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What Does Liberalization without Price Competition Achieve: The Case of Cocoa in Ghana

Ghana Strategy Support Program (GSSP)

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Summary

The deregulation of Ghana's domestic cocoa supply chain that took place in the early 1990s was expected to bring competition among different private buyers and to generate a number of production incentives to the farmers. Most notably, it was expected that competition would emerge by means of price bonuses and/or premiums over the guaranteed price. However, this paper finds that price-based competition mechanisms did not develop in the resulting domestic cocoa value chain. Rather, the now increasing numbers of Licensed Buying Companies compete for cocoa supplies based on the provision of different services to farmers. The availability of a number of outlets offers farmers the option to choose among those that can provide cash as well as credit. The cash payment and credit for inputs offered to attract cocoa sales mainly benefit liquidity-constrained farmers, enabling them to invest in productive inputs. Since cash constrained farmers are likely to be the poorest as measured by simple welfare indicators, liberalization may be seen to have had a progressive impact on Ghana's cocoa farmers.

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1. Introduction

Since the turn of the millennium, rural Ghana has achieved an impressive growth rate, with five-year average figures of 5.5 percent and a notable reduction in the incidence of poverty (Coulombe and Wodon, 2007). The success in sustaining this continuous path of economic growth is partly ascribed to the recovery of the cocoa sector, which represents the lifeline for over 700,000 smallholders.

This paper looks at the country's domestic cocoa supply chain, representing the means by which internationally determined revenues from the export of the cash crop are transferred to smallholder producers in rural southern Ghana. Ghana's cocoa sector is particularly interesting because of its unique marketing arrangement, which combines elements of privatization with a strong government presence, which confirms the central role of the export crop in Ghana's political economy.

As in other tropical commodity producing countries, the full control that the Ghana Cocoa Board (COCOBOD), the state marketing board, had over both domestic purchases and international cocoa exports ended in Ghana in the early 1990s. (COCOBOD, however, retained a major regulatory role.) Since 1992 a number of private companies have been licensed to purchase cocoa beans from farmers alongside the Produce Buying Company (PBC), the former purchasing arm of the Cocoa Board. In the last fifteen years, the number of traders actively buying in all cocoa growing regions has increased from the initially licensed six to over twenty five (COCOBOD, 2006 internal documents).

Two major constraints, however, limit the actual margin within which these companies operate and compete with each other. First, companies only sell cocoa forward to the state

owned Ghana Cocoa Marketing Company at a given fixed price. Secondly and more closely linked to the question addressed in this paper, private buyers are licensed to purchase from farmers at a minimum price set at the beginning of the main season by the Producer Price Review Committee (PPRC).³ Taken together, this structure effectively means that all managerial decisions regarding prices (and profits) are made between an institutionally set selling price and a minimum buying price that must be offered to all producers. Thus companies cannot compete through price differentiation but rather seek a variety of other sources of competitiveness. Analyzing the consequences of this partially liberalized marketing arrangement on farmers' production incentives is the main objective of the current study.

The paper proceeds as follows. The next section provides an overview of the structure and functioning of the cocoa domestic chain in the country. Section Three illustrates the changes observed in the distribution of buying companies across three regions of largest production through a descriptive analysis of village level primary data collected in 2002 and 2004. Section Four then estimates how the present system benefits producers, as suggested by the production benefits gained through the provision of cash and, in some instances, credit. Conclusions and policy recommendations are given in Section Five.

2. An overview of Ghana's cocoa marketing system

³ The price is fixed by the Producer Price Review Committee (PPRC). This committee is made up of representatives of the cocoa farmers, licensed cocoa buyers, cocoa hauliers, Ministry of Finance, the Bank of Ghana, the Institute of Statistical, Social and Economic Research (ISSER) of the University of Ghana and COCOBOD officials. The Minister of Finance is the Chairman of the PPRC. The committee has the sole responsibility of fixing cocoa producer prices and other related rates and fees in the cocoa purchases and marketing.

There are three main actors involved in the domestic supply chain of cocoa in Ghana, as illustrated in Figure A1: the farmers; the buying companies; and the Ghana Cocoa Board (formerly known as Cocoa Marketing Board, now simply referred to as COCOBOD) who oversees all production and marketing activities of the crop.

The role of COCOBOD is central to understanding the functioning and the changes that occurred in the national cocoa supply chain over the period of reforms. Prior to 1992, COCOBOD was in full control of all operations along the domestic chain. These transactions were carried out by a variety of COCOBOD subsidiaries: 1) the Produce Buying Company (PBC), which organized purchases throughout the cocoa growing regions; 2) the Quality Control Division (QCD), responsible for the quality checks of cocoa beans at different collections points (in the villages, in depots, and in the ports, immediately before exports); and 3) the Cocoa Marketing Company (CMC), in charge of all exports.

After the sector reforms that began in the early 1990s the COCOBOD retained a prominent role in the regulation of this market. Through the QCD it is responsible for ensuring that the overall quality of the beans is kept to the high standard for which Ghanaian cocoa is renown in the world markets. Through CMC it remains, to this day, the only authorized exporter of Ghanaian cocoa.

Through the Producer Price Review Committee, COCOBOD also retained an important role in the price setting system: over the period of extended reforms, the only formal change in the process through which producer prices are set is that COCOBOD consults not only with representatives from the Finance Ministry, but also with farmers' representatives and various business groups involved in the sector. The producer price is still determined ahead of the main

harvest season and remains fixed both throughout all growing regions and within the two crop seasons.

In the structure and functioning of the internal market, COCOBOD remains responsible for issuing licenses to private purchasing companies (collectively known as Licensed Buying Companies, or LBCs) and is available to finance their operation, at the start of the season, by lending them money at slightly below market rates.

For the purposes of our discussion, it is worth considering the set of LBCs as comprising three different types of companies. First is the Produce Buying Company (PBC), the only one that is active in all villages producing cocoa. This is a requirement by COCOBOD to ensure that under the newly privatized system all farmers are granted at least one outlet for their sales, regardless of how remote they produce from the initial collection points (which are set up in the villages based on a mapping of cocoa districts). The PBC was partially privatized in 2000, when it went listed on the Ghana stock exchange.

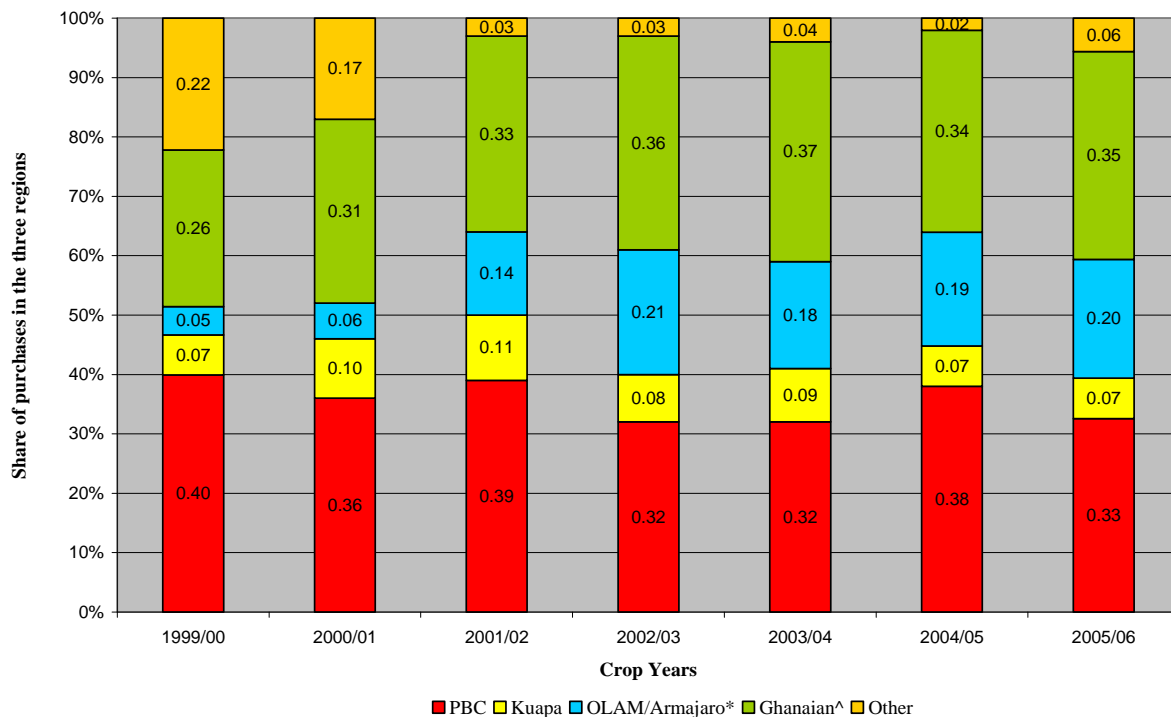
Second, since 1992, the local supply chain has become increasingly populated with a number of private buying companies. Fold (2008) provides a detailed account of how these companies operate and compete with one another across the cocoa belt. One of these is Kuapa Kokoo, which is unique in that it operates on fair trade principles, and has had an impressive geographical expansion since its foundation in 1993. One of the direct benefits that this LBC has brought about is its Credit Union scheme which has promoted the level of savings among farmers' members by enabling them to access credit at competitive rates (Commodity Risk Task Force, 2002; Tiffen et al., 2004).

Two other prominent buying companies are the foreign owned Olam (Singapore based), and Armajaro (British owned). The availability of foreign capital to Olam and Armajaro may

have put them in a slightly more advantageous position relative to other local companies, as they are less dependent on COCOBOD's financial decisions to organize their buying and transport activities ahead of the harvest season. The remaining companies are of Ghanaian origin, and a large number of these are owned by former transport groups which used to be contracted by the PBC under the previous system. One major example of this is given by Global Haulage, a former transport company now the key shareholder in all business purchases carried out by three local companies: Federal Commodities, Transroyal, and Adwumapa (Laven, 2007).

Although the total number of LBCs that have a license to operate in the internal market is relatively large (around twenty), the number of companies that are active players in the local market remains much smaller: fewer than ten purchase up to 90 percent of the harvest. Figure 1 below illustrates this point. Using aggregate data for purchases carried out in the three main cocoa producing regions in the country, this figure shows that from 2000 onwards, the PBC -- while maintaining a dominant share of total purchases in the domestic market -- has lost seven percent of this market. The two foreign owned companies have raised their position, especially since the British owned Armajaro began its operations in 2001/02.

Figure 1
LBCS SHARE OF PURCHASES IN ASHANTI, B-A, AND WESTERN REGIONS: 1999/00 - 2005/06



Source: Authors' calculation from COCOBOD statistics. Notes: *Armajaro started its purchases in 2001/02. ^The companies are: Federal Commodities, Transroyal, Cocoa Merchants (all three financed by Global Haulage), Adwumapa, and Akuafu Adamfo Marketing Co. (who started buying only in 2002/03).

The fair trade Kuapa Kokoo has maintained virtually a constant share of the market, accounting for around ten percent of aggregate purchases in these three regions. Four to five Ghanaian LBCs cover together another third of the market in equal shares. All other companies command a marginal share of the market and they often stop purchases from one year to another.

3. Buying and selling cocoa in the village

Throughout the six growing regions of Ghana there are approximately 2,700 locations where cocoa is bought by the LBCs. After harvest, farmers take cocoa to the selling point where, depending on the volume of cocoa being produced in the region, there will be at least one LBC (by mandate, the PBC is present in all villages in the cocoa producing areas) for selling cocoa.

To describe and analyze some of the features of the Ghana local supply chain portrayed above we use a dataset of 441 farmers, collected by the Centre for the Study of African Economies of Oxford University in 2002 and 2004.⁴ The survey was carried out in twenty five villages across three regions which are central for the production of the crop: Western (disaggregated into the Sefwi and Wassa areas), Ashanti, and Brong Ahafo. This geographical coverage offers an accurate and diverse representation of the major cocoa areas.

⁴ The survey was designed and first undertaken in 2002 when Vigneri was at Oxford University leading the DfID funded project "Coping with Agricultural Reforms in the 1990s: The case of cocoa farmers in Ghana". The baseline survey was replicated in 2004 with funding from the Global Poverty Research Groups by a team from the Centre for the Study of African Economies (Oxford University), with a revisit of 441 farmers from the original sample of 497.

The first two columns in Table 1 below show the geographic coverage of these LBCs. The picture which emerges broadly confirms the pattern observed in the aggregate data (Figure 1). The PBC, as it is mandated, is present in all villages in both periods. While in 2002 Kuapa Kokoo is, in terms of presence, the only close competitor to the PBC, being present in 22 out of the 25 villages, this changes dramatically in 2004, when both Kuapa Kokoo and Adwumapa are active and three other LBCs (the Ghanaian Akafo and the foreign owned Olam and Armajaro) significantly increase their geographical presence in these sampled areas.⁵

In the relatively short period of two years, farmers saw a significant increase in the number of potentially available buyers at village level, with the average number of LBCs per village increasing by almost 30 percent. At the same time, and perhaps paradoxically, as will be shown in Table 2, their choices seem to be increasingly restricted to only one buyer.

TABLE 1: KEY INDICATORS FOR MAIN LBCs: 2002 - 2004

<i>LBC</i>	<i>2002</i>	<i>2004</i>	<i>2002</i>	<i>2004</i>	<i>Main reason for choice (% farmers reporting as 1st reason)</i>
	<i>N villages where LBCs were active</i>		<i>N times chosen as first outlet</i>		
PBC	25	25	274	260	Pay cash (32%) - Accountability (20%)
Kuapa Kokoo	22	25	70	61	Pay cash (47%) - Provide credit (18%)
Olam	12	23	11	27	Pay cash (47%) - Provide credit (16%)
Armajaro	10	20	9	27	Pay cash (56%) - Provide credit (25%)
Cocoa Merchants	12	9	12	8	Pay cash (25%) - Provide credit (20%)
Federated Commodities	15	10	16	13	Pay cash (45%) - Provide credit (14%)
Transroyal Ltd.	9	4	5	3	Pay cash (38%) - Provide credit (13%)
Adwumapa Buyers Ltd.	17	25	27	28	Pay cash (42%) - Provide credit (20%)
Akafo Adamfo Mkt'ng Co.	6	23	1	10	Pay cash (45%) - Provide credit (27%)
Number of observations	25		441		

The third and fourth column show the LBCs selected by farmers as first choice outlets.⁶ The PBC comes in by far as the dominant company, accounting for more than half the sample of respondents. The successive ranking of other LBCs remains consistent with the aggregate

⁵ All other LBCs are marginally represented in the sample and were therefore not reported in Table 1.

⁶ These were reported to be the LBCs to whom farmers sold most of their production.

regional data: Kuapa Kokoo is the second most preferred buying company, and Olam and Armajaro almost triple their share of the market (in terms of being first preferred selling outlets and under the assumptions that most production was sold to the first chosen LBC). While the data are silent on quantities sold to each LBC (which would enable to measure the share of production captured by the first buyers), it includes detailed information on the reasons driving farmers' choices. This is presented in the last column of Table 1, which reports the two most frequent reasons for choosing a particular LBC given by the respondents (and their frequency) in the two years for which we have data.

Before going into a more detailed analysis of the reasons advanced by these farmers to justify their choices, and their consequences in terms of production outcomes, it is important to point out what farmers *do not* report: in no meaningful way is the payment of a price premium a reason to choose one LBC over one of its competitors. This is further reinforced by data on revenues collected in both years: the price paid to farmers is always the minimum price defined annually by the Producer Price Review Committee. In other words, although there is an increase in the presence of LBCs in the cocoa producing areas (and, one assumes, an increase in the competition for local production), such firms do not seem to use price as a strategy to compete with each other.

This structure carries two consequences. First, the position of Ghanaian cocoa farmers' along the local supply chain did not change substantially since liberalization. Just as under the monopoly of the PBC pre-1992, their capacity to affect their share of the profits generated at the traders' level is limited by the amount of cocoa they produce and by how much cocoa they supply through their sales (Besley, 1997). Second, that selection of LBCs is based on a variety of

non-price motives, chiefly among them the modality of payment (cash/ check), and the provision of other services, namely cash and to a lesser extent credit.^{7,8}

Liberalization did bring several changes to the internal market. Prompt cash payment for cocoa was by far the most frequently cited reason for choosing one particular buyer. This result is not surprising given that the alternative mode of payment, by *akuafo* (farmer) checks,⁹ is usually considered problematic to cash by farmers in the absence of nearby rural banks and difficulties to cash them in credit institutes locally available (EIU 2007; Barrientos et al. 2007) .

An additional issue to consider is the relationship between village level production, number of LBCs active and diversification of outlets chosen by farmers. As seen in Table 2, there is a positive correlation between total production of cocoa in the villages and the number of active LBCs. Areas of greater production (e.g. Western Sefwi) are those with a larger number of buying companies. This correlation points to the obvious strategy adopted by LBCs to locate buying stations in areas of greater production. The share of producers selling to only one LBC is also quite high in 2002, increasing to over 85 percent of the sampled farmers in 2004. The table also shows that no farmer sold to more than two LBCs in any of these years.

⁷ It is also possible that non-economic reasons play a role in this choice: Fold (2004, 2008), in his analysis of the behavior of LBCs points to the role played by purchasing clerks. These buying agents are typically selected under the advice of the elderly in the village, based on their ethnic, political, and religious ties within the community as these are social assets that will likely influence the selling choice of the largest farmers.

⁸ As suggested by other authors (Fold 2008, Barrientos et al. 2007), these buying companies are often not in the financial position to bear the risk of defaulting farmers as these reportedly sell to other LBCs after the harvest

⁹ The *Akuafo* (Twi for farmers') check system was introduced in the 1980s to reduce the incidence of cheating by purchasing clerks, and to promote the expansion of a rural credit network. These checks can in principle be cashed by the farmers in the local branches of national banks. However, the system has had a limited success among its users to the long distance that farmers have to travel to cash these checks and the additional incidence of liquidity problems reported in local banks.

TABLE 2: PRODUCTION AND MARKETING INDICATORS

Cocoa region	Variable	survey year	
		2002	2004
Ashanti (n obs. 112)	Average cocoa production (Kg.)	1,037	1,081
	Land under cocoa cultivation*	3.64	4.05
	n. active LBCs (village means)	3.25	3.50
	n. LBCs farmers sold to	1.37	1.16
	% farmers selling to one LBC only	0.67	0.89
Brong Ahafo (n obs. 98)	Average cocoa production (Kg.)	1,004	1,216
	Land under cocoa cultivation	4.05	4.90
	n. active LBCs (village means)	4.14	3.29
	n. LBCs farmers sold to	1.40	1.20
	% farmers selling to one LBC only	0.65	0.87
Western Sefwi (n obs. 109)	Average cocoa production (Kg.)	1,625	2,746
	Land under cocoa cultivation	6.48	7.08
	n. active LBCs (village means)	6.80	6.40
	n. LBCs farmers sold to	1.71	1.32
	% farmers selling to one LBC only	0.52	0.73
Western Wassa (n obs. 122)	Average cocoa production (Kg.)	1,388	1,698
	Land under cocoa cultivation	4.36	4.96
	n. active LBCs (village means)	6.40	6.20
	n. LBCs farmers sold to	1.34	1.07
	% farmers selling to one LBC only	0.73	0.93
Total (n obs. 441)	Average cocoa production (Kg.)	1,272	1,693
	Land under cocoa cultivation	4.45	5.26
	n. active LBCs (village means)	4.84	4.56
	n. LBCs farmers sold to	1.45	1.19
	% farmers selling to one LBC only	0.65	0.86

Note: * Median The primary unit of observations throughout this paper is the cocoa farmer. This is defined as the respondent – in the household – managing the land, and deciding on the level and allocation of labour and non-labour inputs for the production of cocoa.

Finally, we note that the PBC was reportedly chosen for its accountability, something which points to the importance that farmers attach to the reputation of the former state company. This remains a relevant attribute for farmers’ selling choices for at least two reasons: the recurrent allegations that LBCs are cheating farmers by “fixing” scales and the recurrent

allegations that LBC agents press farmers to sell wet and under-fermented cocoa to increase the turn-over of cocoa loads.¹⁰

This analysis highlights several points about the unique marketing system prevailing in Ghana. First, the deregulation in the domestic segment of the supply chain was expected to bring competition among different private buyers and to generate a number of production incentives to the farmers. Most notably, one would have expected competition to emerge by means of price bonuses and/or premiums over the guaranteed price to characterize the new marketing arrangement; and this in turn to both stimulate farmers' production supply and to increase traders' own share of the domestic market. What makes Ghana's cocoa marketing system unique is the virtual absence of any price based competition mechanism. LBC competition for cocoa supplies – a fierce one, if anecdotal evidence is to be believed – is based on the provision of different services. The next section uses a two year panel dataset to understand whether and how this hybrid marketing arrangement has been effective in the recovery of the country's cocoa sector. The analytical strategy adopted is to capture the existence of any effect of LBCs' competition on production in farmers' diverse selling choices based on whether they have received a cash payment for their cocoa.

4. Market competition and production

Growing cocoa requires the availability of cash throughout the crop season to ensure that all farming practices can be carried out in time. Although land and labor are the two key factors of production in cocoa, the use of chemicals for the control of pests and diseases, and the

¹⁰ This aspect has had detrimental effects on the quality of the beans and, ultimately, on farmers' benefits from cocoa sales given the tight control on quality still enforced by the Quality Control Division. The practice can lead to the rejection and non-payment of poorly graded cocoa.

application of fertilizer is crucial to take advantage of the production potential of the crop. As with most cash crop producers, cocoa farmers are often unable to advance cash for the purchase of such inputs or to hire additional non-family labor to work on the farm. They face serious liquidity constraints and with most of yearly income coming during the main harvest season, producers often find themselves short of cash by the time they reach the lean season, which falls roughly in the middle of the crop year.

There is no universally accepted way of defining whether a farmer is cash constrained. In this study, we define cash constrained farmers as those who do not have a bank account, since the very existence of these accounts would signal that the value of savings is high enough to overcome the transaction costs of opening and maintaining a bank account.

Table 3 presents a profile of the sampled farmers based on their cash constrained status showing marked differences across the above defined groups: farmers who are cash constrained tend to be younger, less educated and recent migrants. They consistently use less hired labor, non-labor inputs and agricultural equipment and, unsurprisingly, they produce significantly less cocoa than non-cash constrained farmers. Finally, they are also the poorest as shown by two wealth indices (the amount of land they own, and the average value of their asset score¹¹) derived from the data.

Particularly interesting is the fact that farmers who are cash constrained employ consistently lower absolute levels of all production inputs. This observation is further reinforced by a simple inspection of what loans are used for: among farmers reporting to have borrowed

¹¹ This was constructed using ten poverty predictors in line with what is suggested by the CWIQ survey, a relatively new survey instrument to collect data to proxy households' real expenditure using poverty correlates (see <http://www4.worldbank.org/afr/poverty/measuring/indicators> for a discussion of this methodology). This information was collected only in 2002.

money in the previous twelve months, the majority explained that these were used for purchasing agriculture inputs or to hire labor.

TABLE 3: A PROFILE OF COCOA FARMERS BY CASH CONSTRAINED STATUS

	<i>Non- cash constrained</i>	<i>Cash constrained</i>	<i>All Sample</i>
<i>N Observation</i>	516	366***	882
Male cocoa farmers (% in sample)	0.87	0.74***	0.82
Age	53.48	50.51**	52.25
Years of education	7.24	5.49***	6.51
Migrant (% in sample)	0.41	0.52***	0.46
Cocoa produced (kg)	1,839.56	979.43***	1,482.63
Hired labour (person/days)	369.08	183.95***	292.25
Fertilizer (kg)	186.58	77.43***	141.29
Insecticide (lt)	12.91	6.94**	10.43
Value ag equipment (2002 '000¢)	1,898	263	1,219
Investment in replanting (% in sample)	0.50	0.34***	0.43
Land owned (ha)	10.78	5.83***	8.73
Asset Score	6.35	4.76***	5.69

Notes: This table was prepared pooling across the two survey years. The asset score variable was constructed based on ten poverty predictors measured in the baseline year (2002) to capture a proxy of farming household wealth status. ** and *** indicate group differences significant at 5% and 1% respectively.

In order to explore the possible links between choice of LBC and cash constrained farmers, we revisit the information in Table 1 to illustrate if a reported difference exists in the selection of LBCs based on the liquidity status of farmers. Table 4 depicts quite a different pattern across the two groups of farmers (cash constrained and not). In 2002 there was no difference in company preference (with the exception of the PBC) by the cash constrained farmers. In 2004 this appears to be the case only for the two foreign owned LBCs: Olam and Armajaro. The choice of LBCs is largely driven by the offer of prompt cash by any LBC, with credit supply reported as the second reason for choosing a buyer. Although, as mentioned earlier, we do not have information on what share of production is sold across different buyers (when farmers diversify their sales across more than one), the descriptive evidence shown in

these tables suggests that cash constrained farmers may chose buyers based on their ability to get a full cash payment for their production and, possibly, some loan to finance productive activities. The availability of a diverse menu of outlets, offers the option to choose among those that can provide cash as well as credit.

TABLE 4:
FARMERS' FIRST CHOICE OF LBC BY CASH CONSTRAIN STATUS (%)

<i>First Licensed Buyer[^]</i>	2002		2004	
	<i>non-cash constrained</i>	<i>cash constrained</i>	<i>non-cash constrained</i>	<i>cash constrained</i>
Produce Buying Company	0.69	0.59	0.61	0.61
Kuapa Kokoo Ltd.	0.15	0.18	0.16	0.12
Olam	0.02	0.03	0.06	0.07
Armajaro	0.02	0.02	0.04	0.10
Adwumapa Buyers Ltd.	0.05	0.08	0.07	0.06
Global Haulage	0.06	0.10	0.07	0.04

Note: [^]Table shows LBCs buying from 96% of sampled farmers

TABLE 5:
TOP REASONS FOR LBC SELLING CHOICE, BY CASH CONSTRAINED STATUS

First (Main) Licensed Buyer [^]	Top two reasons for selling choice	non-cash constrained	cash constrained
Produce Buying Company	Pay promptly	0.30	0.36
	Accountability and Trust	0.36	0.31
Kuapa Kokoo Ltd.	Pay promptly	0.43	0.52
	Offer Credit	0.19	0.15
Olam	Pay promptly	0.48	0.47
	Offer Credit	0.24	0.06
Armajaro	Pay promptly	0.73	0.43
	Offer Credit	0.13	0.33
Adwumapa Buyers Ltd.	Pay promptly	0.37	0.48
	Offer Credit	0.20	0.20
Global Haulage	Pay promptly	0.29	0.48
	Offer Credit	0.21	0.04
Average across total	Pay promptly	0.35	0.41
	Offer Credit		0.13

In order to test the effects of the presence of several LBCs in these villages on production we estimate a production function model that, in addition to conventional inputs (namely, land, labor and chemicals employed) is augmented with a proxy for the level of competition among LBCs in each village, namely the number of LBCs to whom farmers sold their cocoa.

We start by estimating this function on the whole sample (Table 6, column 1). Our results suggest that, on average, selling to more buyers does affect the total level of production. There are two possible explanations for this effect. The first is that this is nothing more than reverse causality: those who produce more cocoa sell to more LBCs. We deal with this possible explanation below, by instrumenting our measure of local competition among buyers (see Table A1).

The second is that LBCs do have a real effect on production by paying in cash or by supplying inputs on credit, possibly as a way of creating loyalty relations with a set of producers. If this were true, we would expect the effect of our measure of local competition among LBCs to differ across producers, in particular as a function of how cash constrained they might be. The results are presented in Table 6, Columns 2 and 3, for farmers who are respectively cash constrained and unconstrained. The differences are clear and suggest that the channel through which competition between buyers at local level impacts on production is by relaxing cash constraints. While farmers who have a bank account (and, presumably, easier access to cash) do not seem to benefit from selling to different LBCs, that is clearly not the case for those who do not have a bank account. Our results suggest that competition, by providing additional resources to farmer, matters most where those resources were scarcer to start with, that is, the cash constrained farmers.

As we mentioned above, the results of Table 6, while clearly showing the significant effect on production of local competition among LBCs, might be biased due to the potential endogeneity of the proxy variable used, the number of companies farmers sell cocoa to across the two survey years, with respect to production. The argument here is that the number of outlets used for cocoa sales could also be a function of farmers' production, i.e. when more cocoa is harvested and brought to the villages, there is the possibility that sales must be fragmented across more companies, as not all of them will be in conditions to buy and transport farmers' production.

To account for this possibility, we estimate two alternative models. First, a two stage least squares for the model in Table 6, where we use as instruments for competition two community level variables (the presence of a bank in the village, and the distance to the closest market), and a dummy variable to identify farmers who borrowed money (regardless of their bank account holding status) in the year preceding the interview date.

TABLE 6: THE EFFECT OF MARKET COMPETITION ON PRODUCTION

	Full sample	Cash constrained	Non-cash constr'd
<i>Dep. variable is ln (kg cocoa)</i>			
N.of lbc farmers sold to	0.07* (0.04)	0.15** (0.06)	0.02 (0.05)
Ln (land)	0.53*** (0.04)	0.51*** (0.06)	0.49*** (0.06)
Log (labour)	0.10*** (0.03)	0.14** (0.06)	0.08** (0.04)
Ln (insecticide)	0.19*** (0.05)	0.19** (0.07)	0.19*** (0.06)
Ln (fertilizer)	0.06 (0.06)	0.08 (0.10)	0.06 (0.07)
Ln (r value ag equip)	0.10*** (0.02)	0.04 (0.03)	0.13*** (0.02)
Farmer years of schooling	-0.01 (0.02)	-0.04 (0.05)	0.00 (0.02)
Farmer (yrs schooling) ²	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Farmer is male	0.18** (0.07)	0.16 (0.11)	0.14 (0.10)
Age farmer	0.01 (0.01)	0.02 (0.02)	-0.00 (0.01)
(Age farmer) ²	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Ashanti	0.10	0.14	0.07

	(0.09)	(0.15)	(0.12)
Brong Ahafo	0.14	0.54***	-0.17
	(0.11)	(0.18)	(0.13)
Western Sefwi	0.40***	0.62***	0.28**
	(0.10)	(0.17)	(0.12)
Ln (rainfall)	0.69***	1.34***	0.41*
	(0.19)	(0.35)	(0.23)
Y04	-0.36***	-0.52***	-0.28**
	(0.10)	(0.16)	(0.12)
Constant	0.61	-2.64	2.23*
	(0.99)	(2.03)	(1.16)
Observations	882	366	516
R-squared	0.51	0.43	0.54

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors in parentheses. The omitted category for regional dummies is Western Wassa.

Table A1 in the appendix confirms the findings from the OLS estimates: the instrumented variable “number of LBCs farmers sold to” displays a positive and statistically significant coefficient in all three samples, the cash and non-cash constrained, and the pooled group. What is noteworthy is the size of the coefficient which is 81 percent higher for cash constrained farmers. The relevant diagnostics tests on the validity of the selected instruments (J-Hansen test), and on the consistency of the estimated variable over the one obtained in the least square regression, confirm the robustness of the set of selected instruments, and by implication of the results obtained.

The second check on our baseline regression is to estimate the least square model using an alternative proxy for competition, a set of dummy variables identifying whether farmers sold to the PBC alone, a combination of the PBC and other buying companies, or two or more LBCs (excluding the PBC). We use the latter as the omitted category for identification and present the results in table A2. Selling to a combination of the PBC and other buying companies has a positive and significantly greater effect on the production outcome of cash constrained farmers than both selling to the PBC alone (as reflected in the size and significance of the included regressor) and to one or more buying companies (but not the PBC). This result highlights once

again the benefits of the present marketing system: access to full payment and possibly credit advances enhances the production potential of those who are financially constrained.

5. Conclusions

The cocoa marketing system prevailing in Ghana has been the subject of a large debate on *whether* and *how* the combination of full liberalization (for domestic purchases) and state control (for all exports) have affected the large share of smallholders engaged in the cultivation of the tree crop.

This paper discusses which elements of the present domestic marketing system have provided positive production incentives to the farmers: the provision of cash and credit services to relax production constraints for the many producers facing liquidity problems. Although the data used in this analysis do not look at how actual contracts for the purchase of cocoa take place (or at the exact modality of the bargaining process between buying agents and farmers), our empirical investigation adds to what is known about the local cocoa supply chain in Ghana on three different levels. First, we show that the major change that has taken place in Ghana cocoa marketing system has primarily involved private buyers' ability to enter the domestic segment of the chain, and make a profit between buying (from the farmers) and selling to the state through the licensing system. This competition is based on volumes of production, with no major changes on how producer prices are set, with limited direct impact on farmers' profit margins.

At a second level the paper discusses the role of the licensed buying companies: who are the main ones, what services they provide to attract farmers' selling choices as reflected in the number of companies chosen and how farmers choices have changed over time. Using a unique

panel data set on production and marketing choices, we show how LBCs map out in the growing areas, and discuss which ones capture the majority of the market and how.

Thirdly, we estimate a production function model on sub-samples of credit and non credit constrained farmers to show that competition seems to have a positive effect on the production level of those farmers who are cash constrained, something that we attribute to the existence, post-liberalization, of ready cash payments and occasional credit extended by LBCs. This seems to be one unambiguous benefit to farmers from partial liberalization. The descriptive data suggest that cash constrained farmers are likely to be the poorest as measured by simple welfare indicators. Based on these initial results, we therefore conclude that the current cocoa marketing system in Ghana has to some extent succeeded in promoting pro-poor policy incentives.

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