share of the farm to the developer on *abusa* terms. Nationally representative GLSS 6 data (GSS 2014) suggest that *abunu* and *abusa* were practiced by only 8 percent and 3 percent of the sample, respectively. This may be an underestimate because *abusa* sharecroppers are not usually interviewed because they are not treated as decision makers. Also, many producers who have their own farms sharecrop on others' farms.

Cocoa growers in Ghana are reported to be older than those in Côte d'Ivoire. Comparing two villages along the border between Ghana and Côte d'Ivoire, MacLean (2004) notes that the mean age of Ghanaian cocoa farmers was 60 compared to 40 for Ivorian farmers. The largest group in Ghana was those who were over 70, while the youth had switched to growing tomatoes in the mid-1990s.

Often, neither parents nor children in cocoa households view cultivation as a long-term occupation. Many cocoa growers think it is a good source of income to provide for and educate their children, but not as an occupation for their children to engage in. The low status of cocoa farming work, the limited prospects of upgrading, and the risks associated with the physically demanding tasks were reported as significant disincentives to engaging in cocoa production. More generally, low productivity, lack of innovation, and low incomes were among the key reasons given in Ghana's policy documents

as to why young people do not want to enter agriculture (Anyidoho, Leavy, and Asenso-Okyere 2012). Young people in cocoa areas say that cocoa farming involves sheer drudgery with little reward, as well as what they see as the socially inferior status of farming and rural life. In a 2010 survey, only 20 percent of respondents indicated that their children planned to continue cocoa farming, and only 40 percent indicated that they wanted their children to do so (Hainmueller, Hiscox, and Tampe 2011). However, changes in the mode of production might make cocoa more attractive. If cocoa can be developed as a commercial enterprise that does not require much physical labor or a full-time commitment, cocoa might be considered more attractive to youth (Anyidoho, Leavy, and Asenso-Okyere 2012).

Chapter 6

EFFECTIVENESS OF BOARD PROGRAMS

Cocoa boards in Ghana have historically intervened to stabilize and increase cocoa production. Beginning in 2004, COCOBOD dramatically increased the scope of its interventions by retaining a significant share of export revenues. Two of its most significant programs are CODAPEC, under which public spraying to control capsids and black pod disease is undertaken in selected districts, and Hi-Tech, a good-practices program that focuses on encouraging the use of fertilizers. The two programs seek to address three yield-limiting agronomic constraints: low soil fertility, capsid bugs, and black pod disease. Although these programs are associated with dramatic increases in productivity and production, their effectiveness and benefits incidence are critical issues.

This chapter examines the effectiveness of the two major programs. After a brief overview of the history of public programs, it presents an assessment of the extent of damage caused by diseases and pests of cocoa. It uses econometric analysis to estimate the contribution of fertilizer application and plant protection to yields. It assesses the effectiveness of public spraying programs by comparing the contribution to yields of private and nonprivate sprays. The chapter uses two datasets: the GCFS, which was used for analysis in Chapter 5, and the ICI dataset, which has information on a "spray-initiative" that is presumably nonprivate. We conclude the chapter by highlighting some of the trade-offs involved.

History of Public Programs

Direct interventions undertaken by the Cocoa Board with the objective of protecting yields have included fungicide and insecticide spraying to control pests and diseases. The rationale is to avoid the negative effects of capsids, in particular, that spread from the fields of individuals who do not take measures to control them. Another consideration is that smallholders need help to undertake plant protection. Public spraying is reported to have contributed to

significant increases in production in many instances. For example, production increased in the early 1960s after the government offered both chemicals and sprayers at subsidized prices to producers to protect cocoa from capsids (Killick 1966, cited in Rimmer 1992).

However, such programs were not implemented consistently because of resource limitations, although many administrations made efforts to maintain cocoa production, even while taxing farmers heavily. Swollen shoot control was suspended between 1962 and 1965, for example. In 1965 UGFC withdrew subsidies on insecticides and spraying machines as foreign exchange became scarce (Rimmer 1992).

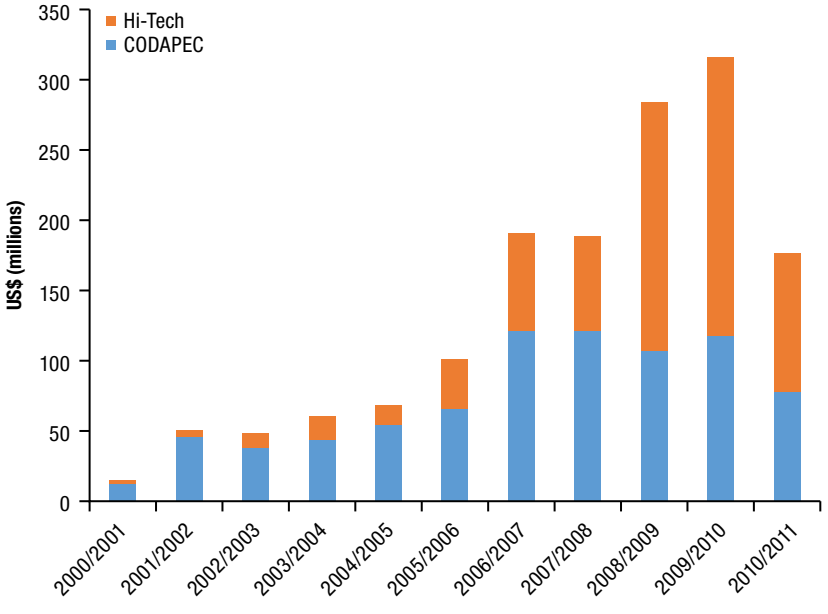
The extent of subsidization of inputs, however, was substantial. By 1977 subsidies at the official exchange rate had risen to between 81 percent and 91 percent of input prices, because input prices were maintained during rising inflation (Stryker 1990). Sprayers were subsidized at a rate of 84 percent in 1973/1974, and up to nearly 95 percent in 1981/1982. The high subsidies encouraged the diversion and smuggling of inputs to neighboring Côte d'Ivoire and Togo. Until 1993 the board continued to heavily subsidize plant protection chemicals through various credit programs (Shepherd and Farolfi 1999). As a result, supplies were often inadequate to meet the demand, were not timely, and failed to reach remote production areas.

Postreform revival

Reviving the tradition of interventions, the Kufuor administration, which came to power in the 2000 elections, began CODAPEC in 2001. In 2002/2003, it began the Hi-Tech program, which offered subsidized fertilizer on credit to producers. Hi-Tech began with the modest objective of supplying subsidized fertilizers to smallholders to fertilize 40,000 ha belonging to 50,000 producers in selected cocoa districts of Western Region. The program included the supply of the CRIG-recommended annual application of 3 50-kg bags of dry fertilizer per acre, or 7.4 50-kg bags per ha. It also promoted the planting of selected hybrid varieties developed by CRIG, which are supplied by a division of COCOBOD.

From 2000 to 2009, COCOBOD's annual expenditures on the importation and distribution of subsidized granular fertilizer, liquid fertilizer, insecticides, and fungicides through these programs steadily increased, reaching a high of $312 million in 2009 before dropping by one-half in 2010 (Figure 6.1). As of September 2011, a total of $1.45 billion had been spent on these two programs over the previous 11 years. Farmers responded positively. In the

FIGURE 6.1 COCOBOD expenditures on the Hi-Tech fertilizer and CODAPEC pesticide programs, September 2000 to August 2011



Source: Gockowski (2012).
Note: CODAPEC = Cocoa Diseases and Pest Control Program.

four years prior to the start of the Hi-Tech program, annual production averaged 392,000 tons; at peak program levels, from 2007 to 2010, production averaged 762,000 tons, reaching a maximum of 1 million tons in 2010/2011. COCOBOD credits the Hi-Tech program with contributing to an increase in production to nearly 750,000 tons in 2005/2006 (COCOBOD 2011). The credit component of the program, however, was not successful, because loans could not be recovered until 2009/2010 (COCOBOD 2011).

HI-TECH

COCOBOD supplies both granular and liquid fertilizers (Table 6.1). From 2006/2007 to 2009/2010, granular fertilizers accounted for 78 percent of total COCOBOD fertilizer expenditure. Granular fertilizers are purchased through tenders at internationally competitive prices. The share of liquid fertilizers in the total has increased. COCOBOD grossly overpaid for liquid fertilizer. The 3.4 million liters purchased by COCOBOD at a cost of $28 per liter supplied the nutrient equivalent of 1,646 tons of granular fertilizer. The

TABLE 6.1 Quantities and prices of granular and liquid fertilizer purchased by COCOBOD, 2006/2007 to 2009/2010

Crop year	Granular fertilizer (tons)	Price (US$/ton)	Granular cost (US$)	Liquid fertilizer (liters)	Price (US$/liters)	Liquid cost (US$)
2006/2007	70,083	438	30,691,185	193,704	22.0	4,261,488
2007/2008	60,799	1,394	84,769,053	185,771	28.5	5,294,473
2008/2009	105,000	1,114	116,960,000	1,000,000	28.7	28,700,000
2009/2010	130,000	879	114,333,500	2,000,000	28.7	57,400,000
Total	**365,882**	**948**	**346,753,738**	**3,379,475**	**28.3**	**95,655,961**

Source: Gockowski (2012).
Note: Price totals are period averages.

granular import value of the liquid fertilizer was $1.6 million, compared to nearly $100 million paid for it. Even assuming that fertilizer use efficiency would be higher with foliar applications, the extent of price differences suggests a choice of an inefficient source of fertilizer. Interestingly, liquid fertilizers were given free to producers while granular fertilizers were sold at a subsidized price.

Fertilizers were initially distributed through public channels. In 2006/2007, the public sector, including the district officers of the Ministry of Agriculture and agents of the CIC, distributed 88 percent of the total dry fertilizers. The fertilizers were then distributed to producers, largely by the LBCs. By 2009/2010 the share of the private sector partners had risen to 53 percent, and the total volume distributed had doubled from 2006/2007. The increase in private sector activity is most visible in Western Region, where there are numerous reports of LBC purchasing clerks competing to supply fertilizer on credit against the future sale of the borrowers' cocoa.

Many of the LBCs, however, are less than enthusiastic about their role in supplying fertilizers; they feel that they are obligated to distribute fertilizers, and they must bear the losses if they are not able to recover their costs from producers. In Eastern Region, the leading buying company is able to recover only about 70 percent of the costs of distributing fertilizers; however, the company is not withdrawing, because its managers believe that if they don't distribute fertilizers, they will lose some of their farmers.

In 2015 COCOBOD began supplying free fertilizers to selected farms. Extension staff were asked to identity well-maintained and disease-free farms with 10- to 25-year-old trees to receive free fertilizers. Alleged corruption

by COCOBOD staff in distributing free fertilizers has led a regional chief farmer to demand that COCOBOD establish a monitoring system. The policy in 2017 is that COCOBOD supplies a limited quantity of fertilizers for all cocoa farmers. Distribution is overseen by task forces that are made up of three COCOBOD staff, the district police commander, a Bureau of National Investigation officer, a National Disaster Management Organization officer, a district chief cocoa farmer, and two representatives from the District Assembly (COCOBOD 2016).

Private supply of inputs on credit, apart from the credit extended by the LBCs, has not been successful. In 2006 a private input supply company developed a program known as the Cocoa Abrabopa Association (CAA) to offer fertilizer on credit to cocoa producers. Under CAA groups of farmers with mature trees on at least 2 acres receive inputs on credit, along with technical and business training. An evaluation of the program conducted in 2008 suggests that the principle of group liability employed in this program has ensured, to some extent, the effective use of the fertilizer and other inputs provided by the CAA package. Nevertheless, participation in this program has not increased significantly (Opoku et al. 2009). Membership has not grown as rapidly as one would expect given the significant benefits derived through participation. Some of this may be attributed to the heterogeneity of returns discussed earlier.

CODAPEC

Between 2005 and 2010, COCOBOD supplied fungicides and insecticides worth nearly US$39 million annually to producers through mass spraying. More than 90 percent of the expenditures were on insecticides to control capsids. From 2005 to 2010, COCOBOD procured 2,500 motorized sprayers and 35,000 pneumatic sprayers for use by the spray gangs at a cost of US$11.3 million. COCOBOD supported public spraying in 72 districts, to control either capsids, black pod disease, or both. Two sprays per year are made to control capsids and three sprays to control black pod disease. At the end of 2013, the program employed nearly 58,000 people—mostly sprayers—mechanics, watchmen, and supervisors.

CODAPEC, because of the way it is implemented, has grown to be a large program that requires considerable coordination and monitoring, but without adequate accountability to producers. In 2012, for example, sprays were undertaken by 2,964 black pod gangs and 3,320 capsid gangs. With 6 and 10 people in each of the capsid and black pod gangs, respectively, nearly 50,000 rural youths were hired to spray chemicals.

Cocoa and Plant Protection

Cocoa yields are influenced by many factors: how the farm is established (genetic material, tree density, and shade), climatic conditions, nutrient management, and incidence of pests and diseases. As cocoa trees age, they also become more susceptible to pests and diseases. So plant protection is an important aspect of maintaining cocoa yields.

Investments in plant protection potentially offer high returns because pest and disease incidence is widespread. In a baseline survey, nearly 30 percent, more than 60 percent, and more than 55 percent of the respondents reported the presence of swollen shoot disease, capsids, and black pod disease, respectively, on their farms (Hainmueller, Hiscox, and Tampe 2011). Despite the control measures taken through various COCOBOD programs, the losses from black pod disease and capsids were estimated to be US$300 million and US$172 million in 2008 and 2010, respectively (World Bank 2011b). Between 2007 and 2010, nearly 100,000 hectares were estimated to have been affected by the outbreak of swollen shoot disease. The losses to farmers from cutting down the trees during the first year were estimated to reach nearly US$90 million (World Bank 2011b). The majority of farmers interviewed during a risk assessment exercise conducted by the World Bank in 2011 reported that black pod disease was the most important cause of crop loss, with most farmers interviewed reporting difficulties in obtaining fungicides.

Because the incidence and severity of black pod disease can vary, effective treatment requires farmers to be aware of when is best to treat their trees. Spraying carried out with inappropriate equipment, particularly if the trees are tall, cannot be effective, whether it is carried out by farmers or nonprivate spray gangs. Farmers' knowledge of the best agronomic practices and consequent efficient applications of fungicide and spraying techniques are essential for plant protection to be most effective, regardless of whether this is carried out privately or under a government initiative.

Among the most frequently mentioned complaints of farmers relating to the implementation of CODAPEC were the inability to secure fungicides and other inputs as well as chronic delays in the delivery of COCOBOD-supplied fungicides for black pod management (World Bank 2011b). CODAPEC spraying gangs were also found to not achieve the recommended minimum of two sprays per year; in addition, adequate amounts of registered insecticides were found not to be available to farmers in the open market to complement government applications when needed.

We explore further the frequency of incidence and the extent of damage caused by various problems using the GCFS for the period 2001/2002 to 2009/2010.

Farmer-reported crop damage

The GCFS asked farmers about any problems they faced that affected the cocoa yields, severity of the problems, and any measures they may have taken to reduce the damage. The problems reported by at least 5 percent of the farmers in a given year are presented in Table 6.2.

Based on the proportions of farmers reporting and the number of years in which more than 5 percent of them reported the problem, black pod disease and mistletoe appear to be the two most damaging events that affect cocoa yields. In the most recent round, black pod disease affected 25 percent of the surveyed farms. Mistletoe was the second most frequently reported problem, with close to 20 percent of the farmers reporting it in 2010. Swollen shoot disease, the third most frequently reported problem, was named by 12 percent of the surveyed farmers at baseline, one-quarter of whom also reported an associated total crop loss but did not take any action against the problem in most instances. In 2010 swollen shoot disease was reported by only 6 percent of the sample, with only 9 percent of self-reported cases causing a total crop loss, and the application of chemicals was reported as the most frequent action taken. Termites were also reported as a frequently occurring problem on the cocoa farm, though this was not a significant problem reported in 2006 and 2008. Similarly, stem borer was a commonly reported problem only in 2006, when 6 percent of the farmers reported it. Of the farmers who identified stem borer as a problem, 50 percent felt that there was a noticeable loss of yield.

The data also suggest that the share of producers reporting black pod disease may have declined over the years. Black pod disease was reported as a problem by nearly 75 percent of the sample in 2002—when more than half of respondents rated it as causing a major cocoa loss in that year—and by only 25 percent of the sample in 2010, when only 4 percent of those who reported being affected by it said it caused a major crop loss. All farmers who reported the incidence of black pod disease also said they had sprayed against it.

We further probed the data to see whether the extent of loss reported by farmers relates to cocoa yields reported by them. We did this only for black pod disease, the most recurrent problem reported by farmers. Table 6.3 compares median yields on farms reporting various levels of losses due to black

TABLE 6.2 Reported occurrence, by farmers, of cocoa farm–related problems

Year	Reporting incidence (%)	Reporting loss as (%): Noticeable	Significant	Complete	Most common action taken
Black Pod Disease					
2002	73	18	20	54	Sprayed
2004	38	50	7	6	Sprayed
2006	40	52	31	1	Sprayed
2008	22	30	33	23	Sprayed
2010	25	17	29	4	Sprayed
Mistletoe					
2002	36	32	21	5	Cut off
2004	17	40	2	4	Applied chemical
2006	20	41	27	5	Applied chemical
2008	25	43	18	12	None
2010	18	25	21	1	Pruned trees
Swollen Shoot Disease					
2002	12	24	17	24	None
2004	11	47	12	5	Applied chemical
2006	17	85	8	0	Applied chemical
2008	Reported by less than 5% of respondents				
2010	6	27	27	9	Applied chemical
Termites					
2002	9	23	27	14	Applied chemical
2004	7	29	6	4	
2006	Reported by less than 5% of respondents				
2008	Reported by less than 5% of respondents				
2010	7	25	14	14	Applied chemical
Stem Borer/Caterpillar					
2002	Reported by less than 5% of respondents				
2004	Reported by less than 5% of respondents				
2006	6	50	7	0	Seal holes to kill worms inside tree
2008	17	36	28	17	Applied chemical
2010	6	27	27	9	Applied chemical

Source: Authors' calculations from Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010), 2001/2002 to 2009/2010.

TABLE 6.3 Yields losses from black pod and use of preventive measures

	Median yields (kg cocoa/ha) of producers reporting					Fungicide use in absence of BP	
Years (Obs.)	(1) No pest/ disease	(2) No BP	(3) Noticeable loss to BP	(4) Significant loss to BP	(6) Complete loss to BP	(7) Farmers using fungicide even in absence of BP (%)	(8) Fungicide (kg/ha)
2002	205.92	**220.02**	193.05	154.44	**151.24**	—	—
Obs.	(95)	(24)	(53)	(63)	(178)	—	—
2004	221.85	**218.03**	232.92	122.26	**93.41**	33	0.22
Obs.	(156)	(91)	(124)	(17)	(15)	(464)	
2006	207.30	277.04	246.01	271.40	205.92	26	0.25
Obs.	(49)	(10)	(39)	(26)	(1)	(486)	
2008	257.40	349.83	252.72	218.79	205.92	35	0.38
Obs.	(398)	(26)	(51)	(60)	(43)	(677)	
2010	311.03	**230.63**	361.76	236.71	**92.73**	48	0.59
Obs.	(222)	(40)	(14)	(26)	(4)	(523)	
Total	253.00	**231.66**	236.20	193.05	**161.71**	35	0.31
Obs.	(920)	(191)	(281)	(192)	(241)	(2585)	

Source: Authors' calculations from the Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010), 2001/2002 to 2009/2010.

Note: — = data not available; BP = black pod; ha = hectares; kg = kilograms; obs. = observations. Figures in **bold** show yields which were significantly higher for farmers reporting no loss to black pod (column 2) compared to yields of farmers reporting significant or complete loss of cocoa crop due to the disease (column 6).

pod disease with median yields on farms where no pest or disease problem was reported (columns 1–6).

In any given year, with the exception of 2006 and 2008 (when the sample size of those reporting a loss to black pod disease was too little to make a sensible statistical inference), yields were significantly higher for farmers reporting no loss to black pod disease, compared to yields of farmers reporting significant or complete loss of cocoa crop due to the disease.[1] On average for the five rounds, yields on farms affected by black pod disease were about 30 percent lower than those on farms unaffected by the disease. The data also suggest that farmers take preventive measures; over one-third of the farmers had undertaken spraying even though black pod had not affected their farms.

1 We carried out T-tests on the log transformation of yields to compare values in column 2 (i.e., yields of farmers reporting no black pod problem) and column 6 (i.e., yields of farmers reporting a complete loss of cocoa due to black pod). Figures in bold are statistically different at the 1 percent level.

Impact of Public Programs

We present here the findings from econometric analysis using two sets of data to compare the impact of private and nonprivate sprays on land productivity. The first uses the GCFS data to estimate a log-linear Cobb–Douglas production function, using a fixed effects model. The second is a 2SLS (two-stage least squares) estimation of a sample of farmers grouped and matched with CEM (coarsened exact matching) using the ICI data.

We return to the GCFS data to run an augmented version of the fixed effects production function model presented in Chapter 5, where we explicitly control for the incidence of black pod disease and also for whether farmers received CODAPEC sprays.

Although the last three rounds of the panel data (i.e., 2005/2006, 2007/2008, and 2009/2010) included information on whether farmers' cocoa holdings were sprayed by CODAPEC gangs with either fungicide or pesticide, this disaggregated information was not available for the 2003/2004 round. Therefore, the regression model does not have separate variables for the types of chemicals used. Information for the three rounds, however, suggests that the majority of public sprays received by the survey farmers were carried out with fungicide, and were therefore intended for the treatment of black pod disease (Table 6.4).

Table 6.5 presents descriptive statistics associated with the level variables used in the model. Table 6.6 has the results of the production function model in its logarithmic specification. The results of the fixed effects production function are in line with those presented in Table 5.4. There continues to be evidence of a strong IR between land size (measured as total hectares under cocoa cultivation) and yields. There is no statistically significant contribution of labor to yields, whereas nonlabor inputs, especially fertilizer and fungicide application, are strong predictors of yields. Turning to the new explanatory variables introduced, the regression findings suggest that black pod incidence affected yields negatively. The yields were 16 percent lower for those reporting any black pod problem.

More suggestive is the lack of evidence of any positive association between public spraying and yields; the associated estimated coefficient on the number of public sprays received—although positive—is both negligible in size and has no statistical significance (Table 6.6). Moreover, the regression model shows no significant positive effect of public spraying even on farms that reported black pod disease, as suggested by the interaction term between the black pod dummy and the number of government sprays received. The interaction

TABLE 6.4 Percentages of farmers receiving different chemicals under CODAPEC, 2006 to 2010

Year	Don't know	Fungicide	Insecticide
2006	57	27	16
2008	0	64	36
2010	1	56	43

Source: Authors' calculations based on the Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010).
Note: CODAPEC = Cocoa Diseases and Pest Control Program.

TABLE 6.5 Descriptive statistics of variables underlying the fixed effects–augmented models, 2005/2006, 2007/2008, and 2009/2010

Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
Yield (kg cocoa/ha; median value reported in parentheses)	1931	317.02 (231.66)	270.87	2.03	1,930.47
Land (total ha under cocoa; median value reported in parentheses)	1931	6.24 (4.25)	6.70	0.18	80.94
Labor/ha (person-days/ha)	1931	59.38	64.03	0	347.64
Fertilizer (kg/ha)	1931	50.36	105.69	0	1,575.26
Dummy = 1 if used fertilizer	1931	0.41	0.49	0	1.00
Liters insecticide/ha	1931	1.55	2.38	0	41.18
Dummy = 1 if used insecticide	1931	0.81	0.39	0	1.00
Fungicide (kg/ha)	1931	0.29	1.49	0	45.38
Dummy = 1 if used fungicide	1931	0.32	0.47	0	1.00
Dummy = 1 if affected by black pod	1931	0.27	0.44	0	1.00
Number of government sprays received in a crop year	1931	2.05	1.82	0	25.00

Source: Authors' calculations based on the Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010).
Note: ha = hectares; kg = kilograms; obs. = observations.

term between the back pod dummy and the log amount of privately applied fungicide suggests that a 10 percent increase in chemical use raises yields by 2.6 percent more for farmers with black pod disease. The elasticity of yields to fertilizer and pesticide use is also positive and statistically significant; a 10 percent increase in the amount of each of these chemicals induces respectively a 1.8 percent and a 1.2 percent increase in land productivity.

The data collected by ICI in 2014 from cocoa farmers in the north of Western Region and in the Ashanti Region using a questionnaire like the one underlying the GCFS has information on a "spray initiative," which is

TABLE 6.6 Fixed effects model to estimate the effect of public and private sprays

Dependent variable is ln (yields)	Coef.	Std. Err.	T-statistic
ln (land)	−0.64	0.08	−8.52
ln (labor/ha)	0.02	0.02	1.17
ln (fertilizer/ha)	0.18	0.04	4.50
ln (insecticide/ha)	0.12	0.03	4.55
ln (fungicide/ha)	0.16	0.06	2.84
Dummy = 1 if farmers had BP	−0.17	0.08	−2.16
Number of public sprays	0.00	0.01	0.32
Interaction between BP dummy and number of public sprays	0.03	0.02	1.09
Interaction between BP dummy and kg fungicide/ha privately applied	0.26	0.11	2.48
2006	0.11	0.06	1.86
2008	0.14	0.09	1.57
2010	0.06	0.09	0.70
Constant	6.32	0.16	40.38
Observations = 1931			
(Std. Err. adjusted for 33 village clusters)			
R-sq: overall = 0.15			

Source: Authors' calculations based on the Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010).
Note: 2004 reference year. Dummies to correct the log transformation of quantities of insecticide, fertilizer, and fungicide equal to zero were used in the regression but are not reported in the table above. BP = black pod disease; ha = hectares; kg = kilograms.

presumably nonprivate.[2] This allows us to estimate a similar model using more recent data, to further examine the effectiveness of nonprivate spray efforts.

In the ICI data, respondents were specifically asked whether they had been recipients of the spray initiative, and if so, whether it had been beneficial in raising their yields. The dataset was therefore suitable for evaluating the impact of the spraying initiative. Two different dummy variables were used to evaluate the spraying initiative, one capturing producers who received the sprays and a dummy capturing producers who received and said they benefited from the spraying initiative. Table 6.7 shows descriptive statistics for all variables used in the impact evaluation exercise, dividing the sample into two

2 This analysis does not represent the views or opinions of ICI or the research study donors. ICI and the research study donors specifically disclaim responsibility for any analysis, interpretations, or conclusions.

TABLE 6.7 Descriptive statistics for the impact evaluation analysis, ICI data, 2013/2014

	Farmer received spraying initiative = 1			Farmer received spraying initiative = 0			t tests on group differences	
	Obs.	Mean	Std. dev.	Obs.	Mean	Std. dev.	Difference	Level of significance
Variable								
Mean yields (kg/ha)	360	349.21	257.19	366	439.63	375.95	–90.42	***
Median yields (kg/ha)		(257.19)			(308.75)		–51.56	n.a.
Mean area under cocoa (ha)	360	4.14	3.68	366	4.25	4.67	–0.11	
Median area under cocoa (ha)		(3.24)			(3.24)		0.0	n.a.
Mean labor (person-days/ha)	360	62.05	56.16	366	52.89	61.85	9.16	***
Producers NOT using liquid fertilizer (%)	360	92	27		94	24	–2	
Producers NOT using granular fertilizer (%)	360	67	47	366	71	45	–4	
Fertilizer (kg/ha)	360	65.98	147.98	366	66.04	180.64	–0.06	
Producers NOT using insecticide (%)	360	94	23	366	94	23	0	
Insecticide use (liters/ha)	360	2.21	2.31	366	2.93	4.11	–0.72	***
Producers NOT using fungicide (%)	360	91	29	366	84	36	7	***
Fungicide use (liters/ha)	360	1.22	2.29	366	1.74	5.91	–0.52	
Share area under no shade (%)	360	2	9	366	3	10	–1	
Share area under light shade (%)	360	13	29	366	20	34	–7	***
Share area under moderate shade (%)	360	39	42	366	42	42	–3	
Share area under full shade (%)	360	46	45	366	36	43	10	***
Instruments								
Household adult equivalent size (no.)	360	2.76	1.49	366	2.83	1.59	–0.07	
Dummy = 1 if paid labor nonaffordable	360	0.72	0.45	366	0.58	0.49	0.14	***
Experience in cocoa farming (years)	360	19.86	10.55	366	19.49	11.68	0.37	
Walking time to nearest buying station (minutes)	360	13.12	18.34	366	14.72	22.69	–1.60	

Source: Authors' calculations based on ICI (2014).

Note: *** indicates statistically significant difference at 1%. ha = hectares; kg = kilograms; n.a. = not applicable; Obs. = observations. Light shade implies 1 to 10 trees per ha, moderate shade implies 11 to 20 trees per ha, full shade implies more than 21 trees per ha.

groups depending on whether the producers have or have not been recipients of the spraying initiative.

The two groups are compared after being "matched" on a set of characteristics using a matching algorithm described further below. Interestingly, despite the low share of users across the sample, producers who did not receive the service from the spraying initiative used significantly higher levels of insecticide and fungicide per unit of land and obtained significantly higher yields compared to those who did receive the services of the spraying initiative. Although the survey instruments captured the amount of liquid fertilizer applied by the producers, we decided not to include it as an input in the regression analysis because the proportion of producers applying it was negligible (i.e., about 5 percent).

In the absence of baseline data for the farmers who reported that they benefited from the spray initiative, we set up the evaluation by means of matching the two groups of farmers, recipients and nonrecipients, through a matching method, CEM. CEM is a nonparametric method that can be highly effective in removing imbalances between treatment and control groups. In causal inference, CEM avoids the need to control for observable covariates and, in an experimental framework, allows researchers to estimate causal effects using a simple mean difference between the selected groups of individuals. Furthermore, CEM avoids a recurrent problem that features in other matching methods: the persistent imbalance between the treatment and control groups even after matching (Iacus, King, and Porro 2011, 2012).

Because the purpose of the evaluation was to identify the causal effect of the spray initiative, the econometric approach adopted to compensate for the absence of baseline data consisted of two steps: first, to "exactly" match a subsample of recipients and nonrecipients of the spray initiative through CEM to reduce the selection bias between the treatment and the comparison groups. Farmers "treated" were matched with "comparison" using the gender of the farmer and the district of residence, which were considered essential features in order to create two comparable groups of farmers in a hypothetical prespray initiative setting. The second step consists in the retention of only the original (uncoarsened) values of the matched data (i.e., the "unpruned" observations), which are then used to run the regression analysis. All bad matches are dropped as an integral part of the CEM procedure.

Tables 6.8 and 6.9 show the power of the CEM procedure in balancing the two observed populations: treated and untreated. The purpose of matching farmers with CEM is to reduce the degree of imbalance (i.e., dissimilarities) in

TABLE 6.8 Level of imbalance pre- and post-matching

	Before CEM	After CEM
Multivariate L1 distance	0.15	5.664e-16

Source: Authors' calculations based on ICI (2014).
Note: CEM = coarsened exact matching.

TABLE 6.9 Sample composition: CEM results

Observations	Comparison group (Spray initiative = 0)	Treatment group (Spray initiative = 1)
All	539	357
Matched	539	357
Unmatched	0	0

Source: Authors' calculations based on ICI (2014).
Note: CEM = coarsened exact matching.

the data and to create two groups of identical farmers conditional on selected matching characteristics. This matching method allows for removing from the data imbalance due to selection bias in the sampling procedure. The L1 in Table 6.8 decreases from 0.15 to 5.664e-16, nearly 0, which would be the value that identifies the exact balance between treated and control units.

Table 6.9 further shows that in the process of matching the samples across the characteristics, no observations were dropped in the control group and in the treated group.

Following the pruning of the sample through CEM, an instrumental variable (IV) model was used (Angrist, Imbens, and Rubin 1996; Angrist and Krueger 2001) to net out the causal effect of the spray initiative (the treatment effect) on farmers' yields (the "outcome" variable of interest), to overcome the possibility of endogeneity and omitted variable biases affecting the estimation of the causal inference. The IV approach was performed in a 2SLS framework, and robustness of the chosen instruments was checked by means of including a combination of different instruments and checking the consistency of standard errors in the resulting estimates of the model. The Durbin and Wu-Hausman test was also performed to assess the existence of endogeneity bias.

The IV approach relies on two key assumptions: (1) that the instrument must correlate with the endogenous variable, and (2) that the instrument is not related to the errors in the structural model.

In order to evaluate the impact of the spray initiative on yields, the following baseline equation was estimated:

$$InYield_i = \alpha + \Sigma_k \beta_k x_{ki} + \delta T_i + u_i \quad (1)$$

where $InYield_i$ is the natural log of yields (defined as kilograms of cocoa per unit of land) for farmer I, x_{ki} are the k-covariates included in the model, and β is the effect of the treatment T (i.e., having received or benefited from the spray initiative), whereas the u_i are the village-level clustered errors. The first-stage equation in the 2SLS framework is:

$$T_i = \alpha + \Sigma_k \beta_k x_{ki} + \Sigma_j \gamma_j I_{ji} + \varepsilon_i \quad (2)$$

where I_{ji} are the j instruments included in the model.

In this model, we considered two possible sources of endogeneity with the outcome variable of interest, yield: having received public spraying and land size. As the data used for this evaluation are a cross section, we cannot discount the potential bias introduced in our model by the omission of controls for the quality of land or for the effect of attrition in the labor market, for example, which as discussed earlier, could artificially generate an IR between land and yields. For these reasons we have run two sets of first-stage regressions, one for spray initiative beneficiaries and one for testing the existence of an IR. These first-stage regressions are reported in Table 6.10.

These first-stage regressions suggest a sound selection of instruments, as shown by a very strong endogeneity test outcome but also by the statistical significance of more than one chosen instrument in each selection equation. Finally, Table 6.11 presents the outcome equations comparing the uninstrumented (ordinary least squares) estimates to the 2SLS models using both the generic spray initiative treatment effect (column 2) and the dummy for those reporting a positive impact of spray initiative (column 3).

Several findings are worth discussing from the estimation of these models. One noticeable result is that the spray initiative dummy, which has a negative and significant impact on yields in the uninstrumented regression, becomes positive in sign but shows no statistically significant causal effect on yields in the 2SLS model. This is a central finding that confirms the absence of positive impact of nonprivate spray initiatives on yields. The result is in line with what was found by analyzing the GCFS. A second noticeable result is the size and statistical significance of the fertilizer variables. The estimates suggest that a 10 percent rise in the use of granular fertilizer would be associated with a 1.8 percent increase in yield.

TABLE 6.10 First-stage regressions, spray initiative beneficiaries, and land under cocoa

	Recipient of spray initiative			ln (ha under cocoa cultivation)		
	Coef.	Std. Err.	t	Coef.	Std. Err.	t
Dependent variable						
ln (labor person-days/ha)	0.079	0.015	5.400	–0.240	0.026	–9.280
ln (kg fertilizer/ha)	–0.016	0.048	–0.340	–0.044	0.059	–0.750
ln (liter insecticide/ha)	–0.150	0.036	–4.120	–0.309	0.051	–6.110
ln (liter fungicide/ha)	0.005	0.039	0.120	–0.151	0.046	–3.260
Shade system adopted[a]						
Share ha under no shade	–0.103	0.174	–0.590	0.097	0.120	0.810
Share ha under light shade	–0.236	0.081	–2.930	–0.216	0.088	–2.440
Share ha under moderate shade	–0.094	0.043	–2.180	–0.153	0.069	–2.230
Instruments						
Household adult equivalent size	–0.006	0.013	–0.460	0.118	0.018	6.440
Dummy = 1 if paid labor nonaffordable	0.105	0.043	2.470	0.082	0.076	1.080
Years of experience in cocoa farming	–0.003	0.002	–1.670	0.012	0.003	3.540
Walking time to nearest cocoa buying station	–0.001	0.001	–2.060	0.000	0.001	0.540
Constant	0.394	0.305	1.290	1.326	0.240	5.520
Observations	726			726		
F(14, 711)	25.22			58.95		
Endogeneity Test; F(2,18)	0.70 (p-val = 0.51)					
Adjusted R-squared	0.1			0.35		

Source: ICI (2014).

Note: ha = hectares; kg = kilograms. Dummies to correct the log transformation of quantities of insecticide, fertilizer, and fungicide equal to zero were used in the regression but are not reported in the table above.

[a] Full-shade system is the omitted category.

A third interesting result is that of the IR between land and yields in the OLS model. This negative and significant association disappears once the first-stage regression successfully accounts for the potential omitted-variable bias of unobserved land quality, and for imperfections in the labor market.

A fourth notable result is the finding that among the privately applied chemicals, insecticide and fungicide are the inputs most positively associated with higher yields. We find this result to be consistent across all three models estimated. Finally, we found that farmers cultivating a higher share of cocoa trees under the full-sun system are associated with lower yields relative to farmers cultivating a larger share of trees in moderate to full shade, suggesting

TABLE 6.11 Second-stage equation results, evaluating the impact of the spray initiative

Dependent variable	(1) OLS			(2) IV regression			(3) IV regression		
Ln (kg cocoa/ha)	Coef.	Std. Err.	t	Coef.	Std. Err.	t	Coef.	Std. Err.	t
Dummy = 1 if received spraying initiative	–0.109	0.054	–2.040	0.182	0.419	0.430			
Dummy = 1 if benefited from spraying initiative							0.091	0.408	0.22
ln (land in ha)	–0.090	0.033	–2.730	–0.031	0.087	–0.350	–0.041	0.094	–0.44
ln (labor/ha)	–0.013	0.025	–0.530	–0.024	0.045	–0.550	–0.018	0.043	–0.42
ln (kg fertilizer/ha)	0.111	0.041	2.730	0.122	0.044	2.790	0.118	0.040	2.95
ln (liter insecticide/ha)	0.382	0.058	6.540	0.440	0.091	4.820	0.427	0.102	4.20
ln (liter fungicide/ha)	0.188	0.078	2.410	0.198	0.082	2.420	0.197	0.082	2.39
Shade system adopted[a]									
Share ha under no shade	–0.657	0.140	–4.680	–0.623	0.163	–3.820	–0.621	0.205	–3.02
Share ha under light shade	–0.080	0.088	–0.900	–0.003	0.126	–0.020	–0.025	0.128	–0.19
Share ha under moderate shade	–0.117	0.065	–1.810	–0.080	0.082	–0.970	–0.085	0.097	–0.88
Constant	5.538	0.307	18.030	5.331	0.370	14.390	5.389	0.357	15.09
Observations	731			726			726		
F(12, 18)	17.55								
Wald chi2(14)				178.980			186.920		
R-squared	0.23			0.19			0.22		

Source: ICI (2014).

Note: ha = hectares; kg = kilograms; IV = instrumental variable; OLS = ordinary least squares. Dummies to correct the log transformation of quantities of insecticide, fertilizer, and fungicide equal to zero were used in the regression but are not reported in the table.

Std. Errors adjusted for 19 clusters in village.

[a] Full-shade system is the omitted category.

that farmers practicing the full-sun system are not adequately meeting the higher fertilizer requirements associated with the system.

Price Incentives versus Subsidies and Services

Because COCOBOD retains producer revenues to meet industry costs, some of which could be undertaken by farmers on their own, it is important to examine whether producers would have been better off receiving higher prices rather than the services, particularly given the inefficiencies in service delivery suggested by the differences in returns to private and nonprivate sprays from the analysis presented. Higher prices would be beneficial when

private interventions are more effective than nonprivate interventions, and provision of services on behalf of farmers is a misallocation in some way. An example of a misallocation would be a situation in which a farmer who has a weed-infested farm might have been able to increase his yields more by weeding than by increasing their application of subsidized fertilizers.

To estimate the impacts of these programs on producer income, we first must determine the effect of the programs on the estimated net FOB and producer price. The predicted net FOB price per ton is a function of three uncertain parameters: a = the predicted FOB price per ton, b = the predicted crop tonnage, and c = budgeted industry costs such as government purchases of fertilizers. Algebraically, net FOB is equal to (a * b – c) / b. In 2009/2010, for example, the predicted FOB price per ton was GH¢3,504, predicted tonnage was 700,000 tons, and budgeted industry costs including CODAPEC and Hi-Tech were GH¢277,888,850, resulting in a net FOB price of GH¢3,107. The producer price was then set by COCOBOD at 71 percent of net FOB. Table 6.12 presents our estimates of the reductions in net FOB and producer price after the costs of 2009/2010 Hi-Tech and CODAPEC subsidies are netted out.

By eliminating the programs, substantially higher prices could be passed on to producers. The evidence presented here suggests that CODAPEC and a nonprivate spray initiative do not contribute significantly to yields, while sprays undertaken privately do. An argument in favor of CODAPEC would be that it is designed to be limited in scope, and complementary private sprays are required to effectively control the pests and diseases. The point to note is that CODAPEC has served the purpose of demonstrating to farmers the benefits from sprays. A higher proportion of the nonrecipients of the spray initiative, for example, undertake sprays using more chemicals than the recipients. These results suggest that farmers will continue to spray privately even if nonprivate initiatives are withdrawn. The evidence is strong enough to justify conducting a pilot study of the withdrawal over a limited area to study the effects.

Fertilizer subsidies need two considerations: (1) whether they are needed and (2) how they would benefit different groups of farmers, because a subsidy funded from producer revenues would serve as a tax on nonusers. To answer the first question, we calculate the marginal productivity of a kilogram of fertilizer using the estimated relationships from the fixed effects model presented in Table 6.6.

For a median holding of 4.25 ha and mean fertilizer use of 121 kg/ha, the model predicts a yield of 580 kg/ha.

TABLE 6.12 Impact of 2009/2010 Hi-Tech and CODAPEC programs on net FOB and producer price

Policy	Producer input unit price	Government input unit price	Quantity	Impact on net FOB cocoa price	Impact on farmgate price
Hi-Tech foliar fertilizer	GH¢10,000/ 1,000 liters	GH¢41,900/ 1,000 liters	2,000,000 liters	–GH¢91/ton	–GH¢65/ton
Hi-Tech bagged fertilizer	GH¢500/ton	GH¢1,284/ton	130,000 tons	–GH¢146/ton	–GH¢103/ton
CODAPEC mass spraying	Cost of fuel for motorized sprayers	Cost of fungicides and insecticides; application costs	1,450,000 liters of insecticides; 97,000 sachets of fungicides	–GH¢232/ton	–GH¢165/ton

Source: Adapted from Gockowski (2012).

Note: CODAPEC = Cocoa Diseases and Pest Control Program; GH¢ = Ghanaian cedi.

Calculating the marginal productivity of fertilizers (MPf), with a Cobb–Douglas specification, as MPf = b * y / x, where b is the estimated elasticity of yields to fertilizer, y is the estimated yield, and x is the level of fertilizer application, gives a MPf of 0.86 kg of cocoa per kg of fertilizer.

Using the price of an additional 1 kg of cocoa (Pc), in a scenario without expenditures on a fertilizer subsidy, of GH¢2.38 (instead of GH¢2.21 with Hi-Tech), we get GH¢2.05 (0.86 * 2.38) as the additional value of cocoa produced.

The value of additional cocoa produced by the application of an additional 1 kg of fertilizer is higher than the unsubsidized or full cost of 1 kg of fertilizer, GH¢1.39. Fertilizer application at full cost will remain profitable up to applications of 179 kg per ha, which is nearly one-half of the recommended dosage.

There may be justification for subsidizing in particular regions where soil depletion is a particular problem, but there appears to be little justification for subsidizing the cost of fertilizers, let alone distributing them at no cost to producers. The results also suggest that there may be a need to revise the fertilizer recommendations by taking into account current cocoa and fertilizer prices and yield responses to fertilizers under various conditions.

To answer the second question, we analyze the impact on producers of the Hi-Tech fertilizer subsidies differentiated by the intensity of their fertilizer use. Model-predicted yields at four levels of fertilizer application are estimated by holding the other dependent variables of the production model constant at their means and changing the amount of fertilizer under each scenario

TABLE 6.13 A model simulation of gross returns to fertilizer use at four levels

	Intensity of fertilizer use			
Producer outcomes	None	Average	Intensive	Recommended rate
Yield (kg/ha)	228	462	566	662
Total production (kg)	969	1964	2406	2814
Fertilizer (kg/ha)	0	50	156	371
Total fertilizer use (kg)	0	214	663	1577
Gross return under Hi-Tech (GH¢)	2,140	4,228	4,980	5,424
Gross return w/liberal fertilizer market (GH¢)	2,306	4,376	4,803	4,504

Source: Model estimated using mean values of the 2009/2010 round of Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010).

Note: ha = hectares; kg = kilograms. Prices assumed with the Hi-Tech program are GH¢2.21/kg of cocoa and GH¢0.50/kg of fertilizer, and in its absence, GH¢2.37/kg of cocoa and GH¢1.39/kg of fertilizer. Farm size is equal to the median value of 4.25 ha.

(Table 6.13). These yield estimates, measured in kilograms per hectare, are then multiplied by the median number of hectares of cocoa per household (equal to 4.25 ha) to arrive at the estimates of total production. The fertilizer application rate, also measured in kilograms per hectare, is similarly multiplied to arrive at the estimates of total fertilizer applied. The gross returns to fertilizer use under the Hi-Tech subsidy regime in 2009/2010 are estimated using the COCOBOD producer price (GH¢2.21/kg) and the subsidized fertilizer price (GH¢0.50/kg).

From Table 5.2, we see that 59 percent of the area in our sample was not applied with fertilizers in 2009/2010. All the farmers who did not apply fertilizer would benefit from a higher producer price in the absence of the Hi-Tech program. We estimate that prices would increase by GH¢0.17/kg, raising incomes of the nonusers by 8 percent. Among fertilizer users, those applying average amounts would also be slightly better off in a liberalized market regime. On the other hand, the more intensive producers would witness a significant decline in revenue with the move to a liberalized market.

It might seem only logical that more intensive users of a subsidized input benefit more than other users. It might also seem particularly desirable in this case because it is the smallholders who benefit. But the subsidy serves as a significant tax on nearly 60 percent of the producers who do not use fertilizers. As in the case of sprays, the fertilizer subsidy program has served its purpose of encouraging fertilizer use, even among smallholders who are likely to be more credit constrained than larger farmers. Importantly, the subsidy that has turned into a free supply program discourages the development of private

supplies. As noted, a cocoa revenue–dependent subsidy program is not always able to meet the fertilizer needs adequately. There is a need to target subsidies and to operate the program in a predictable way such that the segment of the market that is willing to pay the full costs is served by the private sector. If the objective in a producer-funded subsidy program is to reduce input costs so as to increase incomes, there is potential to achieve the same objective by passing on higher prices to producers if the private sector can effectively meet the inputs needs of producers.

Chapter 7

UPGRADING IN THE VALUE CHAIN BY MAINTAINING QUALITY

Like producers of other export commodities, cocoa producers have been part of a global value chain ever since they started producing cocoa. Relative terms of trade, where value is added, and who benefits from value addition have always been issues of concern for commodity-exporting countries. Upgrading is an important strategy to improve the position of one or more of the actors in the value chain, but the complexity of the chocolate industry and the need for other raw materials, such as milk and sugar, for the production of final products prevents a producing country such as Ghana from moving into value-added products that might offer significantly higher returns than those from selling beans. Thus, maintaining quality has been Ghana's primary strategy for upgrading its position in the value chain. Ghana's retention of centralized marketing and its efforts to maintain quality have allowed it to not only sustain the reforms that it undertook but even to dictate the nature and extent of local processing.

Cocoa quality is obtained through practices that include good husbandry, timely harvesting, and proper fermentation, drying, and sorting of beans, although some characteristics, such as fat content and flavor, may be unique to varieties and agroecological conditions. Bean weight is largely determined by the tree that produces it. Rainfall is a key environmental factor that is associated with bean weight. Fat content varies from 45 to 65 percent, related to genotype; it is also related to bean weight. Shell content may be lower on larger beans; it is also influenced by fermentation and drying methods (Wood and Lass 1992). Therefore, quality to a considerable degree depends on producers' practices. Ghana's quality-control program, which regulates the quality of cocoa traded by LBCs, passes on incentives for producers to improve quality, in addition to directly influencing them to adopt quality-enhancing practices.

This chapter discusses developments that have taken place in the global value chain; the role that COCOBOD plays in withstanding, to some extent, the emerging pressures; and the role that COCOBOD plays in ensuring producer welfare in the context of values in the chain. The chapter opens with a

description of the value chain, including the geography of primary and secondary processing. It discusses the key actors in the chain that drive how cocoa is produced and marketed, participation by locals in activities further down the chain, and Ghana's efforts to add value. The second part of the chapter focuses on how Ghana maintains its quality: the process it employs to maintain quality, whether quality control has been affected by the introduction of competitive buying, and the costs and benefits of controlling export quality. The last section addresses how global price movements may have contributed to reducing poverty among cocoa producers and concerns about producer welfare.

Global Value Chain

Cocoa is a tropical tree crop grown almost entirely by smallholder farmers in Asia, Africa, and Latin America, with over 65 percent of beans coming from producers in West Africa. Most of the cocoa beans from Africa are exported to the European chocolate industry, the largest worldwide. Unlike commodities such as coffee, which reach consumers in a form close to what the producers sell, cocoa beans go through substantial transformation before the products that contain them reach consumers.

There are four stages: raw and minimally processed cocoa beans; semi-finished products such as cocoa paste/liquor, cocoa butter, and cocoa powder; coverture or industrial chocolate; and finished chocolate products. The two major stages in processing, one to produce intermediate products and the other to produce final products, are treated as separate segments of the cocoa value chain, making it significantly more complex than those of other commodities.

Getting the beans ready for the market is a labor-intensive process that has changed little over the years for producers. Forests are cleared, and cocoa is planted using tools little more sophisticated than cutlasses. Production and processing on the farm are also labor intensive, using tools that have changed little in decades. Producers harvest the pods by hacking them from tree trunks with long-handled knives or machetes every few weeks from November to February. Ripe-harvested fruits are sometimes left in the field for up to 10 days, both to enhance flavor and often to allow time to assemble enough labor to break all the pods on the same day, usually on a Saturday morning.

Harvesting and fermentation methods continue to be artisanal. The pods, each of which usually contains more than 50 beans, are split open using sharp knives or a wooden baton so as to scoop out the beans, which are covered

with a sweet white pulp or mucilage. In Ghana the beans are fermented using the "heap method" in which the wet beans surrounded by the pulp are piled on plantain leaves; they are wrapped with leaves, leaving the "parcels" in a circle on the ground. The heap is left to ferment in the heat for five to eight days, during which time the beans turn brown and organic compounds within them begin to acquire the color and flavor that are associated with chocolate.

Farmers then carry the wet mass of beans to their residences to be dried in the sun, spread out on large bamboo mats over a frame a few feet above the ground. They turn the beans regularly by hand to ensure even drying, to prevent beans from sticking to one another, and to remove any broken beans or foreign matter, such as mucilage. The beans are dried for 5 to 12 days to reduce the moisture content from 60 percent to 8 percent. The dried beans are then packed in mini or maxi jute bags that take 30 kg and 62.5 kg, respectively. Producers then take the beans to one or more of several buyers who maintain buying sheds in their village.

Primary and secondary processing

Cocoa processing begins with grinding to produce intermediate products. Beans are roasted before grinding, traditionally whole, although some prefer to deshell or crush the beans to roast only the nibs. Roasted beans are then subjected to alkalization or "dutching" to make the cocoa powder darker and to develop a unique flavor. The nibs are then milled to obtain fine cocoa liquor, which is also referred to as cocoa paste or cocoa mass. Cocoa liquor, which may be used directly as an ingredient of chocolate, is further processed into cocoa butter and cocoa powder, which are obtained in fixed proportions given the fat content of the beans—the powder is usually treated as a by-product. The cocoa butter, which is extracted by pressing the cocoa liquor through a very fine sieve or by using a solvent, is highly homogeneous. It may be substituted with cheaper butters such as that of shea nuts when cocoa butter prices climb.

The intermediate products are used in products other than chocolates in the dairy, confectionery, and baking industries. However, virtually all the cocoa butter produced through conventional hydraulic pressing is used in the manufacture of chocolates. The pharmaceutical and cosmetics industries, which also use cocoa butter, typically use the lower-grade solvent-extracted butter. The residue from pressing cocoa cake, which still contains 10 percent to 20 percent fat, is either kibbled or ground coarsely for sale in the generic cocoa market to produce cocoa powder by further grinding and sifting. Cocoa

powder is also used in drinking chocolates or bakery products, depending on its fat content.

Cocoa paste or cocoa liquor and butter are combined with other inputs such as sugar, vanilla, and powdered milk to make a smooth chocolate dough, which is then refined and put through a conching machine to produce coverture, the industrial chocolate. Coverture is used to make finished chocolate products as well as for the coating material used in the manufacture of confectionery, biscuits, ice creams, and cakes. The coverture is either used in-house by vertically integrated manufacturers to produce consumer products or sold to third parties (either small companies that do not themselves manufacture coverture—for example, small confectioners, bakers, and patissiers—or large companies that buy some of their coverture requirements) (Musselli 2008). Because chocolates contain other raw materials, the supply chain that originates with cocoa interacts with those that originate with milk and sugar. Depending on the prices, cocoa accounts for around one-half of the raw material costs of chocolate, averaging across all types of chocolate confectionery (Gilbert 2007).

Primary processing of cocoa, or "grinding," continues to be undertaken predominantly in cocoa-importing countries, although the share processed in cocoa-producing countries is increasing. Secondary processing, however, is done primarily in developed countries. Europe accounted for 42 percent of world grinding in 2005/2006. The two principal cocoa-processing countries are the Netherlands and the United States, with 14 percent and 12 percent shares, respectively, of global grindings in 2005/2006. The share of processing by cocoa-producing countries has increased over the past few years, from approximately 33.6 percent in 2001/2002 to roughly 37 percent in 2005/2006. Among the producers, Côte d'Ivoire and Malaysia together accounted for almost half of origin grindings (Musselli 2008).

The increasing share of global grinding in cocoa-producing countries is primarily a result of investments by the large grinding companies. These investments have strengthened the dominance of these foreign companies by giving them higher shares of global capacity and increased political power. Origin grinding is a strategy to make use of low-quality beans (Fold 2001, 2002). A substantial part of origin grinding is based on low-quality beans that are unsuitable for exports. So in principle, origin grinding offers the opportunity to transform an unsellable product into an exportable value-added product. However, a number of challenges limit the potential for increased grinding in West Africa. Cocoa processing is capital intensive and requires a large tonnage and continuous throughput.

Changes in value chain governance or leadership

Beyond domestic trading, the international cocoa trade has become more diversified and vertically integrated. International cocoa traders now are fewer, bigger, more diversified across a range of commodities, and more vertically integrated upstream to the farmers' level and downstream in transportation and processing. During the 1990s, trading companies with diversified interests such as Cargill and Archer Daniels Midland (ADM) took over the role of the specialized companies such as Gill & Duffus, Berisford, and Sucden that led the cocoa trade throughout the 1980s. The new cocoa trading companies also process products from origin countries as they have vertically integrated their operations; they now reach the producers directly through their cocoa-buying stations or indirectly through agents. Five large oligopolists now dominate the conversion industry: ADM, Barry Callebaut, Blommer, Cargill, and Petra Foods, none of which produce chocolates (Gilbert 2007).

Emerging standards, such as the European health regulations that require low bacteriological counts in cocoa products, increase processing costs in humid cocoa-producing countries (Fold 2001). And there is increasing demand for delivery of customized intermediate products on a just-in-time basis by manufacturers in Europe that use the intermediate products. Large processors deliver cocoa liquor and cocoa butter in liquid form to chocolate manufacturers on a just-in-time basis, and many of the chocolate manufacturers are phasing out equipment to handle solid intermediate products. Remoteness from chocolate manufacturers, who are primarily in Europe and North America, is also an operational disadvantage for origin grinding.

Prior to liberalization, parastatal marketing boards that wielded considerable control over supplies by engaging in a range of activities across the chain, from input supply to bean exports, may have exercised some governance. The reforms that eroded the power of marketing boards changed value chain governance in nearly all cocoa-growing countries, with the exception of Ghana, where the markets were not liberalized (Fold 2002). Three of these traders, which have become the dominant grinders in the sector, have taken over the governance roles exercised by former state marketing boards (Fold 2002). The cocoa value chain is often characterized as international trader driven (Gibbon 2001). Governance may be bipolar because large chocolate manufacturers also play a large role. Some technological developments have also weakened the position of producers. For example, cocoa beans are now transported in bulk. Changes in processing, such as the grinding of beans without roasting, have also reduced the need for uniform bean sizes.

Participation by locals in the value chain

Ghanaians participated in internal marketing of cocoa even prior to independence, although exports were controlled by foreign traders. Expatriate companies purchased cocoa through Ghanaian brokers or intermediaries. Even after the board was established, foreign firms continued to participate in local buying of cocoa until the cooperative UGFCC was given the sole right to buy from producers. Following the abolition of the UGFCC, cocoa was purchased through licensed companies, but the expatriate firms were excluded from local buying by the NLC government. At the same time, the board also began to supply working capital to licensed buying agents, a practice that has been abused to different degrees over the years. Following a review of the situation in 1976, the board set up the PBC to purchase all cocoa.

Ghanaians have tried to participate in the cocoa trade beyond local purchasing. Producers and local traders who supplied beans to merchant firms tried to export on their own without success. In 1924 an experienced broker who was also a farmer organized the Gold Coast Farmers' Association in Nsawam, Mangoase, and Koforidua to sell nearly 9,000 tons to an American broker, who paid them 10 percent on delivery but took years to pay them the balance (Amoah 1998). Another group, Ashanti Farmers' Association Ltd., also tried to export directly but failed due to low prices in 1924/1925.

After the reintroduction of licensed buying in 1993, foreign firms were again allowed to participate in the local marketing of cocoa. They have not been able to dominate the trade, however, and local firms account for the majority of the cocoa procured from producers. Local firms are typically unable to raise funds externally at reasonable cost in the absence of the vertical integration that would make it feasible in a liberalized sector (Shepherd and Farolfi 1999). COCOBOD's supply of working capital, borrowed in international markets, creates a level playing field for all the firms. Earlier, COCOBOD issued cocoa bills in the domestic market, which it discontinued because of the high costs of retiring cocoa bills. However, many of the local LBCs now appear to be in a position to raise funds domestically at competitive rates as banks have realized that cocoa purchasing is a viable operation.

Moving up the value chain

Upgrading in a value chain may mean moving to a technologically more sophisticated capital- and skills-intensive niche within the value chain (Gereffi 1994). Upgrading can involve improving the quality of cocoa or adding value to cocoa beans. Adding value to cocoa or participating in stages of the cocoa value chain where the returns are higher has been an important aspect of

Ghana's cocoa sector strategy. Ghana's objective is to process 60 percent of the beans it produces. In a recent strategy document, it says that it seeks to encourage secondary processing from which the returns are far higher (COCOBOD 2015).

In the past, Ghana attempted to process cocoa closer to the market for intermediate products by having the beans processed by an independent processor for a fee. Between 1991/1992 and 1995/1996, Ghana contracted with the Hosta group of companies in Germany to process the beans and market the intermediate products in Europe. The partners were able to get marginally higher returns per ton of beans by processing 15,000 to 20,000 tons, but they incurred losses with larger quantities. They discontinued these efforts because the agreement was not a purely tolling contract, in which raw material or unfinished products are given to a third party to provide processing services for a fee. In contrast to a tolling contract situation, Ghana also expected the processor to market the processed outputs on its behalf (Amoah 1998).

Ghana now offers price discounts, extended-payment credit, and special zone-related tax breaks to encourage local processing (World Bank 2011b). Value-added products already account for a significant portion of the total value of exports; US$480 million of the US$1.73 billion from total cocoa exports in 2012, for example, came from exports of value-added products (COCOBOD 2013).

There is substantial capacity for primary processing of cocoa in Ghana, but the policy now encourages investments in secondary and tertiary processing. Ghana has an installed capacity of 430,000 metric tons, of which only 245,000 metric tons is currently used, accounting for about 29 percent of West African grinding (Ecobank 2014a). The limitation to using the processing capacity better is the supply of local beans for processing. Ghana also has stringent import regulations that discourage the importation of beans from other countries to improve capacity utilization. As a result, local processors have been demanding export-quality beans at a discount to compensate for higher production costs. Ghana usually supplies local processors with lower-quality light beans at a discount of nearly 15 percent of the export price. Processing was expected not to grow in 2014/2015 because of the scarcity of light cocoa (Ecobank 2014b). The supply of light cocoa in Ghana is expected to remain a problem in the medium term; Ghana's light crop was estimated to be 20,714 tons in 2013/2014 while Cote d'Ivoire's was nearly a half a million tons.

Local companies argue that the government would benefit economically from encouraging local processing by supplying export-quality beans at

a discount. Using information supplied by a majority of the firms, the firms indicated that their collective investments by the end of 2011 amounted to over US$300 million and furthermore that their investments' impact (direct, indirect, and induced), including the creation of nearly 1,800 jobs amounting to US$56.3 million, is much higher than the nearly US$18 million the industry received in incentives (PwC 2012). The government has not been convinced that processing would create adequate numbers of jobs in the country, but it has agreed to negotiate to sell beans of all grades, including exportable quality, at prices related to prevailing market prices.

Value added in primary processing is marginal, representing only 5 percent of the final value. Nearly 75 percent of the final value comes from the manufacturing and marketing of chocolates (World Bank 2012). Constraints to processing in source countries include the high cost of inputs such as sugar, milk, and packing materials; higher energy costs; the need for transportation under controlled conditions; and the absence of opportunities to blend intermediate products from various sources. Processing also has limited potential for job creation; it might potentially require an investment of half a million dollars before one position is created (World Bank 2011a, cited in World Bank 2013a). Escalating tariffs imposed by richer countries on the imports of value-added products, which tend to be 4–6 percent for intermediate products and higher than 10 percent for industrial chocolates, make value adding uncompetitive even if the higher costs of inputs could be overcome (World Bank 2013a).

While encouraging the buildup of primary processing capacity, Ghana has not offered incentives in terms of lower-priced beans to increase the share that is processed locally. Without significantly adding value to cocoa beans, improving the quality of beans it exports has remained the key strategy for Ghana to capture value in the chain.

Cocoa Quality in Ghana

In 1934 because neither producers nor traders seemed to want to improve quality on their own, the colonial government introduced the Cocoa Industry Regulation, which set standards and grades, under the assumption that in the absence of legislation, competition among buyers would prevent voluntary action to export beans of high quality. The administration could not prove that economically sound premiums could be obtained, but it argued for legislation, saying that the West Indian cocoa produced under European control was superior and that legislation was necessary for future prosperity (Green and Hymer 1966).

Cocoa buyers were also interested in sourcing quality cocoa. Cadbury laid the foundation for production of quality cocoa beans in Ghana at the beginning of the 20th century. The company wanted to move away from its suppliers in São Tomé and Príncipe Island, which were tarnished by the use of slave labor, and began to buy cocoa in the Gold Coast in 1908. It found the first shipment of nearly 8 tons to be of better quality than that of its previous sources and superior to beans available in the Liverpool market (Amoah 1998). Valuing quality beans, Cadbury not only paid Ghanaian producers a premium but also provided technical assistance to help produce high-quality cocoa (Williams 2009).

The quality of cocoa beans refers to aspects of flavor and purity as well as the physical characteristics that have a bearing on manufacturing performance, especially the yield of cocoa nibs (Biscuit, Cake, Chocolate, and Confectionery Alliance 1996). Flavor, purity or wholesomeness, consistency, yield of edible material, and cocoa butter characteristics are some of the criteria that influence a manufacturer's assessment of the value of beans (ICCO 2012).

The Federation of Cocoa Commerce (FCC) stipulates grades on the basis of the content of mold, slate, and other defects. It also categorizes cocoa as main or light crop on the basis of bean size and weight, as measured by the number of beans in a sample of 100 grams. Due to increasing consumer concerns, the beans are now checked for chemical residues as well. Japan first introduced legislation on residue levels in cocoa imports in May 2006, and the European Union (EU) followed in 2008. While the EU requires that only the nibs are tested for residues, Japan, which imports nearly 50,000 tons annually from Ghana, requires that beans, including the shells, are tested. Ghana usually meets the EU requirements but not the more stringent Japanese requirements.

Some dimensions of cocoa bean quality, particularly flavor and color, depend largely on the planting material used (Clapperton 1993). Other important factors include pre- and postharvest disease and pest control, timely harvest of ripe pods, a six-day fermentation period, adequate sun drying to reduce moisture content to 7.5 percent, removal of bad beans during the drying process, and proper storage of cocoa beans. Processing on a small scale by smallholders in Ghana contributes positively to quality. For example, Ghanaian beans have a luster because the producers remove attachments such as the mucilage as they turn the beans over by hand while they are drying on mats. Hand turning also makes flatter beans fall through, resulting in greater uniformity of beans.

Ghanaian cocoa, the quality of which is controlled by COCOBOD, attracts a premium estimated to be 4 percent to 6 percent on the world commodity markets because of its flavor, higher fat content, and lower share of defective beans and foreign matter (Gilbert and Tollens 2002). Gilbert and Tollens (2002) use the relative unit values of cocoa beans imported into Europe from the four West African cocoa-producing countries and the premiums or discounts for beans from these origins traded on the Euronext–LIFFE cocoa market to create period averages between 1988 and 2008. The analysis shows that Ghanaian cocoa drew a premium of 3 percent to 5 percent relative to Côte d'Ivoire, currently the world's largest producer of cocoa. A more recent report suggests that mild flavor and higher butter content give Ghana cocoa a 7 percent to 10 percent premium over cocoa of other West African origin (Ecobank 2014a). Ghana's quality-control measures specify that only the beans with counts of lower than 100 beans per 100 grams are exported, to ensure quality.

Control process

The QCC, which in its earlier form was a subsidiary of COCOBOD, is responsible for maintaining the quality of Ghana's cocoa exports. Its mandate is to initiate and maintain quality standards in COCOBOD operations and to ensure compliance with international standards through both education and regulation. The QCC inspects and certifies storage sheds and other facilities of LBCs; inspects, grades, seals, and certifies bagged cocoa; disinfects stored cocoa, storage sheds, and containers in which cocoa is shipped; undertakes research to support the above operations; and educates farmers and agents of LBCs on the proper preparation and storage of cocoa.

Each season, the QCC initiates quality control by inspecting the storage sheds or depots maintained by LBCs for signs of insect infestation, roof leakage, and poor hygiene. It issues Certificates of Registration to those facilities that meet the hygienic requirements, designating them as Scheduled Grading Centers; it will not grade and seal cocoa in an uncertified shed. The QCC measures moisture content of beans using a moisture meter, determines the category by counting numbers of beans in 100 grams, and determines the grade by cut tests. It carries out these tests in all the certified storage sheds and the three takeover centers in the ports maintained by the CMC. It has staff in all 73 districts of the six cocoa-growing regions of Ghana, an area office at Hohoe in the Volta Region, the two ports in Tema and Takoradi, and an inland port in Kumasi.

The QCC claims that it samples every bag of cocoa by following an elaborate process whereby inspectors draw cocoa beans from all sides of a bag using

a stab sampler, known as a sampling horn, to obtain a sample from each of the 30 bags that are usually stacked as a lot in the depots. They then bulk and mix the samples drawn from the bags in each lot. They draw separate samples for the two tests: cut and count; these samples make up the "box sample" drawn from a lot. For the count test, they simply take 100 grams of the beans. For the cut test, they repeatedly divide the beans into four quarters, rejecting two opposing quarters each time until only approximately 300 beans remain. These are then divided into three sampling bags in approximately equal quantities. The cut test is performed by cutting 100 beans lengthwise through the middle and counting the number of moldy, weevil-damaged, germinated, slate-colored, flat, or decayed beans. If a bean is found to be defective in more than one respect, only one defect is counted, whichever is noticed first.

Graded bags of cocoa are sealed at the depots, and the bags are issued a Certificate of Inspection of Produce. The officer also issues an Evacuation Certificate, which indicates the grade, category, and drop mark for easy traceability. Beans will be accepted at the takeover centers maintained by the CMC only if they are accompanied by the Evacuation Certificate.

The regulations require retesting of at least 30 percent of the stock if the certified cocoa remains in depots for longer than expected, usually a month. At the takeover centers, cocoa arrivals are once again sampled by the QCC port staff using the same procedure, but pooling samples from 600 bags or a truckload. A Purity Certificate is issued to truckloads that meet the standards. All consignments are tested again prior to shipment by using the same procedure, but pooling samples from 200 to 250 bags, depending on whether cocoa is shipped in bags or poured into containers. By following this procedure, every bag is likely to be sampled at least three times before it is shipped out of the country (see Table A.3 in the Appendix).

The rigorous process involved in checking quality along the supply chain and the LBCs' interest in moving the cocoa as quickly as possible to ports creates opportunities for tension and rent seeking. At the beginning of the season, the QCC and the CMC staff are alleged to take an upfront fee of GH¢0.5 to GH¢1.00 per bag to not delay grading and sealing. One of the LBC district managers reported that transportation costs of the QCC staff have to be paid to encourage them to visit the depots to certify, but he also noted that such payments do not prevent them from rejecting poor-quality cocoa. This is supported by another LBC representative, who noted that while extralegal payments need to be made to the QCC staff to have them certify in a timely fashion, it is usually not possible to influence the QCC officers to accept cocoa that does not meet the standards. Bauer and Yamey (1954) also

note widespread corruption in produce inspection. Those who did not pay were made to wait a long time, and there was a recognized tariff that was considered reasonable.

MARGINAL DECLINE IN QUALITY UNDER LICENSED BUYING

Prior to the introduction of licensed buying in 1993, the state-owned PBC, the only domestic buyer of cocoa, inspected the quality of beans prior to purchase and bulked them into homogeneous lots. The practice sent a signal to farmers to pay attention to quality because inferior beans were rejected (Shepherd and Onumah 1997). Since the introduction of licensed buying, the many buyers who vie for cocoa beans have little incentive to maintain quality. The practice of paying according to quality, maintained during the 1950s, appears to have been discontinued because of enforcement difficulties. Also the practice of rewarding with bonuses only those who have delivered higher-quality main crops appears to have weakened with the introduction of licensed buying.

As a result, some quality issues have emerged, although they are not significant enough to tarnish Ghana's reputation for quality. The quality issues include the admixture or mixing of beans of different sizes, inadequately dried cocoa, black beans, and recently, purple beans. Cocoa that is not adequately dried is usually reconditioned later; out of nearly 650 bags that a clerk may purchase, about 15 may be reconditioned. Purchasing clerks are ultimately responsible for the costs of reconditioning the improperly dried beans they purchase.

In addition to inadequate drying, underfermentation of cocoa has emerged as a problem. Both problems are a result of farmers' incentives to bring beans to market with as little effort as possible in a competitive buying environment. Following a complaint in 2003/2004 from Japan of unusually high levels of purple beans in cocoa from Ghana, COCOBOD conducted a survey which suggested that nearly one-third of the beans produced were purple, due to underfermentation of cocoa (Adzaho 2010). COCOBOD subsequently revised its grading system to track the presence of purple beans. By the new standards that it introduced, the bulk of the country's exports now fall into grade II, whereas typically more than 98 percent of the beans they exported used to be grade I.

The decline in bean uniformity is also believed to be associated with a significant amount of new planting, which may prevent beans from growing to full size. COCOBOD has now specified tolerance levels to reduce admixture and also regularly revises categorization to meet the FCC requirements. It

TABLE 7.1 Share of quality-control costs in total revenues, 1996/1997 to 2012/2013

Item	1996/1997 to 1999/2000	2000/2001 to 2003/2004	2004/2005 to 2007/2008	2008/2009 to 2012/2013
Average annual gross revenue (GH¢)	152,708,850	577,305,450	1,119,224,228	3,728,330,177
Average annual quality-control expenditure (GH¢)	851,690	5,713,117	15,777,959	48,213,165
Quality-control expenditure as % of gross revenue	0.56	0.99	1.41	1.29

Source: Kolavalli et al. (2012).
Note: GH¢ = Ghanaian cedi.

initially had only four categories: main crop, light crop, small beans, and remnants. It has created more categories to increase uniformity. It also makes use of mechanical graders and sorters to ensure uniformity in bean size.

COSTS AND BENEFITS OF QUALITY CONTROL

The costs of quality control are less than 1.5 percent of cocoa revenues (Table 7.1). From 1996 to 2013, they ranged from 0.23 percent to 1.83 percent. So long as Ghanaian cocoa earns premiums greater than 2 percent, the resources that go into quality control pay for themselves. Of greater concern, however, is whether the market will continue to offer a premium for quality.

Recent advances in processing technology may have reduced the quality demanded. Grinders that produce liquor, butter, and powder now depend much less on traditional origin parameters (Fold 2002). Varangis and Schreiber (2001) contend that the introduction of bulk transportation of cocoa, in which beans of different qualities from different producers are mixed together indiscriminately, has made buyers less willing to pay a premium for quality. However, the cocoa market is still willing to pay a premium for Ghanaian cocoa because the costs of achieving similar liquor from other beans are higher, and the flavor is a direct result of proper fermentation and drying (Fold 2002). As traceability becomes important, quality will also continue to be important (Gilbert 2009).

However, the price premiums are not the only benefits from quality control. Ghana's reputation for consistently high-quality cocoa is an important factor that enables it to forward sell up to 70 percent of its crop, which in turn allows it to offer pan-seasonal prices to producers. A fixed price system can be maintained only with a quality-control organization that meets the requirements of industrial customers (Gilbert 2009). Ghana's reputation relates to both the stability of its bean supply and the quality of its beans.

Value Chain Concerns

Fairness and exploitation are among the tensions that arise in cocoa value chains due to the fact that cocoa beans are mostly produced by poor smallholders in poor countries but are a key ingredient in luxury products consumed in rich countries and by rich consumers throughout the world. Socially minded consumers who attribute moral significance to products and the economic exchange involving them are, however, not exclusive to the modern era (Berlan 2008). Consumer concerns have led to interventions to minimize the use of child slave labor in the production of cocoa and efforts to improve producer welfare through programs such as fair trade. Global prices and the share passed on to producers, however, may play a bigger role in improving producer welfare, particularly when global prices are high.

Global prices

Cocoa prices have risen after a decline in previous decades. After a 28-year record low of US$774 per ton in November 2000, the cocoa market changed direction the following year. In early 2001, bean prices began to rise when the industry faced the prospect of a substantial decline in global stocks, sharply reducing the world stocks-to-grindings ratio (ICCO 2010). Prices recovered spectacularly, averaging US$1,580 per ton, almost a 60 percent increase over the previous season—a dramatic increase recorded on only two earlier occasions, once in 1972/1973, when cocoa prices rose by 74 percent, and again in 1976/1977, when they increased by almost 120 percent. The upward pattern in market prices seen in 2001/2002 was largely due to a deterioration of the fundamental supply versus demand situation in the world cocoa market. Market participants acknowledge that the world cocoa economy had entered a phase of structural deficit.

A comprehensive price series of world cocoa prices from 1850 to 2011 shows 20 years of declining and nonvolatile prices from 1980 to the end of the 1990s, followed by a recovery (Gilbert 2012). Two important developments in the 1980s and 1990s put downward pressure on global cocoa prices: increased production in Ghana, and reduced costs in the supply chain due to market liberalization in numerous countries, which shifted the supply curve down, reducing the FOB prices (Gilbert and Varangis 2004). Producers ended up getting higher shares of lower global prices due to higher volumes of cocoa being traded internationally. Gilbert and Varangis (2004) suggest that countries with market power in commodities should apply optimal tax rates when adopting trade and domestic liberalization.

Coleman, Akiyama, and Varangis (1993), however, suggest that reforms in Ghana and Nigeria had only a marginal effect on global prices and that increased production in other countries had far greater effects. They estimate that cocoa prices would have been only 8 percent higher because of inelastic demand if Nigeria and Ghana had not liberalized, and they suggest that increased production in other countries, such as Côte d'Ivoire, Malaysia, and Indonesia, contributed more to price decreases. They also contend that if governments had not adopted liberalization policies, production would have declined by half, and the budget deficits would have been bigger.

Movements in global cocoa prices are a function of a shifting equilibrium between production and consumption rather than the result of a trend in cocoa prices influencing investment in planting (Gilbert 2012). The long-run income elasticity of demand for cocoa is around 0.4, although the short-run elasticity is over 1.0; in the long run there is also an annual increase in consumption of over 1 percent independent of income growth. The price elasticity of demand is around −0.3. Much of the price response occurs in the crop year following a rise in cocoa prices. This may result from pricing practices in the chocolate and confectionery industry (Gilbert 2012). Using an income elasticity of 0.4 and growth in global GDP of 3.5 percent, Gilbert estimates an income-generated growth in cocoa grindings of around 1.35 percent. Income growth therefore explains only one-half of overall consumption growth, as grindings have grown at an average rate of 2.7 percent. He attributes the rest to changes in tastes.

Producers' share in chocolate prices is small, and it is not a good indicator of their power in the value chain because extensive value addition takes place after the commodity leaves the producers. Cocoa growers generally receive less than 10 percent of the price of chocolates, which, evidence from the UK suggests, is less than the 25 percent share they have received over the past three decades (Gilbert 2006). Farmers' share in chocolate prices has declined even as their share in raw cocoa prices has increased because processing, marketing, and distribution costs incurred in consuming countries have tended to increase over time while production costs at origin have declined (Gilbert 2006).

Producer welfare

Some suggest that Ghanaian cocoa producers were better off before World War II than the majority of peasants in southeastern Europe (Hancock 1943, cited in Rimmer 1992). Citing a study conducted by Beckett (1944) and followed up by Okali and Kotey (1971), Rimmer (1992) notes that at that

TABLE 7.2 Reduced incidence of poverty among cocoa households (%), 2005 to 2012

	Reduction in poverty among cocoa households				Poverty among cocoa- and non-cocoa-producing households in 2012			
	Poverty		Extreme poverty		Poverty		Extreme poverty	
Item	2005	2012	2005	2012	Non-cocoa	Cocoa	Non-cocoa	Cocoa
Obs.	780	1405	780	1405	4213	1405	4213	1405
Mean	33.43***	26.93***	12.44***	7.28***	32.28***	26.93***	9.88***	7.28***
Std. Dev.	3.85	7.90	5.90	5.41	5.51	7.90	1.96	5.41

Source: Authors' estimates using GSS (2008, 2014).

Note: ***significant at $p < 0.001$; **significant at $p < 0.005$; * significant at $p < 0.05$; the sample size more than doubled in the 2012 survey, hence, the difference in number of observations. In 2012 extreme poverty was defined as expenditures that are barely adequate to meet the caloric requirements, and they were at 27.1 percent of the mean consumption. The poverty line was at 44.9 percent of mean consumption.

time annual income per family in a model cocoa village was only £20, only 35 of the 180 children between 5 and 10 years of age attended school, and two-thirds of the families contained no literate person. A survey conducted nearly 40 years later found modest improvements in schooling, communication, and housing, but the village was without electricity or a safe drinking water supply, and the advances made during the period were only moderate ones. The only major change that had taken place since independence was that more producers were living outside the villages. Although the conditions in southern Ghana were better than in the north, there were acute deficiencies in public service provision. Poverty was rampant throughout the period. Although cocoa was a remunerative crop, producers were poor because of high taxation and the small quantities they produced (Rimmer 1992). There was, however, a small group of large cocoa growers who accounted for a substantial fraction of the total crop (Austin 1990, cited in Rimmer 1992).

However, cocoa households have experienced significant improvements in their living conditions compared to food crop farmers (Coulombe and McKay 2003); poverty rates among cocoa households dropped 36 percentage points between the early 1990s and 2005 (World Bank 2007). Between 2005 and 2012 also, the incidence of poverty among cocoa growers decreased more among cocoa-producing households than among non-cocoa-producing households. In 2005 there was only a 1 percentage point difference between cocoa and non-cocoa farmers in the incidence of poverty, but it was significant only at the 10 percent level. By 2012 that difference had expanded to more than 5 percentage points, and it was significant at the 1 percent level (Table 7.2). The differences in the incidence of extreme poverty were also insignificant in 2005, but by 2012 there was a highly significant difference of more than

TABLE 7.3 Annual gross margin per household and adult equivalent (GH¢), 2010

Land size quartiles	Ashanti Region		Brong-Ahafo Region		Western Region		Total	
	HH	AE	HH	AE	HH	AE	HH	AE
Q1	508.55	142.35	636.28	175.60	940.24	266.16	745.66	209.00
Q2	348.64	84.72	484.08	123.37	777.01	224.42	539.54	142.30
Q3	245.80	55.97	430.40	94.42	722.78	183.01	539.50	128.07
Q4	272.13	63.37	417.38	90.95	526.12	126.72	394.68	91.65

Source: Authors' estimations based on data from Ghana Cocoa Farmers Survey (Centre for the Study of African Economies 2010).
Note: AE = adult equivalent; HH = household.

2 percentage points. The incidence of poverty and extreme poverty among cocoa households declined by more than 6 percentage points and 5 percentage points, respectively.

Although poverty may be declining faster among cocoa-producing households than among other agricultural households, the incomes cocoa households earn from cocoa are barely enough to keep them above poverty. In 2011 producers had a median income of GH¢716 from cocoa and a household income of GH¢1,020, which translates into GH¢250 per household member (Hainmueller, Hiscox, and Tampe 2011). More than 90 percent of households did not report income from any other sources in the same survey. While cocoa may not be the only source of income for cocoa households, it is not feasible from available datasets to determine the extent of dependence on cocoa.

Another estimate of household and per capita income using the 2010 round of the GCFS also suggests that the cocoa incomes are low (Table 7.3). Only households in quartile 1 in Western Region received margins per adult equivalent to the extreme poverty line, which is GH¢792.05—the amount needed to meet nutritional requirements, which was about 27 percent of mean consumption in 2012/2013 (GSS 2014).

Value chain actions

Consumer-driven measures such as those intended to eliminate the use of child labor tend to be effective because they can deny access to markets. Other nonmarket efforts to increase producer incomes tend to be less effective. One set of interventions includes the offer of higher-than-prevailing prices for the intangible value created through certified production practices (Ricketts, Turvey, and Gómez 2014). A study of Kuapa Kokoo in Ghana, a fair trade cooperative with more than 45,000 members, suggests that producing certified cocoa does not have a significant impact on income, household welfare,

or education levels (Nelson et al. 2013). This is partially because the minimum fair trade price is lower than the price offered by COCOBOD, which is not likely to fall soon (Nelson et al. 2013). It is also unclear whether fair trade farmers are producing a superior product that would warrant a premium on the market. The distinction between fair trade and conventional cocoa is not always clear because not all of the fair trade certified is sold as such, and conventional cocoa is not always produced under inferior labor conditions (Berlan 2012). However, markets for fair trade chocolates grew at a much faster rate than those for chocolates as a whole (Ricketts, Turvey, and Gómez 2014).

Meanwhile, major chocolate companies have recognized the growing demand for sustainable, quality cocoa and have also engaged in programs to boost producers' livelihoods and production practices. All major cocoa companies are involved in at least one international initiative, such as the World Cocoa Foundation, which runs the Cocoa Livelihoods Program and Sustainable Tree Crops Program, among others. Nestlé's Cocoa Plan and ADM's Socially and Environmentally Responsible Agricultural Practices program are also examples of companies' own initiatives to improve producers' livelihoods by increasing productivity through environmentally sustainable practices (Griek, Penikett, and Hougee 2010).

While fair trade and similar initiatives may provide greater impact to farmers in more liberalized markets, Ghanaian cocoa farmers may benefit more from improvements to the domestic management of the sector than from international schemes highly visible to consumers. Higher shares of prices offered by COCOBOD would have a greater impact on farmers than any of these schemes, particularly when global prices are high (Ryan 2011).

Chapter 8

IMPLICATIONS AND OPTIONS

The key issue that the book seeks to examine is how Ghana succeeded in revitalizing its cocoa sector without liberalizing the cocoa markets and while keeping the cocoa sector under the management of a board. Ghana's experience in this regard has implications for the appropriateness of economic reform measures that routinely include liberalization of markets and abolition of commodity boards. An important related issue is how effectively the board, as a monopsonistic institution, provides essential services, in the tradition of marketing boards, to smallholder farmers. Whether and how it does so without hampering the development of private service provision is also a consideration. COCOBOD's use of producer revenues to offer the services adds another dimension: would the producers be better off if they were offered higher prices instead?

In this final chapter, we offer some conclusions on the general implications of the findings of the study and some suggestions for making sector management more effective. Our conclusions on the implications focus on some considerations underlying the choice of instruments for effectively managing export crop sectors. The recommendations relate to measures needed to improve the effectiveness of use of producer revenues to offer critical services to producers. They focus on ways to improve transparency so that many of the existing institutions can deliver more effectively and on the use of the private sector to complement some of the public service provisions.

Reforms without Market Liberalization

A number of factors have contributed to Ghana's ability to steadily increase the producer share of export prices without liberalizing domestic and export marketing to improve their efficiency:

- The government has become accountable for the performance of the sector because the performance has come to be treated as a key dimension of economic management.

- Cocoa producer pricing has emerged as a key agricultural policy that reflects on the government's commitment to agriculture.
- The government has the ability to raise funds globally for the sector. This ability is tied to Ghana's being a reliable supplier of cocoa of uniformly high quality; among other factors, this requires producer pricing to discourage the smuggling of cocoa out of the country.

Importantly, a thriving sector offers whichever administration is in power the resources to provide programs and services that it can take credit for. But despite all these incentives, Ghana has been able to increase prices primarily by decreasing taxes rather than by reducing marketing costs. However, Ghana's experience suggests that given appropriate context, there could be alternatives to liberalizing markets and getting rid of parastatals.

The feasibility of alternatives to market liberalization further discredits the already shunned set of policies that came to be known as the Washington Consensus. The reason is because various instruments can help in achieving a policy objective (Rodrik 2006). The World Bank, a key proponent of the Washington Consensus, now recognizes that there is no unique universal set of rules for policy reforms (World Bank 2005). The Growth Commission of the World Bank also recognized the problem of translating a broad set of economic reform objectives into a narrow set of policy actions. It suggested that governments should adopt an experimental approach to policymaking, allowing room for country specificities (Kanbur 2009). Aryeetey, Harrigan, and Nissanke (2000, 2) note that the lack of progress in Ghana could be attributed to "right policies applied within the wrong institutional arrangement" or "the wrong sequencing of otherwise appropriate policy instruments."

The cocoa experience does suggest some considerations that should go into identifying appropriate policy instruments for particular situations.

Capacity for producer management

One obvious consideration is what might be the local alternative to market liberalization. Whether or not producers can collectively manage the sector might be the first option to examine, as it is a commonly suggested alternative to market liberalization (Rondot and Collion 2001). Ghana lacks an effective organization of cocoa producers that can represent the entire sector. As noted earlier, the GCCSFA's development has more to do with the mandate of COCOBOD over the three crops than anything else in common among the producers of these three crops.

The inherent limitations of producer organizations (POs) and the challenges of strengthening their capacity to assume managerial roles also raise concerns over whether POs can be a viable alternative to liberalization. Much of the literature on POs grapples with the free-rider problem, in addition to conflicts created by a dual focus on welfare and profitability and the potential for elite capture and/or cooptation of the organization for political purposes (Chirwa et al. 2005). The interests of wealthier, more educated, and male members are also more likely to be represented by POs at the expense of other members (Bernard and Spielman 2009). Greater disparity between members in these attributes decreases the ability of members to hold leaders accountable and increases the risk of elite capture (Rondot and Collion 2001).

As an intermediate step, could the stakeholders be given a say in the management of parastatals? Again, it would depend on whether the producers are adequately organized to have appropriate representation in the management, and more importantly, whether they develop or are granted a voice over time. Ghana's cocoa experience would suggest not. Ghana's use of the PPRC in the price-setting process gives the impression of empowering producers and other stakeholders, but as noted, there is more at play. The boards are usually extensions of government, and COCOBOD is no different. Producer prices, for example, are determined at the highest levels, perhaps at the presidency. It is no different from the way it was done during colonial times when the cocoa marketing board comprised nine members appointed by the minister of commerce, industry, and mines, and the producer prices it prescribed had to be approved by the minister, who also had the authority to direct the board in its management of funds (Bauer 1954b).

Potential for an indigenous private sector

Important considerations are what kind of markets would emerge following liberalization and whether there would be opportunities for domestic firms to participate in the sector. Cocoa liberalization, for example, has not led to competitive exporting in other countries, although there are no indications of monopolistic behavior (Gilbert 2009). Gilbert (2009) also notes that it may have been overly ambitious to expect competitive exporting to emerge given the characteristics of the cocoa industry. Competition in internal marketing, however, has increased in all the countries that have liberalized.

Countries are often reluctant to privatize because they are unwilling to permit foreign firms to dominate critical sectors in their economies. Ghana's cocoa sector has retained practices that offer opportunities and support for

local enterprises to participate in the sector without discouraging investments by international firms. Offering opportunities for local participation is also important politically, to enable reforms to be sustained. If they expect to lose significantly, powerful intermediaries may undermine reforms that may focus on benefiting the powerless smallholders (Aksoy 2012).

Ability to tame the parastatals

A critical question is whether or not it would be feasible to reorganize the parastatals to reduce costs and to make them continue to seek efficiency. Reforms without market liberalization entail a key role for quasi-public organizations in the management of the sector. Political and other pressures to offer adequate incentives to producers do translate to some extent into pressures to reduce marketing costs as well, but that may not be enough. As the Ghanaian experience suggests, producer share has been increased largely by foregoing tax revenues. Producer shares were to be increased primarily by reducing marketing costs, but that did not materialize after the reforms (World Bank 1992). In the past two decades too, producer share has been increased largely by reducing taxes. Administered pricing systems provide few incentives for a monopolistic marketing organization to be efficient; unless scrutiny is extremely tight, costs are likely to rise over time (Duncan and Jones 1993, cited in Varangis and Schreiber 2001).

The Ghana government may have been forced to reduce cocoa taxes to meet its commitments in the absence of a significant reduction in marketing costs. But fulfilling this obligation was made easier by a decreased dependence on cocoa taxes for revenue. Other countries in Africa south of the Sahara have also reduced agricultural taxes. Policies that are more favorable to rural sectors, particularly in terms of reduced taxes, have replaced trade policies that existed in the 1960s and 1970s that favored urban workers and domestic production of goods that might otherwise be imported at the expense of exportable goods (Krueger, Schiff, and Valdes 1991; Anderson and Masters 2008). At least in Ghana, the government found it easier to reduce taxes than to make the parastatals in the cocoa sector more efficient.

Sector-specific accountability of government

Are there indications that the government would be held accountable for weak performance in the sector? The factors that have pressured Ghana to manage its cocoa sector successfully are some signals to look for: production levels and producer price share that have caught the public imagination as indicators of government performance, or political incentives that would encourage

the government to seek sector expansion. This kind of accountability is not necessarily tied to the size and importance of the sector to the economy. The Ghanaian government's accountability for the performance of the mineral sector, for example, is weak despite the sector's contribution to exports (Ayee et al. 2011). However, accountability could develop over a period of time and may not be apparent when considering reform options. The cocoa sector itself offers some examples. The use of LBCs had been abandoned in the past primarily because of the misuse of funds extended to them to procure cocoa from producers. There appears to be greater political commitment now to prevent the kinds of abuses that parastatals may be prone to. The government may be willing to control smaller abuses in order to benefit from a better-performing sector.

Is a board appropriate?

Finally, would marketing boards be appropriate where there are none now? In Ghana there is considerable demand for a COCOBOD type of organization to manage the development of export crops such as shea nuts. Some crop-specific aspects would seem to be important for a board to be able to deliver the services that COCOBOD does, the offer of pan-seasonal prices being the most valued among them. The key to being able to offer the services is the ability to sell in advance of the season and borrow at low cost to finance purchases from producers. This option is not available for many export crops. It may be feasible to do it without advance sales, but it requires considerable political management.

Administered pricing, which is what may be demanded most from a board, is risky. Unless the pricing is demonstrated to be through an objective market price–related process, prices would be perceived to be a government policy, and hence governments would be under pressure to keep increasing them, at least nominally, even when export prices began to fall. While such pricing is feasible when prices are not declining, such a system may not be sustainable when prices are falling (Varangis and Schreiber 2001).

Admittedly, a board can be established with a more limited agenda. For example, merely implementing a small levy on exports or coordinating various efforts in a sector to finance research or critical infrastructure could significantly benefit the sector. Such financing of research makes sense because the research systems are starved of operating expenses (Essegbey and Asare 2014). Given the increasing demand for standards and traceability to ensure product quality and/or ethical production, boards or a board type of organization could play an important role in ensuring standards and helping sectors build a reputation for quality. Exports such as pineapples would have

benefited considerably from investment in research and efforts to maintain quality (Gatune et al. 2013). Organizational forms can vary from being either a producer or an exporter organization to a statutory organization. However, organizational capacity that is required to manage the sector is not to be underestimated. The capabilities of COCOBOD have been developed over decades.

Supporting Smallholders

The challenge in supporting smallholders is to develop supply chains that provide smallholders with access to the range of preharvest services that they require while giving them access to remunerative output markets (Dorward, Kydd, and Poulton 2005). COCOBOD does a decent job of passing on a significant share of international prices, but it needs to do a lot more to increase productivity and producer incomes. COCOBOD played an important role following the ERP in eliciting a strong supply response from producers. Aryeetey and Tarp (2000) note that the ERP policies in Ghana that focused on macro policy, liberalizing markets, and "getting the prices right" did not adequately address structural issues, so supply responses in agriculture were poor, with the exception of cocoa. While COCOBOD's service provision has been useful, it is also the area with the most potential for improvement, perhaps more than its role in producer pricing, although rationalizing service provision could result in higher producer prices.

The potential for improvement and the nature of reforms required depend on the nature of services provided. Broadly, COCOBOD provides three kinds of services: (1) public goods (cocoa research and cocoa roads); (2) private goods that are supplied free, selectively (public spraying in areas with endemic pests and diseases, or investing in swollen shoot disease control on affected private farms); and (3) subsidized private goods (fertilizers, chemicals, equipment, and planting material). Welfare-oriented programs such as the scholarship program or farmer housing schemes, the benefits of which go to a selected subgroup, would fall into the second category.

COCOBOD invests in two key public goods: research and the building of roads in cocoa-growing areas. CRIG is one the better producer-funded research organizations in Africa. Without doubt cocoa roads have contributed to cocoa growth. While there may be room for improvement in how research is managed and the roads are built, the greater need is for processes that scrutinize expenditures on the provision of private goods of both kinds.

The supply of the other two types of goods—selectively free private goods and subsidized private goods—requires more scrutiny to determine the optimum size and scope of the programs. There are three considerations: whether these goods need to be provided or farmers would be better off if given higher prices instead, whether there are more effective ways of supplying them, and a related issue, whether supply can be organized in a way that does not discourage private provision.

The assumptions underlying the rationales for various programs need to be examined, and opportunity needs to be provided for stakeholders to weigh in with their priorities so that the size and scope of the programs are related to needs rather than the availability of producer revenues that can be diverted to meet industry programs. The argument for public sprays is the externality of individual farmers not undertaking plant protection on their fields, plus concerns that farmers may not have the resources or the ability to undertake spraying. As our analysis suggests, producers do spray on their own, and one-third of the producers even take preventive action against black pod disease; a major complaint of producers is the difficult access to chemicals. Given the ineffectiveness of public sprays and the fact that farmers undertake more sprays than they receive from CODAPEC, a policy of passing on higher prices instead needs to be considered, thus limiting public action to where there may be justification for it. Policymakers need to acknowledge that public sprays have served their purpose in demonstrating the benefits of spraying and leave the activities to be undertaken privately at lower cost.

Similarly, subsidization of fertilizers is associated with intensification of cocoa production in Ghana. Whether the subsidies should be continued needs to be examined. Continent-wide, the costs of such programs have generally outweighed the benefits (Jayne and Rashid 2013). The use of fertilizers is profitable, and anecdotal evidence suggests that increased use may be constrained by supplies in some locations. In any case, there cannot be any rationale for free supply of fertilizers, particularly given the difficulties in rationing a free good. The absence of targeting and the free supply of fertilizers is hampering the development of private suppliers.

In addition to discouraging private provision, the fertilizers that COCOBOD supplies and the public sprays that it undertakes are also inadequate to meet the sector's needs. The size and scope of activities vary from year to year depending on anticipated levels of resources that can go into financing industry costs. A way needs to be found to provide resources for input supply programs—those deemed necessary and unlikely to be met by the private

sector—that are independent of producer revenues so that the size and scope of programs are based on need. The need is likely to be minimal, given that the non-cocoa crop sector is served adequately by a vibrant network of private fertilizer suppliers.

The Last Mile of Reforms

Although the cocoa sector may seem to be performing well at an aggregate level, it is based on weak microeconomic foundations: productivity is low, and because smallholders produce a small quantity of cocoa, it is not a significant source of income. Increasing cocoa productivity remains the key task in Ghana. Productivity increases are necessary to maintain cocoa's competitiveness with other crops and livelihood options. Because cocoa farming is labor intensive and full of drudgery, younger generations in cocoa households may not wish to continue the tradition. Although not discussed in this book, maintenance of forest resources is also necessary for sustaining competitive cocoa production.

The strategy is to offer an even higher share of prices to producers and to increase access to inputs at lower costs. Better genetic material, more effective inputs, and improved husbandry practices would be necessary steps in this process.

These can be achieved through the following:

1. Making cocoa pricing even more transparent, particularly to strengthen the process of determining the size and scope of industry activities
2. Streamlining and modernizing the operations of the quasi-marketing organizations COCOBOD, the QCC, and the CMC to reduce their costs and limit the scope of their operations
3. Employing the private sector wherever feasible to reduce costs and improve effectiveness

The weaknesses in governance that ail the cocoa sector are not unique to it. The mining sector is another example. Ghana has not been able to translate its mineral wealth into overall economic development because of an excessively centralized policymaking process, a powerful executive president, a system of political patronage, a lack of transparency, and weak institutional capacity at the political and regulatory levels (Ayee et al. 2011). Transparency in the management of public assets and state enterprises is low, and the executive rarely reacts as it should to poorly performing boards of state and parastatal

organizations (Ayee 2007; Gyimah-Boadi 2009, cited in Ayee et al. 2011). The institutions are not accountable downward or to parliament. Individuals are awarded prospecting and exploration licenses through administrative processes rather than through a tendering or bidding process (Ayee et al. 2011). Mining concessions and leases that have nondisclosure clauses act as barriers against accountability and transparency.

Given the situation of the cocoa sector, two measures are likely to yield greater accountability and effectiveness: increased transparency in operations and the use of the private sector to carry out certain operations where feasible, while retaining the features of centralized marketing that appear to be beneficial to Ghana. Broadly, transparency could be expected to result in better use or allocation of sector resources, and the use of the private sector would make many of the activities more efficient. Increasing transparency is something that appears in COCOBOD's strategy. We identify below some opportunities to increase transparency and effectiveness through the use of the private sector.

Workings of the PPRC

Until a few years ago—even after the PPRC started recommending producer prices and compensation for other marketing agents—how prices were determined and the fact that a budget for cocoa revenues was recommended by the committee were not public knowledge. Even now, it is not common knowledge that all cocoa activities, including the building of cocoa roads, are implemented using cocoa revenues. Cocoa finances are reported periodically by the IMF, but the reporting is not in a form that makes it easy to understand how cocoa revenues are used.

While producer prices and costs of other services are announced at the beginning of the season, the rationale for the budget and details of how it is used to carry out industry activities are not published. As noted, expenditures on industry activities often significantly exceed the budgets proposed by the PPRC. The scope of some of the activities, such as the fertilizer subsidy and CODAPEC, which have implications for private inputs supplies, are announced much later than producer prices. Publicizing a summary of the recommendations of the PPRC would make the committee members more accountable to the public, and the committee members, in turn, would demand more extensive committee deliberations and a say in determining prices and setting budgets. Additionally, the role of the PPRC should continue after revenues become known: the PPRC should deliberate on how surplus revenues should be used and whether or not they should be passed on to

producers as bonuses, put into the price stabilization fund, or spent on industry activities.

Transparent marketing

The operations of the CMC are cloaked in secrecy. There is no clarity about how it markets or the outcomes of marketing, except for the prices obtained, which are disclosed in the annual reports. There were newspaper reports of retired traders working as agents of buyers and of some personnel changes being made to reduce such conflicts of interest. There is need to examine the potential for making the CMC's operations transparent, without compromising the operations of one of the largest sellers of cocoa beans. Draft agreements between COCOBOD and local processors, for example, prohibit them from disclosing the terms to others as in the mining sector.

Using the private sector

The marketing costs incurred by the three marketing organizations could potentially be reduced by using the private sector to carry out certain functions. Even if the costs are not reduced, the marketing organizations can at least be held accountable to deliver services more effectively. There are two opportunities to consider:

SEED/SEEDLING SUPPLY

Seeds and seedlings are supplied free of cost to producers, but they rarely come free to farmers because the farmers have to incur substantial costs as a result of lengthy processes they need to go through. There is no rationale for COCOBOD through CRIG to be involved in multiplication and distribution of seeds. The raising and the supply of seedlings could be offered to cocoa producers as an enterprise to complement cocoa production.

CERTIFICATION OF COCOA AT LBC DEPOTS

Although the quality-control system pays for itself, unit costs are rising, and opportunities exist for further streamlining operations. Importantly, the quality-control system may be imposing considerable costs through delays in certification. First, because the current sampling procedures are quite elaborate, it is unlikely that they are strictly followed. It is important to explore sampling protocols that provide the same level of reliability with higher rates of compliance. Second, the current quality procedures, which require clearance at several stages in the movement of cocoa from depots to ports, and the incentives for LBCs to move cocoa quickly through the system lead to opportunities for rent seeking. The government should consider opening

up-country certification to private agencies that compete with one another to certify cocoa without delay. The traceability mechanisms that the QCC now has in place should enable the monitoring of private agencies at the district level.

LIBERALIZED BUYING

Under the existing institutions, none of the marketing costs are determined through competition. Even for licensed buyers, the margins are determined administratively. One option is to introduce elements of competition in the sector by passing on additional functions to LBCs and having them compete to deliver cocoa at the lowest cost to COCOBOD. The additional functions could be the secondary evacuation of cocoa from depots to ports, the price of which is now set administratively.

The reformed cocoa sector has been a relative success in that it has spurred production increases and improved marketing to offer a higher price share to producers. However, while centralized marketing appears to ensure that Ghanaian cocoa has better quality and thus earns a premium that pays for the quality-control costs, many of the services provided by COCOBOD are wasteful, functioning as a tax on producers that does not benefit them universally. If a private sector emerged to provide those services, farmers would be able to earn the revenues COCOBOD saves by eliminating those services. Ghana's case is interesting as an alternative solution to full market liberalization; even though liberalization is basically complete across the continent, some sectors in Ghana and other countries still have interest in marketing board arrangements. However, Ghanaian cocoa seems to be dependent on many other conditions that may not be applicable in other sectors or countries.

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Appendix Tables

TABLE A.1 Cocoa revenues and expenditures, 1996/1997 to 2012/2013

	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003
Hectares under cocoa cultivation (FAOSTAT)	1,050,000	1,074,970	1,364,530	1,300,000	1,500,000	1,350,000	1,195,000
Gross FOB/metric ton (US$) achieved	1,466	1,662	1,626	1,127	978	1,166	1,818
GH¢/US$ exchange rate achieved	0.19	0.23	0.23	0.44	0.70	0.72	0.83
Gross FOB/metric ton (GH¢) achieved	282	381	374	499	685	840	1,515
Quantity purchased (metric tons) (annual report)	322,488	409,359	397,775	436,946	389,771	340,562	496,846
Sector revenues (GH¢)							
Gross revenue (annual report)	92,332,600	147,654,000	141,857,300	228,991,500	260,964,600	327,495,100	728,562,300
Quantity sold: Exports + domestic sales (metric tons)[a]	268,200	300,350	331,050	355,750	307,075	290,509	469,442
Industry costs (expenditure on public goods) (GH¢)							
Disease/Pest Control—CODAPEC	n.a.	n.a.	n.a.	n.a.	5,835,999	30,418,718	27,813,191
Swollen Shoot Disease Control program	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Hi-Tech	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	7,500,300
Cocoa roads	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,500,000
Scholarship Fund	n.a.	n.a.	n.a.	n.a.	n.a.	500,000	1,000,000
Cost of elimination of WFCL	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Stabilization Fund	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Farmers' Housing Scheme	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tree replanting and rehabilitation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Social Security for Farmers	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Total industry costs	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**5,835,999**	**30,918,718**	**37,813,491**

Direct marketing costs (GH¢)							
Crop Finance	2,746,302	3,331,600	3,512,200	58,297,500	7,857,400	7,890,000	15,098,603
Buyers' Margin (LBCs)	8,707,176	12,969,517	14,116,613	15,931,825	24,677,385	23,653,347	57,942,134
Haulage Cost (Distribution Depots and Registration of Warehouses)	2,268,677	4,095,637	3,852,733	4,389,154	5,896,291	6,986,055	20,385,520
Storage and Shipping (Storage and Marketing by CMC)	2,472,166	1,364,515	1,403,493	1,434,750	3,608,600	4,676,600	6,543,700
Jute Sack and Related Items	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Antismuggling funds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
QCC (grading, quality control, and grants)	211,875	340,996	350,042	2,503,848	3,625,077	4,316,132	4,398,578
Scale Inspection and Phytosanitary	69,600	n.a.	n.a.	n.a.	80,000	55,634	80,000
Total direct marketing costs	**16,475,796**	**22,102,265**	**23,235,081**	**82,557,077**	**45,744,752**	**47,577,768**	**104,448,536**
COCOBOD expenditures (GH¢)							
Recurrent expenditure	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Head office	5,222,155	6,996,541	10,877,361	68,395,802	27,816,329	17,918,391	31,537,720
CSSVD	n.a.	n.a.	n.a.	n.a.	n.a.	4,590,300	5,920,000
SPU	n.a.	n.a.	n.a.	n.a.	903,975	1,569,964	3,219,855
CSD	3,284,088	2,876,011	n.a.	n.a.	n.a.	n.a.	n.a.
CRIG	647,434	881,348	1,008,239	1,563,599	2,033,825	2,435,110	4,770,326
Bunso Cocoa College	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Cocoa Clinic	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Capital expenditure	n.a.	n.a.	n.a.	n.a.	727,800	2,937,600	2,673,400
Total COCOBOD expenditures	**9,153,678**	**10,753,900**	**11,885,600**	**69,959,400**	**31,481,929**	**29,451,365**	**48,121,300**
Total marketing costs (Direct marketing + COCOBOD)	**25,629,474**	**32,856,165**	**35,120,681**	**152,516,477**	**77,226,681**	**77,029,133**	**152,569,836**

(continued)

TABLE A.1 Continued

	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003
				Payment to producers			
Producer proceeds + bonus	38,698,560	73,684,620	89,499,375	98,312,850	143,182,377	215,507,634	439,808,079
Bonus	n.a.	n.a.	n.a.	n.a.	6,945,936	4,148,219	15,791,965
Producer proceeds	38,698,560	73,684,620	89,499,375	98,312,850	136,236,441	211,359,415	424,016,114
Net balance before transfers to government	28,004,566	41,113,215	17,237,244	(21,837,827)	34,719,542	4,039,616	98,370,895
Transfers to government (duties)	26,594,250	39,048,703	20,993,100	17,881,400	29,960,000	33,526,600	78,390,300
Balance after transfers to government	1,410,316	2,064,512	(3,755,856)	(39,719,227)	4,759,542	(29,486,984)	19,980,595

	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010
Hectares under cocoa cultivation (FAOSTAT)	1,500,000	2,000,000	1,850,000	1,835,000	1,463,000	1,822,500	1,656,000
Gross FOB/metric ton (US$) achieved	1,561	1,472	1,487	1,668	2,104	2,688	2,928
GH¢/US$ exchange rate achieved	0.87	0.90	0.91	0.91	0.98	1.21	1.42
Gross FOB/metric ton (GH¢) achieved	1,355	1,325	1,348	1,513	2,065	3,252	4,157
Quantity purchased (metric tons) (annual report)	736,975	599,318	740,458	614,532	680,781	710,642	632,024
Sector revenues (GH¢)							
Gross revenue (annual report)	992,199,800	888,502,500	1,100,691,700	1,076,000,394	1,411,702,318	2,464,455,036	2,790,149,437
Quantity sold: Exports + domestic sales (metric tons)	726,652	595,434	732,717	622,714	673,219	654,060	526,760
Industry costs (expenditure on public goods) (GH¢)							
Disease/Pest Control—CODAPEC	34,100,000	44,836,384	56,400,000	106,778,607	113,438,547	123,905,205	162,565,019
Swollen Shoot Disease Control program	n.a.	n.a.	n.a.	n.a.	n.a.	15,182,859	14,093,831
Hi-Tech	13,300,000	12,525,001	n.a.	63,782,403	66,783,125	216,602,378	280,489,581
Cocoa Roads	891,500	n.a.	1,500,000	1,500,000	1,500,000	5,000,000	40,000,000
Scholarship Fund	1,200,000	1,500,000	1,500,000	1,500,000	2,000,000	2,500,000	10,000,000
Cost of elimination of WFCL	n.a.	6,700,000	n.a.	n.a.	n.a.	n.a.	2,000,000
Stabilization Fund	n.a.	n.a.	n.a.	n.a.	n.a.	19,045,000	34,172,047
Farmers' Housing Scheme	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	868,000
Tree Replanting and Rehabilitation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	35,000,000
Social Security for Farmers	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	15,000,000
Total industry costs	**49,491,500**	**65,561,385**	**59,400,000**	**173,561,010**	**183,721,672**	**382,235,442**	**594,188,478**

(continued)

TABLE A.1 Continued

	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010
Direct marketing costs (GH¢)							
Crop Finance	20,216,698	22,669,100	19,127,500	14,168,527	21,958,677	21,186,744	67,279,124
Buyers' Margin (LBCs)	77,496,273	57,875,743	79,729,246	71,833,650	90,074,290	134,607,479	162,301,831
Haulage Cost (Distribution Depots and Registration of Warehouses)	34,743,405	25,531,671	36,176,018	33,495,729	39,481,939	57,947,772	74,169,576
Storage & Shipping (Storage and Marketing by CMC)	7,884,512	6,948,700	9,875,353	9,000,000	21,304,885	39,575,174	19,027,400
Jute Sack and Related Items	4,900,000	44,500,000	8,200,000	10,500,000	14,500,000	19,702,475	19,800,000
Antismuggling funds	200,000	105,000	105,000	60,000	100,000	100,000	350,000
QCC (grading, quality control, and grants)	10,512,683	7,461,467	14,808,417	15,006,583	25,835,371	40,804,466	44,919,868
Scale Inspection & Phytosanitary	137,200	120,000	19,695	150,000	169,000	214,500	195,300
Total direct marketing costs	**156,090,771**	**165,211,681**	**168,041,228**	**154,214,488**	**213,424,162**	**314,138,610**	**388,043,099**
COCOBOD expenditures (GH¢)							
Recurrent expenditure	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Head Office	38,621,143	43,202,175	42,836,240	40,899,159	62,204,663	87,909,358	135,679,011
CSSVD	9,842,300	12,786,238	12,036,225	19,728,412	28,468,554	38,615,874	48,290,649
SPU	4,416,990	4,957,386	5,430,607	6,891,302	9,394,306	13,030,114	21,783,685
CSD	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
CRIG	5,815,029	6,197,266	7,747,055	11,065,084	18,409,562	24,080,297	25,340,423
Bunso Cocoa College	5,173,500	111,400	230,000	254,027	316,913	575,044	1,020,102
Cocoa Clinic	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Capital expenditure	1,970,700	2,874,300	6,190,847	12,271,535	6,015,912	11,726,459	43,588,574

Total COCOBOD expenditures	**65,839,662**	**70,128,765**	**74,470,974**	**91,109,519**	**124,809,909**	**175,937,146**	**275,702,443**
Total marketing costs (Direct marketing + COCOBOD)	**221,930,433**	**235,340,446**	**242,512,203**	**245,324,007**	**338,234,071**	**490,075,756**	**663,745,542**
			Payment to producers				
Producer proceeds + bonus	680,964,900	539,386,200	686,722,963	579,153,393	838,722,192	1,188,193,424	1,542,138,560
Bonus	16,119,975	n.a.	17,830,530	32,154,665	42,443,106	50,873,352	23,543,771
Producer proceeds	664,844,925	539,386,200	668,892,433	546,998,728	796,279,086	1,137,320,072	1,518,594,789
Net balance before transfers to government	39,812,967	48,214,469	112,056,534	77,961,983	51,024,383	403,950,414	(9,923,143)
Transfers to government (duties)	99,720,000	64,119,000	61,600,000	92,055,200	46,252,800	85,473,828	153,933,253
Balance after transfers to government	(59,907,033)	(15,904,531)	50,456,534	(14,093,217)	4,771,583	318,476,586	(163,856,396)

(continued)

TABLE A.1 Continued

	2010/2011	2011/2012	2012/2013
Hectares under cocoa cultivation (FAOSTAT)	1,625,000	n.a.	n.a.
Gross FOB/metric ton (US$) achieved	3,294	2,918.00	2,383
GH¢/US$ exchange rate achieved	1.42	1.7901	2
Gross FOB/metric ton (GH¢) achieved	4,557	5,338.46	4,459
Quantity purchased (metric tons) (annual report)	1,024,541	879,054.00	832,054
Sector revenues (GH¢)			
Gross revenue (annual report)	4,754,198,210	4,619,210,810	4,013,637,396
Quantity sold: Exports + domestic sales (metric tons)	923,000	878,566	912,877
Industry costs (expenditure on public goods) (GH¢)			
Disease/Pest Control—CODAPEC	104,402,721	159,852,580	72,109,000
Swollen Shoot Disease Control program	10,170,951	36,074,373	34,466,540
Hi-Tech	140,546,138	129,503,707	182,457,873
Cocoa Roads	284,000,000	n.a.	n.a.
Scholarship Fund	2,400,000	n.a.	n.a.
Cost of elimination of WFCL	2,000,000	2,352,166	51,900
Stabilization Fund	29,271,136	21,945,251	n.a.
Farmers' Housing Scheme	1,270,431	873,000	581,497
Tree Replanting and Rehabilitation	20,244,930	2,456,827	4,583,522
Social Security for Farmers	13,616,150	7,863,387	n.a.
Total industry costs	607,922,458	360,921,292	294,250,331

Direct marketing costs (GH¢)			
Crop Finance[b]	37,774,827	231,900,421	430,940,531
Buyers' Margin (LBCs)	331,711,832	311,645,884	283,317,209
Haulage Cost (Distribution Depots and Registration of Warehouses)	146,331,122	155,915,398	135,420,268
Storage and Shipping (Storage and Marketing by CMC)	46,217,045	106,214,208	128,551,276
Jute Sack and Related Items	40,036,250	29,559,615	37,671,732
Antismuggling funds	2,741,800	79,419	1,108,217
QCC (grading, quality control, and grants)[c]	64,062,640	30,504,701	60,774,151
Scale Inspection and Phytosanitary	338,099	491,864	2,631,207
Total direct marketing costs	**669,213,613**	**866,311,511**	**1,080,414,592**
COCOBOD expenditures (GH¢)			
Recurrent expenditure	n.a.	n.a.	n.a.
Head Office	82,730,121	115,070,064	119,070,064
CSSVD[d]	70,315,988	102,285,575	85,088,003
SPU[e]	23,376,635	26,825,285	30,928,587
CSD[f]	n.a.	n.a.	n.a.
CRIG[g]	33,012,688	47,474,262	36,514,512
Bunso Cocoa College	754,462	755,683	1,252,917
Cocoa Clinic	n.a.	n.a.	n.a.
Capital expenditure	35,284,328	121,482,568	49,805,000
Total COCOBOD expenditures	**245,474,222**	**413,893,436**	**322,659,083**
Total marketing costs (Direct marketing + COCOBOD)	**914,687,835**	**1,280,204,947**	**1,403,073,675**

(continued)

TABLE A.1 Continued

	2010/2011	2011/2012	2012/2013
Payment to producers			
Producer proceeds + bonus	3,340,258,030	2,993,020,538	2,738,778,440
Bonus	61,688,430	29,559,615	n.a.
Producer proceeds	3,278,569,600	2,963,460,923	2,738,778,440
Net balance before transfers to government	(46,981,682)	14,623,648	(422,465,050)
Transfers to government (duties)	148,679,011	76,000,000	40,000,000
Balance after transfers to government	(195,660,693)	(61,376,352)	(462,465,050)

Source: IFPRI/COCOBOD (2014); Kolavalli et al. (2012).

Note: CMC = Cocoa Marketing Company; CRIG = Cocoa Research Institute of Ghana; CSD = Cocoa Services Division; CSSVD = Cocoa Swollen Shoot Virus Disease; LBC = Licensed Buying Company; n.a. = not applicable; QCC = Quality Control Company Limited; SPU = Seed Production Unit; WFCL = Worst Forms of Child Labour; QCC grants from COCOBOD have been excluded from COCOBOD expenditure and included under direct marketing costs.

[a] Crop size-export plus local sales from accounts for the period 1996/1997 to 2001/2002 relate to bean exports only, excluding bean deliveries to local companies.

[b] Crop finance cost includes both global and local borrowing for cocoa operations.

[c] QCC based on QCC income and expenditures accounts from 1999 to 2009/2010. The years 1996/1997, 1997/1998, 1998/1999, 2002/2003, and 2010/2011 are estimated figures from approved PPRC figures/ton * actual crop size.

[d] CSSVD based on actual budgetary releases from 2005 to 2010.

[e] SPU based on audited accounts from 2001/2002 to 2010/2011.

[f] CSD based on audited accounts of 1996/1997 and 1997/1998.

[g] CRIG based on audited accounts from 1996/1997 to 2009/2010.

TABLE A.2 PPRC projected revenues and recommended expenditures

	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004
Projected revenues								
Predicted FOB/metric ton (GH¢)	236.25	333.50	400.95	304.18	552.50	680.20	1,386.00	1,452.00
GH¢/US$ exchange rate	0.18	0.23	0.24	0.26	0.65	0.72	0.84	0.88
Predicted FOB/ton (US$)	1,350	1,450	1,650	1,150	850	950	1,650	1,650
Predicted crop size (tons)	350,000	350,000	350,000	420,000	360,000	430,000	390,000	500,000
Recommended industry costs (GH¢)								
Disease/Pest Control	n.a.	n.a.	n.a.	n.a.	n.a.	11,000,000	24,200,000	34,100,000
Scholarship Fund	n.a.	n.a.	n.a.	n.a.	2,000,000	500,000	1,000,000	1,200,000
Stabilization Fund[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Jute Sack and Related Items	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	4,900,000
Rehabilitation/Replanting (cocoa)[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Swollen Shoot Disease Control program	n.a.	n.a.	n.a.	n.a.	12,500,000	n.a.	n.a.	n.a.
Cost of elimination of WFCL (2009/2010)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Cost of Hi-Tech (2009/2010)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Cocoa Roads	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Farmers' Pension Scheme[c]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Total	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**14,500,000**	**11,500,000**	**25,200,000**	**40,200,000**

(continued)

TABLE A.2 Continued

	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004
	Recommended shares of net FOB (GH¢/ton)							
Producer price	120.00	180.09	225.00	225.00	343.18	438.37	900.00	946.40
GoG/COCOBOD	70.65	103.30	118.40	29.23	68.94	94.10	217.23	219.46
Export duties	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Crop Finance	n.a.	4.30	7.54	0.00	17.93	19.60	30.39	27.43
Buyers' Margin (LBCs)	27.00	31.68	36.09	36.41	56.34	69.92	118.00	110.55
Haulage cost (Distribution Depots and Registration of Warehouses)	7.04	10.01	10.03	9.13	15.37	18.95	29.86	42.52
Storage and Shipping (Storage and Marketing by CMC)	7.65	3.34	3.53	3.53	9.23	10.85	16.78	10.70
Grading/Quality Control	0.66	0.83	0.88	0.88	1.17	1.50	8.85	14.26
Scale Inspection & Phytosanitary	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Stabilization Fund	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Farmers' Housing Scheme	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tree Replanting and Rehabilitation (cocoa and coffee)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Social Security for Farmers	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Total	**233.00**	**333.55**	**401.46**	**304.18**	**512.28**	**653.46**	**1,321.38**	**1,371.63**

	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
Projected revenues								
Predicted FOB/ton (GH¢)	1,307.95	1,310.80	1,365.00	1,536.40	2,599.00	3,504.00	4,686.00	5,370.30
GH¢/US$ exchange rate	0.91	0.90	0.91	0.92	1.13	1.46	1.42	1.54
Predicted FOB/ton (US$)	1,440	1,450	1,500	1,670	2,300	2,400	3,300	3,000.00
Predicted crop size (tons)	700,000	550,000	600,000	650,000	650,000	700,000	700,000	850,000.00
Recommended industry costs (GH¢)								
Deductions chargeable to FOB (budgeted)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Disease/Pest Control	44,500,000	30,000,000	46,491,223	62,051,463	80,905,705	162,565,019	104,402,721	100,190,825
Scholarship Fund	1,500,000	1,500,000	1,500,000	2,000,000	2,500,000	10,000,000	2,400,000	2,000,000
Stabilization Fund[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Jute Sack and Related Items	6,700,000	8,200,000	10,500,000	14,500,000	19,702,475	19,800,000	40,036,250	39,091,000
Rehabilitation/Replanting (cocoa)[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Swollen Shoot Disease Control program	n.a.	n.a.	n.a.	n.a.	15,182,859	14,093,831	10,170,951	2,456,817
Cost of elimination of WFCL (2009/2010)	n.a.	n.a.	n.a.	n.a.	n.a.	2,000,000	2,000,000	2,000,000
Cost of Hi-Tech (2009/2010)	n.a.	n.a.	n.a.	50,000,000	65,500,000	69,430,000	140,546,138	106,970,000
Cocoa Roads	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Farmers' Pension Scheme[c]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	7,602,025
Total	**52,700,000**	**39,700,000**	**58,491,223**	**128,551,463**	**183,791,039**	**277,888,850**	**299,556,060**	**260,310,667**

(continued)

TABLE A.2 Continued

	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
	Recommended shares of net FOB (GH¢/ton)							
Producer price	900.00	899.98	915.00	950.00	1,632.00	2,208.00	3,200.00	3,280.00
GoG/COCOBOD	153.68	139.96	122.76	133.85	288.37	310.70	317.06	372.63
Export duties	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Crop Finance	23.67	23.66	23.61	24.79	32.89	35.11	36.87	36.87
Buyers' Margin (LBCs)	96.39	105.53	116.00	127.60	189.90	250.00	304.50	342.55
Haulage Cost (Distribution Depots and Registration of Warehouses)	36.98	41.12	46.89	50.53	71.57	105.00	125.14	140.40
Storage and Shipping (Storage and Marketing by CMC)	9.24	12.14	15.00	18.00	25.25	34.00	45.11	45.11
Grading/Quality Control	12.45	15.98	28.00	33.60	46.32	53.55	62.62	62.62
Scale Inspection & Phytosanitary	0.25	0.25	0.25	0.26	0.46	0.31	0.33	0.33
Stabilization Fund	n.a.	n.a.	n.a.	n.a.	29.42	61.68	28.57	25.00
Farmers' Housing Scheme	n.a.	n.a.	n.a.	n.a.	n.a.	1.24	1.24	1.02
Tree Replanting and Rehabilitation (cocoa and coffee)	n.a.	n.a.	n.a.	n.a.	n.a.	25.99	19.76	7.22
Social Security for Farmers	n.a.	n.a.	n.a.	n.a.	n.a.	21.43	13.29	n.a.
Total	**1,232.67**	**1,238.62**	**1,267.51**	**1,338.63**	**2,316.19**	**3,107.01**	**4,154.49**	**4,313.75**

	2012/2013	2013/2014	2014/2015
Projected revenues			
Predicted FOB/ton (GH¢)	4,303.53	4,430.40	8,832
GH¢/US$ exchange rate	1.87	2.08	3.20
Predicted FOB/ton (US$)	2,300	2,130	2,760
Predicted crop size	800,000	830,000	850,000
Recommended industry costs (GH¢)			
Deductions chargeable to FOB (budgeted)	n.a.	n.a.	n.a.
Disease/Pest Control	47,420,431	41,157,996	224,000,000
Scholarship Fund	n.a.	n.a.	5,000,000
Stabilization Fund[a]	100,000,000	n.a.	n.a.
Jute Sack and Related Items	32,937,179	42,025,000	86,400,000
Rehabilitation/replanting (cocoa)[b]	n.a.	n.a.	130,000,000
Swollen Shoot Disease Control program	n.a.	n.a.	n.a.
Cost of elimination of WFCL (2009/2010)	n.a.	2,000,000	2,000,000
Cost of Hi-Tech (2009/2010)	n.a.	36,054,500	288,000,000
Cocoa Roads	n.a.	n.a.	480,000,000
Farmers' Pension Scheme[c]	n.a.	n.a.	n.a.
Total	**180,357,610**	**121,237,496**	**1,215,400,000**

(continued)

TABLE A.2 Continued

	2012/2013	2013/2014	2014/2015
Recommended shares of net FOB (GH¢/ton)			
Producer price	3,392.00	3,392.00	5,600.00
GoG/COCOBOD	297.43	262.60	354.58
Export duties	n.a.	n.a.	117.65
Crop Finance	36.87	36.06	163.08
Buyers' Margin (LBCs)	342.55	342.55	665.00
Haulage Cost (Distribution Depots & Registration of Warehouses)	140.40	137.34	224.56
Storage & Shipping (Storage and Marketing by CMC)	45.11	44.13	74.55
Grading/Quality Control	62.62	61.26	102.51
Scale Inspection and Phytosanitary	0.33	0.32	4.66
Stabilization Fund	n.a.	n.a.	93.19
Farmers' Housing Scheme	1.02	1.01	n.a.
Tree Replanting & Rehabilitation (cocoa & coffee)	7.22	7.07	2.34
Social Security for Farmers	n.a.	n.a.	n.a.
Total	**4,325.55**	**4,284.34**	**7,402.12**

Source: IFPRI/COCOBOD (2014); Kolavalli et al. (2012).

Note: CMC = Cocoa Marketing Company; CRIG = Cocoa Research Institute of Ghana; CSD = Cocoa Services Division; CSSVD = Cocoa Swollen Shoot Virus Disease; GH¢ = Ghanaian cedi; LBC = Licensed Buying Company; n.a. = not applicable; PPRC = Producer Price Review Committee; WFCL = Worst Forms of Child Labour.

[a] The accumulated amount from the Stabilization Fund since 2008/2009 was used during the 2012/2013 season to mitigate the effect of the drastic fall in FOB price on farmers, in line with its intended purpose.

[b] Rehabilitation/replanting budget in the 2014/2015 crop season is exclusively for cocoa.

[c] A special budgetary allocation under the Farmers' Pension Scheme was made in the 2011/2012 cocoa season.

TABLE A.3 Ghana cocoa quality-control processes

Where/who	Sampling	Tests/operations	Attributes tested for or developed	Action
Cocoa farm/ producer	Entire crop	Harvest mature and ripened but not overripe pods; ferment and dry cocoa as recommended; and remove foreign matter such as placenta, flat beans, and separately clustered beans.	Well-fermented and dried beans, free from foreign matter and of uniform size	Preparation for sale
Society sheds/purchase clerks	All bags presented by farmers for sale	Manual and visual inspection for dryness; isolation of bags with inferior quality; bulking of beans for uniformity, using sieves if necessary; and weighing of bags.	Well-fermented and dried beans	Sales completed and weight recorded on farmers' passbooks
Up-country depots/ Quality-control assistants	All bags in lots of 30 Samples are drawn from three sides of the overall lot of 30 bags using a sampling horn. The samples are bulked and thoroughly mixed. From this *box sample*, 100 gm of beans are sampled. The beans in the box sample are heaped and divided into four quarters. Two opposing quarters are taken out and the rest of the beans are subjected to a similar process until about *300 beans* are left. They are then put in approximately equal quantities into three sampling bags. Beans are squeezed out of the three bags sequentially to cut 100 beans if one bag is graded or 300 if two or more.	Check for moisture content using Aquaboy moisture meter and perform bean count. Cut test	Well-fermented and dried beans, free from black beans and foreign matter, and of uniform size Category and grade	Lots that do not meet the criteria are rejected. No further tests are conducted. Bags are sealed. All bags get markings to indicate the grade, the LBC, the lot number, and the inspector who graded the lot. Certificate of Inspection of Cocoa (QC form 1) is issued.

(continued)

TABLE A.3 Continued

Where/who	Sampling	Tests/operations	Attributes tested for or developed	Action
Up-country depot (prior to evacuation)/ QCC district director	If graded bags are not immediately evacuated within the waiting period, the district director can double-check grading. This may be done for about 30 percent of the produce. Sampling as before: all bags; box sample; 100 gm; and 300 beans.	Moisture test, bean count, and cut test	Dryness, category, and grade	If the results are significantly different from the certificate issued earlier, unsealing takes place. The lot is either rejected or a different category and grade are given. Evacuation Certificate (QC form 1B) is issued.
Take-over centers on arrival of truck with about 600 bags/QCC	Every bag Sampling from two sides of each bag from a lot that now consists of a truck with 600 bags; box sample; 100 gm; and 300 beans A small sample now taken for pesticide residue analysis	Moisture test and visual inspection of bags for infestation Bean count, cut test, and residue analysis	Dryness, insect infestation, and of uniform size Category, grade, and residue levels	Unacceptable lots (truckloads) are sent as *discrepant* for reconditioning by the LBCs. Otherwise, okay is given for downloading the bags. Purity Certificate (QC form 6) is issued. Cocoa Marketing Board is advised to take over the beans. Lots with different residue levels are identifiable by colored tags.
Take-over centers—prior to shipment/ QCC	Entire stock	The stocks are covered and fumigated. Fogging is done to control adult insects.	Insect infestation	Only after adequate fumigation, at least 7 days, is the stock released for shipment. If the stock is not shipped within 10 days, it is uncovered to be aerated and fumigated again, depending on the length of storage.
Take-over centers—just before shipment/ QCC	Samples taken from every bag in a lot, which now consists of a container that holds 200 bags, or 250 when poured	Moisture, bean count, and cut tests	Dryness, category, and grade	n.a.
Containers at port/ QCC	Containers	Containers are sprayed with insecticides and kept closed overnight; containers are lined and covered with craft paper if they are transported in bulk but not if transported in bags; desiccants are hung; fogging is done.	Control moisture buildup and infestation during shipment	Sealed by the shipper

Source: COCOBOD 2006.

Note: gm = grams; LBC = licensed buying company; n.a. = not applicable; QC = quality control; QCC = Quality Control Company Limited.

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After almost 20 years of declining cocoa production, Ghana has been able in the last decade to increase the share of export prices going to producers and more than double production. Contrary to Washington Consensus prescriptions, these accomplishments were achieved through reforms that did not include market liberalization.

In *The Cocoa Coast: The Board-Managed Cocoa Sector in Ghana*, the authors identify factors that have contributed to Ghana's success in cocoa production. These include the accountability of the government for the sector's performance (cocoa-sector performance being seen as a key dimension of economic management), its interest in maintaining the ability to raise funds globally as a reliable supplier of high-quality cocoa, and its policy of retaining a portion of producer revenues to promote the adoption of yield-enhancing measures. The authors also suggest how Ghana can improve the efficiency of the cocoa sector through measures such as increased transparency and curtailing services that would be better provided by the private sector. *The Cocoa Coast* will be a valuable resource for policy makers, development specialists, and others interested in different national development paths.

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