

COCOA AND FORESTS: SMALLHOLDER INCENTIVES IN
SUSTAINABLE COCOA PRODUCTION

By

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A thesis submitted in partial fulfillment of
the requirements for the degree of

Master of Science

(Geography)

at the

UNIVERSITY OF WISCONSIN-MADISON

2019

Acknowledgements

First, many thanks to my advisors, Dr. Matt Turner and Dr. Lisa Naughton, for all your support and the many hours spent talking through ideas, data, and drafts. Thank you to my committee member, Dr. Holly Gibbs, for providing valuable insight into supply chains, zero deforestation agreements, and working at the interface of policy and science. I'm so grateful to the members of the BIG lab for providing feedback throughout this project and listening to the many iterations of my defense presentation.

This work would not have been possible without the invaluable assistance of my in-country partner, The Forest Trust (TFT). Thank you to Gerome Tokpa, N'Doli Joël Paterne Boko, and the rest of the team for teaching me about cocoa in Cote d'Ivoire, connecting me to industry contacts, and introducing me to the villages where you work. Thanks is also owed to the many villagers who welcomed me into their homes and took time out of their day to answer my questions; I learned a great deal from you all. To Yapo Franck Kouassi, who assisted with the entirety of the data collection, I cannot thank you enough for helping me navigate cultural nuances and for assisting with so many aspects of the data collection, from transportation logistics to the household survey.

Finally, this research was supported through the generosity of Waxman Strategies, the Institute for Regional and International Studies (IRIS) Graduate Summer Research Travel Grant, and the UW-Madison Geography Department's Trewartha Research Award. My sincere thanks for making this work possible.

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Chapter 1 Introduction to Cocoa as Livelihood Strategy in Côte d'Ivoire

I. Introduction

Côte d'Ivoire is the world's largest cocoa producer, contributing 39% of the global supply (Food and Agricultural Organization of the United Nations 2017). The cocoa boom of the mid-twentieth century is credited with boosting the country's economy and spurring development (Moseley, Carney, and Becker 2010), but this rapid economic growth came at a significant environmental cost. Cocoa cultivation is linked to deforestation (Ruf 2001, Norris et al. 2010, Barima et al. 2016), and has contributed to severe loss of forest cover in Côte d'Ivoire since 1960, from 12 million to 3 million hectares today (EU REDD Facility 2017). Deforestation is of particular concern for the rich biodiversity of the Guinean Forest ecoregion of West Africa (Myers et al. 2000). The Guinea Forests in the southern half of Côte d'Ivoire geographically overlap areas of cocoa production, and research has demonstrated a strong connection between primate extirpation and cocoa cultivation (Bitty et al. 2015). However, the risks to biodiversity vary among cocoa cultivation systems; dynamic agroforestry systems with closed canopies pose less of a threat than full-sun or open canopy cultivation, for example (Siebert 2002). Furthermore, much cocoa sourced from Côte d'Ivoire is grown illegally in protected areas (Higonnet, Bellantonio, and Hurowitz 2017, Barima et al. 2016), in part the result of migrant farmers being displaced and forced to find new land during the civil war (Fountain and Huetz-Adams 2018). Together, these factors have contributed to international concern over the environmental consequences of cocoa cultivation in the region.

Faced with growing evidence of the risks to forests and forest species linked to cocoa, individual chocolate companies are turning to third-party certification programs to ensure that their cocoa is sourced sustainably (e.g. Nieburg 2017a, Unilever 2018). These programs stipulate a set of conditions to which certified producers, agricultural cooperatives, and buyers must adhere, in order to market their products as “certified”. Depending on the certification standard, provisions typically include a combination of labor condition standards and environmentally friendly agricultural practices. The most popular certification programs that cover cocoa in West Africa are Fairtrade International, Rainforest Alliance, and UTZ (Lernoud et al. 2017), the latter two particularly emphasizing ecologically sustainable cultivation (Sustainable Agriculture Network 2017, UTZ 2015).

Furthermore, in November, 2017, efforts to sustainably reform the cocoa sector were intensified when a large group of cocoa suppliers and chocolate companies agreed to a joint “Cocoa and Forests Initiative” with the national governments of Côte d’Ivoire and Ghana, aimed at preventing the cocoa they buy from being implicated in additional deforestation (McCoy 2017). As of May 2019, a total of 33 companies have now signed on to the agreement – joining the likes of Cargill, Mars, Mondelez, Nestle and Hershey – along with the government of Columbia. Up to this point, many cocoa companies had developed individual or small multi-company initiatives to address things like sustainability, farmer income, supply chain transparency, and child labor¹. A joint initiative by multiple national

¹ Examples include a multi-company collaboration called Cocoa Life (<https://www.cocoalife.org/>), the Cargill Cocoa Promise (<https://www.cargill.com/sustainability/cargill-cocoa-promise>), and Barry Callebaut’s Cocoa Horizons Program (<https://www.cocoahorizons.org/>).

governments and a number of large companies representing a significant portion of global market share is unprecedented in the cocoa industry.

This voluntary agreement was patterned on prominent commodity exercises elsewhere in the tropics, for example Brazil's soy moratorium and the zero deforestation cattle agreement or "cattle ban" in Columbia and Brazil (Gibbs et al. 2015, Gibbs et al. 2016, Nepstad et al. 2014, Silva et al. 2017). Companies signing on to these commitments agree to no longer purchase commodities grown or produced in newly deforested areas. Like these other policies, the Cocoa and Forest Initiative relies on a combination of satellite monitoring and supply chain tracing to enforce compliance. It also contains provisions for agroforestry programs as a mechanism for re-greening deforested areas and mitigating the environmental damage associated with cocoa cultivation (Donwahi 2017, Amewu 2017).

Policies like third party certification and zero deforestation commodity agreements rely on producer compliance with specific agricultural practices and selling arrangements. However, decisions both about cultivating cocoa trees and selling cocoa beans are likely mediated by a variety of complex constraints beyond those promulgated by certification or commodity agreements, including, but not limited to, land tenure security, social relationships, ecological considerations, education and information transfer, and financial incentives.

To understand the potential impacts of certification policies and commodity agreements, an in-depth understanding of the on-the-ground realities that would impact policy adoption and implementation is essential. While some studies have quantified the factors associated with specific policy components like agroforestry adoption in cocoa systems (see, for example, Atkins and Eastin 2012, Gyau, Smoot, Kouame, et al. 2014), our

knowledge of the complex incentive structure in which planters operate and make decisions affecting fields and forests remains incomplete. This present work improves our understanding of decision-making by smallholder cocoa producers within areas where certification programs operate by taking a mixed-methods approach involving field surveys and in-depth interviews of planters and other supply chain actors.

In this introductory chapter, I provide background information on the history of cocoa production in Côte d'Ivoire and describe the study area. I also provide some preliminary results on land access and tenure systems, land use history, and cocoa production to contextualize cocoa as a livelihood strategy in the region. Chapter 2 will then explore selling behaviors and patterns at the farmer level and answer questions of farmer decision-making and factors associated with cooperative membership. In Chapter 3, third-party cocoa certification programs are analyzed, specifically in the context of agroforestry practices. Results will be presented summarizing current agroforestry practices and how these are shaped or not by certification requirements.

Background

Cocoa cultivation began in southeast Côte d'Ivoire in the early 1900's. During the colonial period, land appeared abundant in the sparsely populated colony, and so land use did not incite conflict between French colonists and local communities (Woods 2003). Instead, labor was the major production bottleneck, especially during the post World War II labor shortage (Woods 2003), and thus colonial authorities implemented policies that favored immigration to the cocoa growing regions as a source of labor (Chauveau and Colin 2010). French authorities encouraged the provision of land to migrants under the customary "tutorat" long-term transfer system, wherein the recipient owes a debt of gratitude to the

“tuteur” in the form of gifts after a harvest or in recognition of a family event like a funeral. In theory, this relationship of social obligation is maintained between the tutorat family and immigrant family through subsequent generations (Chauveau and Colin 2010, Colin and Ayouz 2006). Over time, these transfers of land rights from land-controlling chieftaincies to immigrants became increasingly monetized, blurring the line between customary transfer and land sale (Bassett 2009, Chauveau and Colin 2010). Though in Bété²-dominated areas, selling forest (in addition to traditional tutorat transfers) has historically been more common than in many other parts of the country, where such sales were reported to be rare (Colin and Ayouz 2006, Köbben 1963). Furthermore, land sales among the Bété reportedly incited less conflict historically than in areas where land was scarcer, like Divo and Aumé, further east (Stavenhagen 1969).

When President Houphouët-Boigny came to power at independence in 1960, he continued to encourage migrant participation in cocoa production, claiming, “the land belongs to those who cultivate it” (Crook 2001, p.37). The state enacted policies encouraging expansion of and investment in cocoa production, and often favored migrants in tenure disputes, at the expense of autochthone populations (Crook 2001, Woods 2003). As competition over scarce land escalated, so did conflict between local Ivorian farmers and migrants, both from other regions of Côte d’Ivoire and outside countries, like Burkina Faso, Mali, and Niger (Woods 2003, Amanor 2005). Hostility towards “outsiders” and an emphasis on defining the concept of “Ivoirité” incited and perpetuated conflicts for several decades,

² Bété are part of the Kru, or Krou, ethno-linguistic group in southwest Cote d’Ivoire. They are considered the original inhabitants, or “autochtones” in the study area, and control land access and land transfer. More information is provided below in *Study Area*.

which factored into subsequent presidential elections and the eventual civil war in 2002 (Crook 2001, Chirot 2006). In addition to inciting ethnic conflicts, competition over land drove cocoa cultivation progressively westward during the mid-century cocoa boom as land became scarce in the original cocoa-growing areas (Ruf, Schroth, and Doffangui 2015, Woods 2003, Crook 2001).

Issues of land access remain critical in the Ivorian context, shaped in part by the legacy of French colonization and migration. And while the country has experienced relative political stability over the last seven years, questions of land tenure remain fraught and growing land scarcity continues to push those looking to establish a new cocoa plantation into new areas, in search of available forested land. As a result, most new cocoa plantations today are established in the western part of the country, where much of the remaining forest is found. Decisions of how (dynamic agroforestry systems versus full-sun cocoa) and where (newly cleared virgin forest or land previously cultivated) to grow new cocoa will have important implications for biodiversity in the remaining forest patches.

II. Study Area

This study was carried out in the department of Soubré in the Nawa region of southwest Côte d'Ivoire. This region falls within the third of three historic "cocoa belts," where the majority of cocoa farms were first established in the 1980s as production pushed progressively westward (Bros, Desdoigts, and Kouadio 2018, Pokou et al. 2008). This area was selected because Soubré produces more cocoa than any other department in the country: 28% of total production (Kouamé 2010). The department has a higher population density than the national average (97 km² and 71 km² respectively in 2014) (Institut National de la

Statistique Cote D'ivoire 2014, United Nations 2017), due to the influx of migrants to cultivate cocoa, and the city of Soubré is major hub of cocoa storage and transport to coastal exporting cities (Gyau, Smoot, Kouame, et al. 2014).

Data collection was conducted in two villages in the department of Soubré: Baleyo and Dobré. Baleyo, a small village comprised of approximately 200 households, is 5km from the city of Soubré. Dobré is a larger village – approximately 2,000 households – 35km southeast of Soubré on the border of the protected Niègre Classified Forest (figure 1). On the outskirts of Dobré is a small hamlet called Agnikro, which was also included in the study. Agnikro is composed of about 50 households of cocoa planters who were expelled from the 1000 km² classified forest in the mid-2010s by Société de développement des forêts (SODEFOR) agents. Expelled planting families established or joined encampments like Agnikro just outside the border and continue to cultivate existing cocoa fields within the classified forest, but are not permitted to establish new cocoa plantations there. Because Dobré and Agnikro border a patch of forest, cocoa fields in this village territory have more remnant forest trees than Baleyo, which was more completely cleared of primary forest during the coffee and cocoa booms of the past several decades.

Within the study area, cocoa farmers have the option of selling through an agricultural cooperative or selling to a middleman, called a “pisteur”, who is licensed by the Conseil du Café-Cacao (CCC) and buys on behalf of a downstream buyer. The village of Baleyo has one agricultural cooperative and three consistent pisteurs, two of whom sell to the same buyer. There are also a number of other pisteurs who pass through and occasionally buy cocoa from Baleyo on their way back to the city of Soubré from other villages. In Dobré, a much larger village, there are approximately a dozen agricultural cooperatives and a number

of pisteurs for different buyers. However, only one village cooperative was established by a group of farmers. The rest are simplified cooperatives, or “coopératives simplifiées”, that achieved cooperative status as a part of a series of reforms to cooperative structures (see Chapter 2 for more detail). There are no cooperatives in the encampment of Agnikro, so inhabitants sell their cocoa to pisteurs, many of whom also work in Dobré.

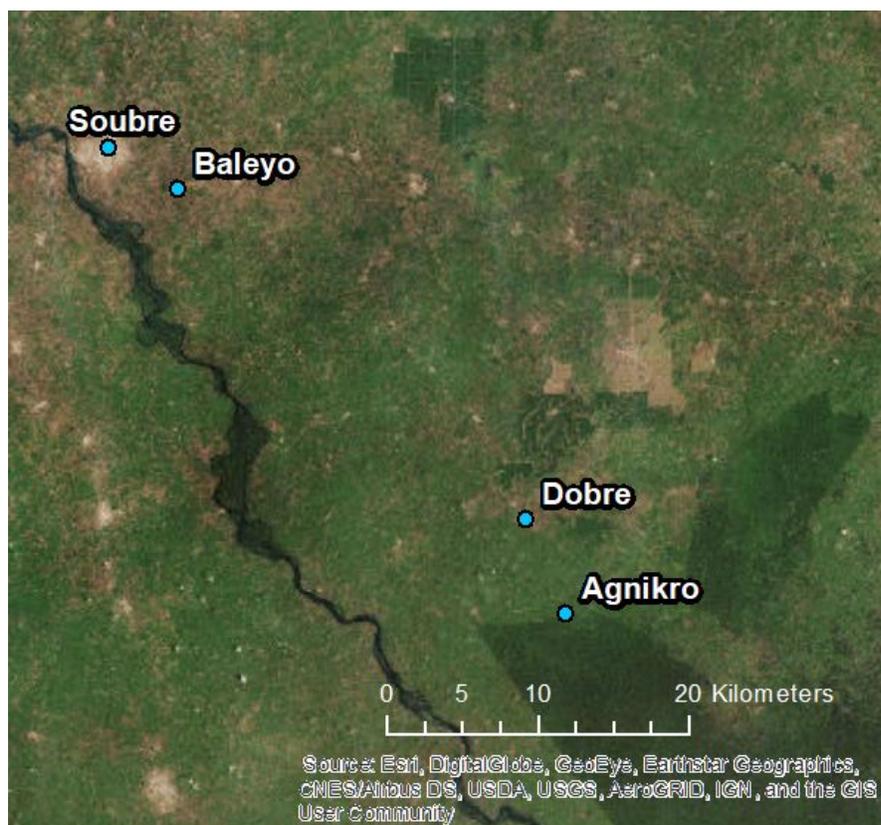


Figure 1: *Satellite image of study area*

Côte d’Ivoire is culturally diverse and boasts over 60 ethnic groups (Bah 2010), due in part to a history of policies encouraging migration as a source of labor and investment in cocoa’s expansion (Bros, Desdoigts, and Kouadio 2018, Chauveau and Colin 2010, Crook 2001, Woods 2003). In Baleyo and Dobré, the original inhabitants or “autochtones” are the Bété (figure 2), but the villages are comprised of a diverse mix of people representing all of the major cultural clusters of Côte d’Ivoire: Voltaïque/Gur, Northern and Southern Mandé,

Akan, and Krou (Bah 2010, Launay and Miran 2000). The most common ethnic subgroups present include Baoulé, Senoufo, Lobi, and Odienneka (table1). There is also a large presence of individuals from other countries: Burkina Faso, in particular, but also Benin and Mali. The hamlet of Agnikro is an exception in that while Agni people originally established the eponymous encampment, today all villagers are Baoulé.

Bété	Original inhabitants of the area, or "autochtone", and serve as "tuteurs" in customary land transfers. The largest subgroup of the <i>Krou</i> people of Southwest Côte d'Ivoire
Baoulé	Largest subgroup of the <i>Akan</i> people, found primarily in Central and Eastern Côte d'Ivoire
Senoufo	Found primarily in North Central Côte d'Ivoire, the Senoufo are part of the <i>Gur/Voltaïque</i> group found in northeast Côte d'Ivoire
Lobi	Originating in Ghana, this subgroup of the <i>Gur/Voltaïque</i> , is today found in northeast Côte d'Ivoire as well as parts of Burkina Faso
Odienneka	Includes individuals from Odienné in northwest Côte d'Ivoire. Part of the <i>Mandé</i> group.

(Launay and Miran 2000, Bah 2010, Abdoulaye et al. 2016)

Table 1: Table of major ethno-linguistic subgroups represented in the study villages

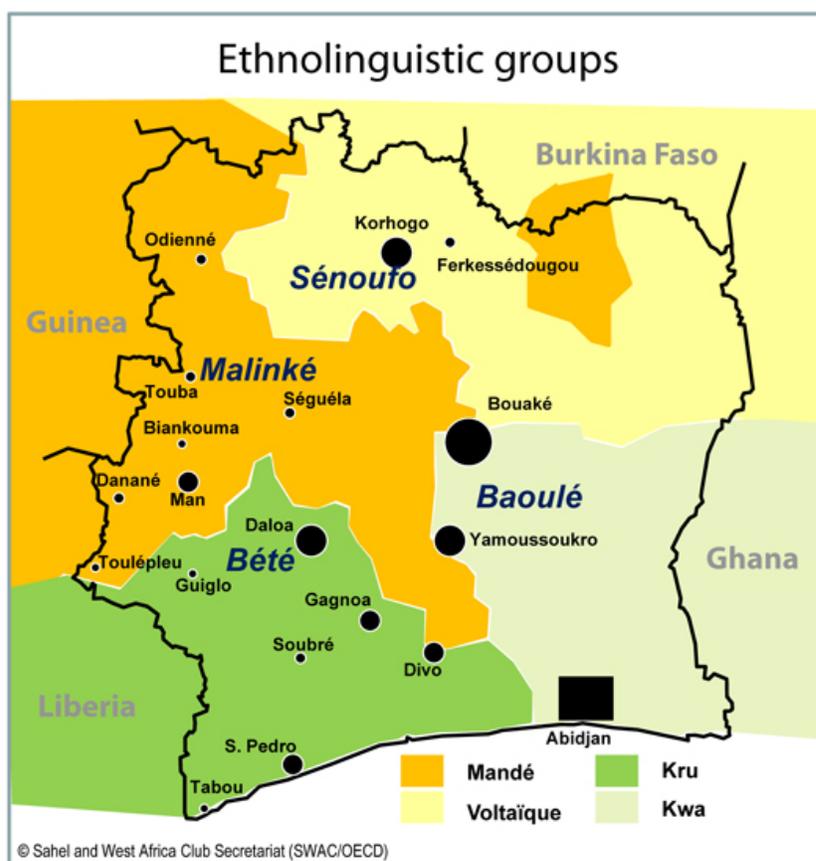


Figure 2: Map of major ethno-linguistic groups in Côte d'Ivoire (OECD n.d.)

III. Methods – Data Collection

This study employed a mixed methods approach to identify the motivations driving cocoa planters' selling behavior and land management decisions, and to document supply chain dynamics at the village level. Data were collected in the two villages and one encampment in the region of Soubré in southwest Côte d'Ivoire during a 6-week period in June and July of 2018. Field research activities included group interviews, individual interviews (both of planters and key informants), and a household survey. A local research assistant, Yapo Franck Kouassi, helped conduct interviews and facilitate communication.

Interviews were generally conducted in French except in cases where subjects were more comfortable expressing themselves in Baoulé. In these instances, local translators were used.

Group interviews: Five group interviews were conducted during the first month of data collection: three in Dobré, one in the encampment of Agnikro, and one in Baleyo. These interviews were less structured than individual interviews and provided multiple perspectives on important themes in cocoa production in each village. Topics covered include historical background information on the village, the evolution of local commodity cultivation, buying and selling patterns in the village, and changes in agricultural practices over time.

Semi-structured individual interviews: Semi-structured interviews were conducted with 46 planters to understand their decision-making in relation to their personal supply chain relationships and cocoa cultivation strategies. Interview subjects included both planters who were members of agricultural cooperatives and those who sold to middlemen “pisteurs”. Each interview lasted between 45 and 90 minutes and covered both previous and current selling patterns, personal engagement with cooperatives and/or pisteurs, certification programs, and agroforestry practices. Farmers were interviewed either in their fields or in a private location in the village, typically the courtyard of their home.

An additional 16 key informants were interviewed to supplement the information gained from farmers and to add the perspective of supply chain actors directly downstream from individual planters. Key informants included five pisteurs, three “délégués” and “producteurs relais” (individuals employed by cooperatives to work with planters and transport cocoa), one certification label employee, seven cooperative representatives and two union of cooperative representatives. These interviews were less structured than those with farmers due to the diversity of informant roles and company structure and lasted between 30

and 60 minutes. Topics covered included the areas where cocoa is purchased, relationships with and services provided to farmers, certification programs, monitoring, and downstream selling behaviors.

Household survey: In the village of Baleyo, a 15-20 minute survey was conducted with heads of households that cultivate cocoa. The survey was not conducted in Dobré or Agnikro due to logistical constraints. Because several pisteurs were unwilling to provide names of planters from whom they purchase cocoa, it was not feasible to conduct an exhaustive survey of all cocoa-growing households in the village. As a result, households were selected using a combination of lists provided by willing cocoa buyers and through snowball sampling. 125 planters were surveyed out of approximately 200 households in the village. The survey included questions on whether or not farmers were members of cooperatives, whether they were certified, and how their selling behaviors had changed over time. Surveyed planters were also asked to describe the positive and negative aspects of their current selling circumstances. Finally, farmers were surveyed on their number of cocoa fields, total hectares of cultivated cocoa, and numbers of fruit and forest trees on each cocoa field.

IV. Results

Land History, Access, and Transfer

Migration Timelines and Arrival Patterns

Group interview participants reported that cocoa first appeared in the region in the late 1950s, but that cultivation began in earnest in the 1980s, replacing coffee as the region's (and country's) major crop. The arrival dates of individual interviewees suggest that there has

been a constant influx of people of various social groups to the area since the 1970s and 1980s with a slight decrease in immigration in recent years (figure 3). Bété people are the original inhabitants, or “autochtones” of the villages (except Agnikro, as described above) and therefore the large majority of Bété respondents reported being born in the village, compared to individuals of other social groups who arrived later. Many of those not born in the study villages reported coming to the area in search of forest to grow cocoa. These results also indicate that there were two major waves of immigration into the study area during the cocoa boom: first the Baoulé followed by the Burkinabé and migrants from Northern Côte d’Ivoire. The later waves may have been influenced, at least in part, by the civil war.

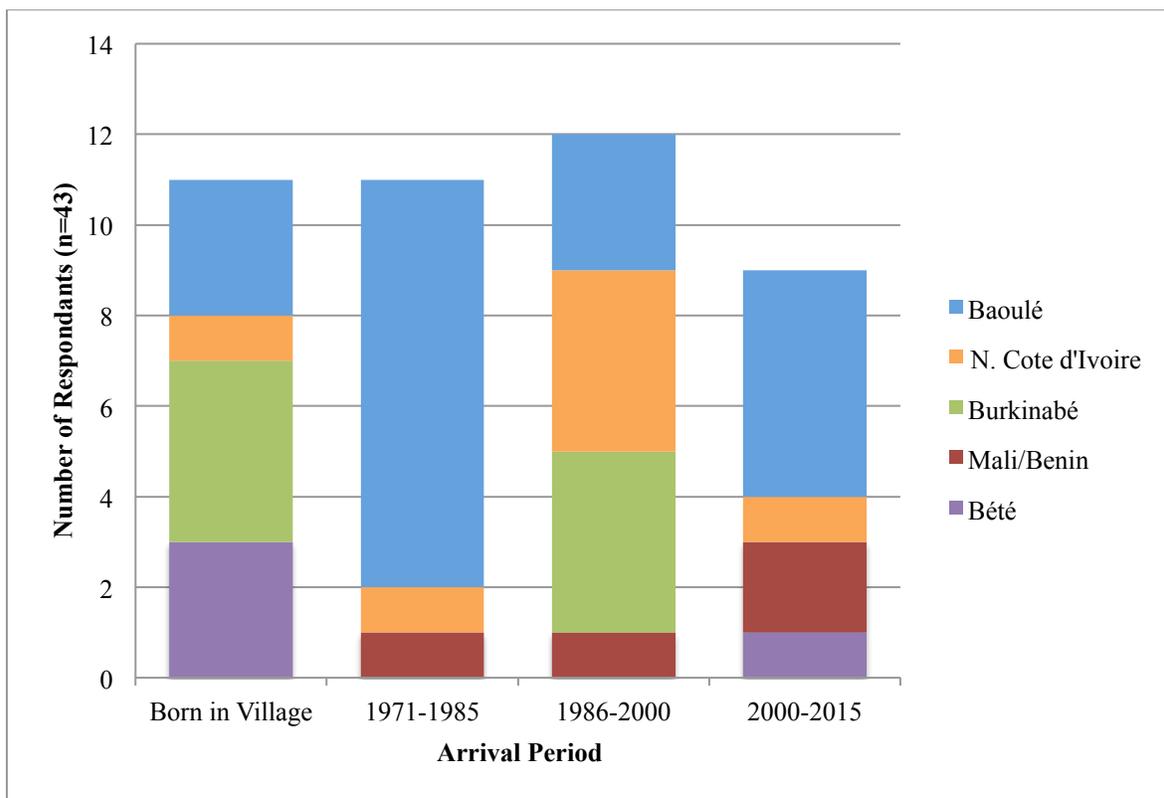


Figure 3: *Year of arrival to study villages by social group*

Land Acquisition and Conversion to Cocoa

The average year of the original forest clearing of existing cocoa fields across the three study villages was 1990 (range of 1970-2013, with a median year of 1990.5), based on 69 fields from the individual interview data. Most were converted directly to cocoa, though just over 13% of cleared forest patches were converted to rice and/or coffee before being planted with cocoa (8 of 61 fields for which the original crop could be established). Group interview participants explained that incoming migrants acquired land as part of a customary long-term transfer wherein a Bété landlord, or “tuteur,” granted a piece of land to “allogène” newcomers. In exchange, the recipient would give the tuteur gifts of gratitude like alcohol; this reciprocal social relationship is heritable and maintained by subsequent generations of the tuteur and recipients’ families. While traditional “tutorat” relationships relied on gifts in exchange for land access, interviewees noted that over time these transfers have become increasingly monetized. They acknowledged that sharecropping did occur, but that it was less common than the customary tutorat system.

Individual interviews with farmers confirmed the trends described in group interviews. The number of fields established through monetary purchase has been increasing, particularly since the 1990s, while the number of exchanges based on a tutorat relationship has declined (figure 4). In addition to transfers becoming increasingly monetized, respondents report that patches of forest cleared for cultivation have gotten smaller over time (figure 5).

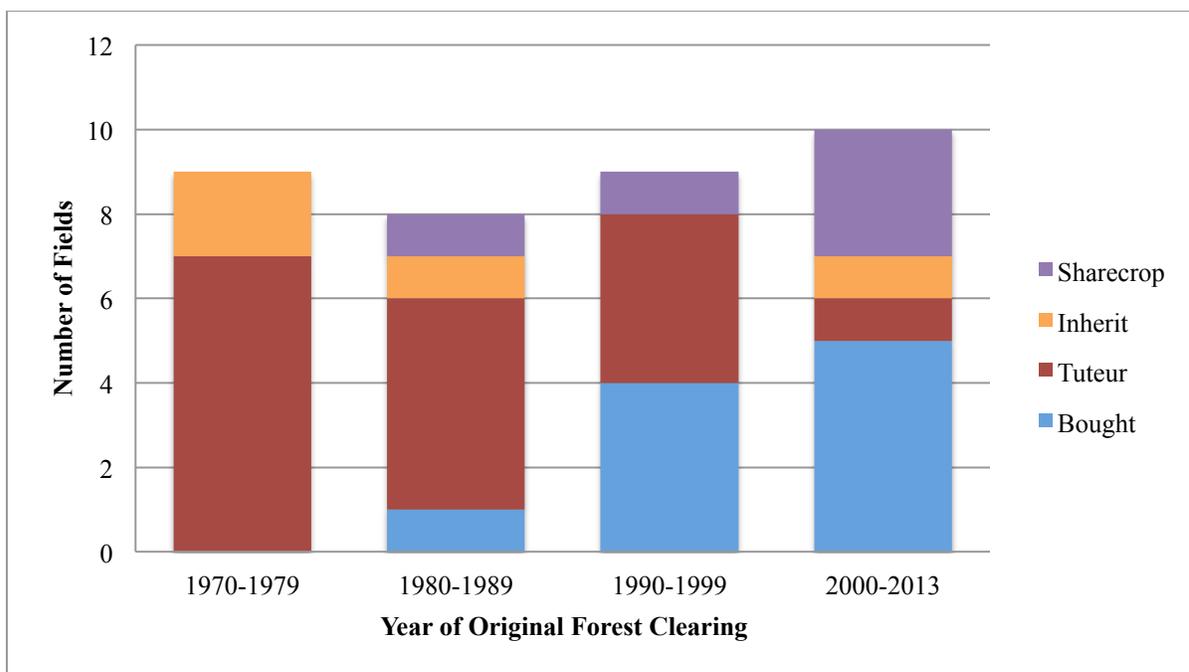


Figure 4: *System of land transfer from forest to agriculture (cocoa, coffee, or rice)*

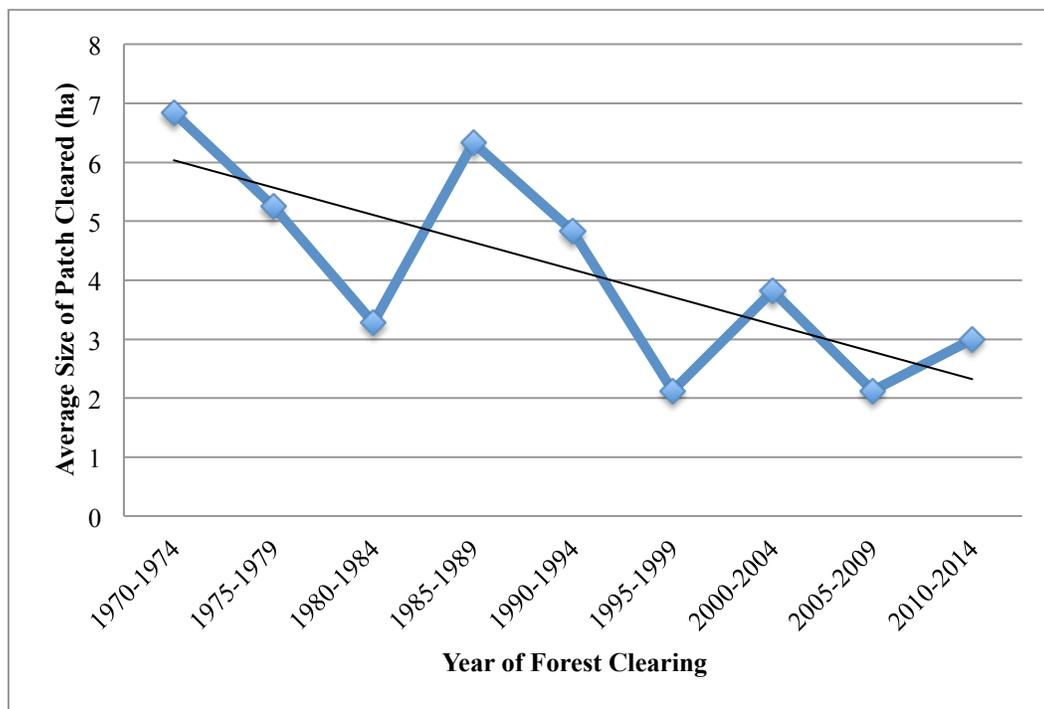


Figure 5: *Average size of forest patches cleared in 5-year periods*

Landholdings

Planters have an average of between 3 and 7.5 hectares dedicated to cocoa, which varies both by village and social group. Farmers have more land on average in Dobré and Agnikro than in Baleyo, based on interview data (table 2).

	Total Hectares Cocoa		
	Average	St. Dev.	Count
Baleyo	2.99	1.84	13
Dobré	6.07	3.71	22
Agnikro	7.45	2.95	11
Total	5.53	3.44	46

Table 2: Average land planted in cocoa per household reported in interviews

The survey found similar cocoa land holdings per household in Baleyo, the only village in which it was conducted: 3.21 ha for surveyed planters (n=125) compared to 2.99 ha from interviews (n=46). Based on the Baleyo survey, the Bété on average have the most land dedicated to cocoa (over 4 ha compared to the survey average of 3.21 ha), followed by the Burkinabé, who have a large presence in both villages (table 3). These two groups also have the oldest average cocoa trees on their existing plantations.

	Total area of cocoa fields (ha)		Avg. age of cocoa plantation (yrs)	
	Avg	St. Dev.	Avg	St. Dev.
Bété (n=26)	4.35	3.77	16.60	8.84
Etranger (n=11)	2.45	1.01	14.82	4.09
Burkinabé (n=35)	3.23	1.60	16.80	6.95
N. Ivorian (n=24)	2.88	1.87	11.67	4.76
Baoulé (n=29)	2.74	1.54	12.69	7.25
	3.21	2.29	14.63	7.13

Table 3: Landholdings and age of cocoa trees by social group

Cocoa as a Livelihood Strategy

Cocoa as an Income Source

Cocoa is the primary source of income for planters in all study villages. All but one farmer interviewed listed cocoa as the most important source of household income (for the farmer that did not, kola was first, cocoa was second). Other important livelihood strategies include cultivation of oil palm, manioc, and rubber. Interviewed farmers reported earning between 140,000 and 3,500,000 cfa from cocoa production last year, with an average of just over 1,200,000 cfa³.

The Future of Cocoa

Nearly all farmers described problems with declining production due to exhausted soil, aging trees, and pests. To understand the evolving importance of cocoa as a livelihood strategy as production declines, interviewed farmers were asked two questions (table 4): 1) What will you do once your cocoa trees are no longer productive (i.e. replant cocoa or something else on this field)? and 2) Can cocoa be replanted on fields where it was grown previously? Of the 46 interviewed, 26 were likely to replant cocoa, while 16 reported an intention to plant another crop, typically oil palm or rubber, both of which arrived in the mid to late 90's and have grown increasingly popular in recent years. Four didn't yet know what they'd do, suggesting they'd wait and see what crops were selling well at the time of replanting. Of those replanting cocoa, one farmer explained that it's easier to cultivate than something like rubber, because you can harvest cocoa yourself. Another farmer planning to continue cultivating cocoa specified that he'd plant a new variety produced by the Centre National de Recherche Agronomique or National Center for Agricultural Research (CNRA),

³ As of June 10, 2010, 1 USD = 586.50 cfa. 1,200,000 cfa equates to just over 2,000 USD.

which reaches productive age more quickly and produces higher volumes. Those not planning to replant cocoa voiced this same concern over production volume. In fact, one farmer explained that he'd plant oil palm because it takes less investment than cocoa, but that if he had the money, he'd replant CNRA cocoa instead. Several planters described being unable to replant cocoa because the soil was no longer fertile or contained pests like termites, which inhibited cocoa production. Still others were pivoting towards other crops in order to diversify their income sources to protect against risk, or simply because they were curious about the newly popular crops like oil palm and rubber. For example several planned to plant both cocoa and palm oil because they were interested in palm oil as an alternative. Another planter intended to replant cocoa but also incorporate rubber (to quickly bring in money) and oil palm (because it's edible and can be used to make soap) on some parts of his land.

In addition to being a question of income generation, replanting cocoa also involves ecological considerations. The majority of farmers, even those planning to replant exclusively cocoa, reported that replanting cocoa on an existing cocoa plantation is challenging and that special techniques must be used. These techniques included application of fertilizer (which many farmers could not afford), planting bananas before the new cocoa crop to replenish the soil, and using special sachets around the seedlings' root systems to protect the young cocoa plants. Three planters reported that replanting cocoa on an existing plot is not possible, and those individuals planned to plant either palm oil or a combination of other crops.

a. What farmer will replant once cocoa no longer productive (n=46):			b. Can you replant cocoa on former cocoa field?				
	Response	Count	Yes	Yes but..	No	Don't Know	No Answer
Cocoa	Cocoa only	18	3	12	0	0	3
	Cocoa and palm oil or rubber	6	1	3	0	2	0
	Cocoa or palm oil	1	1	0	0	0	0
	Cocoa (unless CCSVD arrives, then something else)	1	0	0	0	1	0
Not Cocoa	Palm Oil only	7	1	2	1	0	3
	Rubber only	2	0	0	0	0	2
	Combination of rubber, palm oil, and/or coffee	6	1	2	2	0	1
	Can't replant since field in PA	1	0	0	0	0	1
	Doesn't Know yet	4	1	2	0	1	0

Table 4: *Future planting plans (a) and challenges replanting cocoa (b)*

Concerns over exhausted soil, declining production, and land scarcity are not limited to those already cultivating cocoa. Many young people are pivoting away from cocoa, according to both group interviews and individual interviews. Only about half of cocoa farmers interviewed indicated that their children or other young people in their families were likely to earn a living by cultivating cocoa. Those who planned to continue cocoa cultivation had two options: inherit their parents land or (for those with the means) move away from the villages to seek available land elsewhere, further west. There is no cultivable land – forest or bush – left in the study area; it has already been converted to agriculture. The rest explained that the youths in their families were currently in school and hoped that would allow them to pursue careers outside of cocoa production. There was a general sentiment that cultivating cocoa is hard: the soil is no longer fertile, yields are declining, and farmers can't afford the fertilizer they need to increase production. Those young people that can avoid it will. A small minority reported that their children were neither in school nor would grow cocoa, but would

seek employment (or already were employed) in other industries like commerce, transport, or rubber production.

V. Discussion

Given the small sample sizes, caution is appropriate when drawing inference about trends. Interview data corresponds well to those reported in the literature for the timelines of cocoa production (Woods 2003, Chauveau and Colin 2010), size of cocoa fields (Cappelle 2008, Kouamé 2010), and tutorat system of land transfer (Chauveau and Colin 2010). Differences in arrival period by social group can generally be explained by geographic proximity and political and economic unrest in countries of origin. According to Woods, the Baoulé of southeast Côte d'Ivoire led the push westward in the 1960s and 1970s (2003). It's unsurprising, then, that they represent the vast majority of early arrivals to the study villages. Soon after, arrivals by groups from the northern half of the country peaked. While labor migration to Côte d'Ivoire has long been an important livelihood strategy of individuals from Burkina Faso and Mali (De Haan, Brock, and Coulibaly 2002, Adepoju 2003), migration patterns also fluctuate in response to discrete events like changes in political status or droughts (Bassett 1994). My data indicate that the Burkinabé both arrived earlier and also have more land on average than most other other groups – except the autochtone Bété – which suggests that they may have a stronger position in the area than other migrant groups.

The difference in number of hectares between villages is likely explained by the proximity of Dobré and Agnikro to a large Protected Area (PA). Group interview participants reported that in the 1980s a portion of the PA was declassified for use in agriculture. As a result, this area may have temporarily faced less land scarcity, at least during the region's

cocoa boom, than a village like Baleyo, which is without such a source of forested land. Total hectares (which can serve as a proxy for field size since the majority of planters have only one field) was likely also influenced by the time period of forest clearing. The growing land scarcity over time suggests that fields likely grew smaller as the amount of forest available for clearing decreased, which corroborates the negative trend observed in my results.

However, there is an important caveat to this trend. One elder in a group interview reported first seeing cocoa in Dobré in 1956, but explained that cocoa fields were small at that stage: 0.5 ha was considered large. Others reported cocoa becoming popular in the 1980s while land was still abundant; people at that time were able to acquire large tracts of land and begin growing. The first forest clearing reported in interviews was in the 1970s, and so this dataset doesn't capture the time period before the major cocoa boom when cocoa was initially being established in the study area. This may suggest that instead of a negative relationship between size of forest patch and year of the clearing, this relationship may have followed more of a bell curve. At the outset, cocoa fields were likely small as planters experimented with cultivating a new crop. As cocoa grew in popularity field sizes would have increased significantly until land scarcity pushed sizes back down.

Analyzing not only the timing of land clearing, but the mechanisms of land access and transfer under customary systems presents a unique set of challenges. While the data presented suggest that transfers are becoming more monetized over time, these data are limited to the initial forest clearing, or the transfer of cultivation rights from whoever controlled a patch of forest to the recipient who first cleared that forest patch. Analyzing subsequent transfers of land that had already been cultivated, through purchase or from one

generation or family member to another, is more difficult. Most planters report that they accessed their land through inheritance. However, true inheritance would only happen after a monetary purchase or from one Bété to another. If someone acquired land from a Bété through a tutorat relationship of long-term transfer – but not monetary purchase – and then passed the land to his or her child, the recipient would not be inheriting the *land* itself, but rather the *rights* to cultivate land via a continuation of the tutorat relationship (Chauveau and Colin 2010). Therefore inheritance can be an ambiguous category that masks underlying trends in monetary purchases and tutorat transfers. The category of sharecropping can be equally equivocal. In some cases, providing a crop share to a tuteur is part of the social obligation owed by the allogène recipient. For example, one interview respondent explained that he'd gotten access to his land through a sharecropping agreement with a tuteur. However, others referred either to a tutorat relationship or a sharecropping arrangement, implying they were two distinct systems. In group interviews, respondents explained that the tutorat relationship was the primary mechanism of land transfer in the area, and that while some sharecropping occurred, it was less common. This suggests that sharecropping can function either as part of a tutorat relationship, or as an independent mechanism of transfer.

Both the literature and my data confirm that cocoa is by far the dominant livelihood strategy (Bymolt, Laven, and Tyzler 2018, Moseley, Carney, and Becker 2010, Kouamé 2010). However, there is also evidence that people are pivoting away from cocoa, both those already producing cocoa and young people who haven't yet committed to a primary livelihood strategy. According to group interviews, the arrival of oil palm and rubber at the end of 20th century presented people with an alternative to cocoa, much as cocoa provided another option to those growing coffee decades prior. People show increased interest in

diversifying their income sources, likely a carryover from price shocks in the late 1980s (Sayam and Cheyns 2015). Furthermore, the challenge of replanting cocoa on previously cultivated fields described by many farmers in the study area is well described in the literature (Ruf 1987, Léonard 1997). The large proportion of young people pursuing schooling (and the subsequent opportunities) instead of cocoa reflects both widespread frustration over declining yields, costly agricultural inputs, and lack of cultivable land, as well as attempts to reduce child labor in the cocoa sector (e.g. Mondelez International Inc. 2015). This “rural exodus” (Matissek et al. 2012, p.12) is not limited to the cocoa sector; there is a global shift away from agricultural production across Africa (Min-Harris 2010, Bryceson 2002) and the developing world more broadly (Anríquez and Stloukal 2008).

VI. Conclusion

The cocoa industry will face significant challenges over the next several decades. The sector is burdened not only with the task of making cocoa production more environmentally sustainable, but also more appealing to producers and young people to ensure that production meets growing global demand. The problems are complex and implicate agricultural, ecological, economic, and labor practices. Such diverse challenges will require similarly multi-faceted solutions, in which large-scale efforts like the Cocoa and Forests Initiative and third party certification may play a part. The incentive structure that mediates farmers’ participation in reform efforts also influences their decision-making more broadly, in terms of agricultural practices, like agroforestry, and marketing choices, like participation in collective action organizations. Cooperative membership and selling behaviors will be

further explored in Chapter 2, while Chapter 3 will address the relationship between third-party certification status and agroforestry engagement.

Chapter 2 Supply Chain Dynamics Downstream: Motivations Driving Cocoa Farmers' Selling Behavior

I. Introduction

Cooperatives attract considerable attention from scholars and development practitioners, particularly in Africa. It is generally accepted that cooperatives can provide members access to new markets and the opportunity for higher incomes and reduced poverty, though the materialization of these benefits is heavily dependent on both the characteristics of the cooperative itself as well as the external political and economic environment in which it operates (Hussi et al. 1993, Porvali 1993, Markelova and Mwangi 2010). Furthermore, cooperatives can influence environmental management; participation in collective action groups is correlated with increased adoption of environmentally friendly agricultural practices (Adesina et al. 2000, Caveness and Kurtz 1991). And a report on the cocoa industry asserts that sector-wide reform efforts primarily reach individuals who are organized into cooperatives (Fountain and Huetz-Adams 2018), suggesting that cooperatives are an important subject of study for anyone interested in environmental, agricultural, or market reform in African countries.

Academic research has long approached agricultural cooperatives through a primarily economic lens (see Staatz 1989 for an analysis of early cooperative theory and Cook 2004 for a review of economic work post-1990). This work frequently begins with the cooperative as the unit of analysis and explores how they fit into complex supply chains downstream or how they could best optimize function or maximize member advantages. Rarely do scholars interrogate why individuals join cooperatives in the first place. Historically, those agricultural economists that do consider that question frequently do so through a profit or

benefit-maximizing perspective. Some, for example, take a game theory approach, conceptualizing farmers as rational beings presented with a discrete set of price-based options (Sexton 1986, Staatz 1985, 1983), and hence have been criticized for their unrealistic assumptions (Mensah et al. 2012). While approaches vary, the idea that producers decide to join cooperatives based primarily on the economic benefits they provide remains prevalent (Karantininis and Zago 2001, Mensah et al. 2012).

In response to the simplistic models of commodity production, and markets more broadly, favored by economists, scholars from various disciplines have put forth alternative approaches that allow for a more nuanced, holistic view of commodity chain dynamics. For example commodity systems analysis (Friedland 2001, 1984), the filière approach (Bernstein 1996), ‘real markets’ (Mackintosh 1990), and work by economic anthropologist Peter Clough on the political economy of grain markets (1985) all explicitly focus on understanding the social and political dimensions that mediate market function and commodity systems. These seminal contributions emphasize the importance of considering things like power inequities, kinship, religion, social group, and institutions and have informed important work on commodity systems and cooperative dynamics.

Many modern scholars have therefore sought a more critical understanding of the social factors associated with cooperative membership for diverse commodities throughout Africa. For example, a study in Benin found that satisfactory prior experiences with cashew cooperatives and increased membership by nearby farmers increased commitment to cooperative membership, suggesting that trust and social learning from other planters is important (Mensah et al. 2012). A study of coffee cooperatives in Rwanda similarly found that cooperative members exhibited higher levels of trust in cooperative management than

non-members (Mujawamariya, D'Haese, and Speelman 2013). Furthermore, a working paper on the strengths and weaknesses of the cooperative movement in eleven African countries found that members often left cooperatives in the face of mismanagement or other negative experiences, evidence that trust in management factors not only into the decision to join a cooperative, but also in member retention (Wanyama, Develtere, and Pollet 2009). Indeed there is evidence to suggest that mistrust due to mismanagement of Ivorian cocoa/coffee cooperatives in the 1980s and 1990s led to members selling their cocoa elsewhere, contributing to the failure of this iteration of the cooperative movement (discussed in more depth below in *Background*)(Sissoko 1994).

Another important characteristic overlooked in analyses that prioritize exclusively economic factors is social group. Work in the Ivorian cocoa sector during the colonial and post-colonial periods has reported that ethnic tensions have historically undermined cooperative function, and that “outsiders” did not participate (Woods 1999, p.500). Furthermore, Sissoko (1994) found that immigrants working in coffee and cocoa in Côte d'Ivoire at the end of the 20th century sometimes formed their own cooperative organizations or “cooperatives allogènes” to combat their marginalized status and protect their socio-economic interests. In these cases, villages would have both “coopératives allogènes” and “coopératives autochtones.” More recent work in Benin found that cashew nut cooperative members conversely tended to feel less secure in land tenure rights than non-members (Mensah et al. 2012). Given that insecure tenure is a characteristic of allogène immigrants who rely on autochtone inhabitants for access to land, this suggests that in this context, migrants likely participated in cooperatives at higher levels than autochtones.

Thirdly, indicators of household wealth are often correlated with participation in collective action and rural producers organizations or cooperatives. A study of cocoa farmers in Côte d'Ivoire found that richer and more influential farmers participated at higher levels in and benefited more from cooperatives (Kouamé 1981). Ahmed and Mesfin (2017) reported similar results; the size of landholdings was positively correlated with cooperative membership in Ethiopia. Additional studies have reported that the poorest farmers participate in cooperatives at lower levels, either due to barriers to entry like membership costs or lack of land assets (Francesconi and Heerink 2010, Ito, Bao, and Su 2012). Still others have found a more complicated “middle class” effect, where both smaller and larger farmers participate in cooperatives at lower levels than households with an intermediate level of complementary assets (Bernard and Spielman 2009, p.3). For example Bernard and Spielman (2009) found a positive propensity for farmers with greater landholdings in Ethiopia to join a cooperative, but that this effect dropped off above four hectares. Similar results were reported among smallholder banana farmers in Kenya (Fischer and Qaim 2012).

These studies – which explore the social factors that impact participation in collective action organizations – make valuable contributions to our understanding of cooperative membership, but motivations driving selling behavior remain under-studied for many African commodities. A comprehensive analysis of the factors behind selling behavior has yet to be applied to the modern cocoa industry in Côte d'Ivoire despite the fact that the country produces 39% of the world's cocoa (Food and Agricultural Organization of the United Nations 2017). Much work on the Ivoirian cocoa sector focuses on multinational actors downstream in the commodity chain, discussed in more depth below in the *Supply Chain Description*, and work specific to cooperatives is typically historical in nature and/or

concentrates on things like cohesion within the cooperative or state intervention in the cooperative movement (Sissoko 1994, Woods 1999, Chauveau 1997, Hirschfeld 1975). As a result, the need to understand why farmers today choose to participate in cooperatives as opposed to selling to independent buyers through middlemen remains unaddressed in the literature.

Given the country's commitment to the new Cocoa and Forests Initiative (CFI), a voluntary agreement that seeks to reduce deforestation from cocoa cultivation and improve transparency in cocoa supply chains, this is a critical blind spot. Participating parties – over 30 top cocoa traders and chocolate companies and the governments of Côte d'Ivoire and Ghana – pledge to stop sourcing cocoa from newly deforested plots or protected areas (PAs) and to support efforts to re-green already cleared areas (Donwahi 2017). This initiative requires tracing supply chains from the producer to the chocolate company, a daunting task given that approximately 800,000 people cultivate cocoa in Côte d'Ivoire alone (Cappelle 2008). The majority of producers are smallholders with less than 10 hectares (Cappelle 2008, Kouamé 2010, Fair Labor Association 2016) and no formal land title (McCallin and Montemurro 2009). Furthermore, the agreement is premised upon the idea that if buyers downstream refuse to purchase cocoa from cleared areas, farmers will adjust their agricultural practices accordingly, leading to a reduction in deforestation. A variety of assumptions about buying and selling dynamics and decision-making by farmers about land management are built into such a policy. Therefore, gaging the potential impact of the initiative necessitates an understanding of the complex social and economic dimensions of supply chain relationships. The urgent need to comprehensively map individual cocoa

companies' supply chains is paralleled by an equally urgent need to better understand the nuances and social drivers of these relationships, particularly at the farmer level.

Supply Chain Description

Today, there are two main ways that cocoa is transported from the farmer to large upstream buyers in Côte d'Ivoire: either through cooperatives or "pisteurs", local middlemen associated with licensed buyers (figure 6). In the case of cooperatives, members sell directly to the cooperative through a "délégué", a cooperative employee charged with buying cocoa from members. Meanwhile, independent planters sell to licensed buyers, called "traitants", through pisteurs. Both traitants and pisteurs are licensed by the national Conseil du Café-Cacao to buy and sell cocoa. Typically pisteurs are affiliated with a single traitant, but this can change from season to season. In small villages planters sell their cocoa directly to the pisteur, while in areas with larger volumes designated collectors may be employed to pick up and transport the cocoa on behalf of the pisteur. Both cooperatives and traitants (tier-2 suppliers) sell cocoa downstream to tier-1 suppliers (Cappelle 2008, Fair Labor Association 2016). At this stage, cocoa can either be sold to exporters, who then sell to multinational grinders overseas (of which they may be subsidiaries), or local grinders affiliated with these same multinationals. In the latter case, cocoa will be processed locally into cocoa liquor, powder, and butter, prior to export. Three multinational firms – Cargill, Barry Callebaut, and Olam – dominate the world market for grinding/processing, and supply a large portion of the cocoa and cocoa-derived products purchased by chocolate manufacturers (Oomes et al. 2016). Chocolate manufacturing is similarly dominated by a small number of players, with six companies representing nearly 60% of market share: Mars Inc., Nestle, Hershey, Kraft Foods, Cadbury Schweppes, and Ferrero (Cappelle 2008). In some cases, instead of

purchasing cocoa and derived products from exporters and/or grinders, chocolate companies purchase directly from cooperatives, with whom they have established a relationship of direct supply.

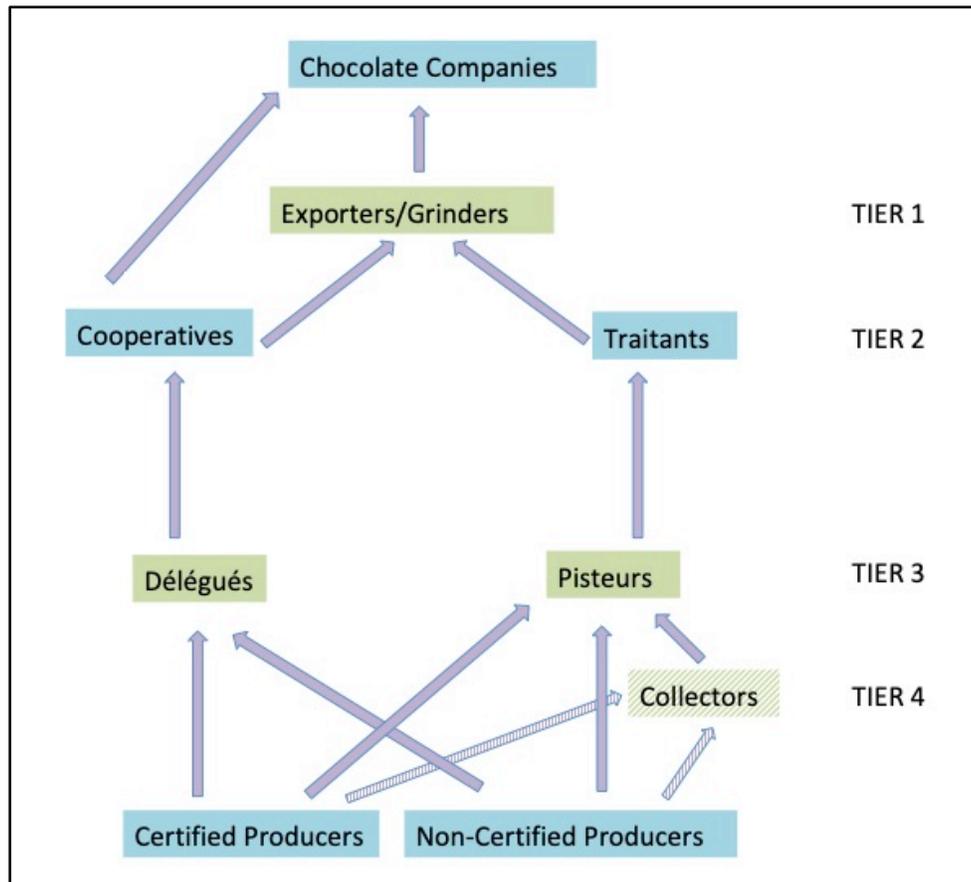


Figure 6: *Modern cocoa supply chain in Côte d'Ivoire*
Compiled by author observation, drawing from (Cappelle 2008)

The downstream portion of the cocoa supply chain is well studied, with many scholars emphasizing the vertical integration and concentrated market power of large multinational actors (see, for example, Fold 2001, Losch 2002, Daviron and Gibbon 2002, Wilcox and Abbott 2004, Wilcox 2006, Wilcox and Abbott 2006). However, while the cocoa supply chain is well established at the level of exporters, processors, and manufacturers (Abbott

2013), individual buying and selling patterns upstream are far less static than the more mature links in the chain downstream. Indeed, cocoa supply chains in Côte d'Ivoire are extremely dynamic at the farmer level. Producers frequently switch which buyer they sell to from season to season, and can sell to multiple buyers in a single season. Recent reforms to the structure of farmer cooperatives, described below, have further complicated our understanding of the upstream selling patterns.

Background

A series of initiatives and regulatory reforms in Côte d'Ivoire over the past decade has changed the buying and selling landscape within the country. These reforms included 1) the establishment of the government-run Conseil du Café-Cacao, which sets a fixed price each season and minimum quality standards for Ivoirian cocoa, and 2) changes to the structure of cooperatives in Côte d'Ivoire and other members of the Organisation for the Harmonization of Business Law in Africa (OHADA)⁴ under the Acte uniforme relatif au droit des sociétés cooperatives. Under this act, cooperatives were newly differentiated into two types: Société coopérative avec conseil d'administration (SCOOP-CA) and Société coopérative simplifiée (SCOOPS). The requirements for what constitutes a SCOOPS were less stringent than those for a SCOOP-CA (OHADA 2010). The new method of registering as a société coopérative was much simpler than under the previous system, but the allocation of responsibilities wasn't fully clear. This introduced the possibility that false cooperatives may have been registered, while legitimate, active cooperatives remained unregistered.

⁴ OHADA countries include: Bénin, Burkina Faso, Cameroun, Centrafrique, Comores, Congo, Côte d'Ivoire, Gabon, Guinée, Guinée Bissau, Guinée équatoriale, Mali, Niger, République démocratique du Congo, Sénégal, Tchad, Togo

Furthermore, there was little oversight after the fact to ensure that registered organizations continued to comply with cooperative principles. Notably, there has been a surge in recent years of registered SCOOPS, or “simplified” cooperatives⁵, likely due in part to political instability during the mid-2010s. In the aftermath, once peace was reached, cooperatives were under pressure to register by the October 2014 deadline for the upcoming 2014-2015 selling season (GEFAK). However, local understanding suggests that many buyers registered as SCOOPS, despite not having been established by a group of planters, in order to reap potential benefits of cooperative status. In other words, while the majority of registered cooperatives are likely legitimate, there is the possibility that a number of registered cooperatives are essentially independent buyers that self-described as cooperatives using lists of farmers they purchase cocoa from as names of “members”.

These reforms are part of a long history of government promotion of and intervention in rural associations. The cooperatives created under this set of reforms are simply the newest iterations of a longstanding rural institution that has evolved over time in response to the state’s changing role in the cocoa industry. In the early 1900s Sociétés Indigènes de Prévoyance (SIP) were established under colonial rule, modeled after a Senegalese system of rural associations. SIP were replaced by a series of other “Sociétés” after World War II, which remained active into the post-colonial period. Groupements à Vocation Coopérative (GVC) were established in the 1980s, the precursor to modern “Sociétés Cooperatives”. Despite high turnover in the cooperative movement, due in part to a history of mismanagement, low levels of transparency and therefore trust, and a lack of solidarity and loyalty among members (Sissoko 1994), they have long held an important role in the

⁵ There are still fewer cooperatives registered today than were under the previous system.

marketing and selling of cocoa, which continues today (Woods 1999). Yet relatively little research exists on how modern cooperatives actually function following the liberalization of the Ivorian economy, and other African economies, in the 1990s (Wanyama, Develtere, and Pollet 2009, p.10).

Statement of Research Questions

This project elucidates supply chain dynamics in the cocoa commodity chain at the farmer level. This work will situate individual farmers within a network of social, demographic, and economic factors that mediate selling relationships and cooperative participation. Specifically, this study seeks to understand why farmers decide to become members of cocoa cooperatives and how farmers who sell to pisteurs make selling decisions.

Research Questions

1. *What are the current selling patterns (in terms of cooperative membership, temporal trends, and social characteristics)?*
2. *What factors shape farmers' decisions to join cooperatives?*
3. *How do farmers outside of cooperatives make selling decisions?*

II. Methods – Data Analysis

Data was collected through two methods: 1) individual semi-structured interviews with planters and key informants and 2) a brief survey of cocoa producers.

Current Selling Behaviors and Temporal Patterns

Initial summary statistics were performed on the household survey data to compare selling behaviors with area of land dedicated to cocoa, age of cocoa plantations, and social group, variables which emerged in the literature as potentially important factors. For both cooperative members and planters that sell to pisteurs, the total number of planters, the total

area of cocoa cultivated, and the average age of the cocoa plantations was calculated⁶. These same statistics, along with the percentage of the total sample, were calculated for each social group: autochtone Bété who first established the villages, individuals from Mali and Benin, the Burkinabé, northern Ivorians, and the Baoulé from southeast Côte d'Ivoire.

Individual interviews were used to supplement the survey results and gain greater insight on temporal patterns across and within selling groups. The average time with current buyer (i.e. the amount of time an individual has been with his or her current cooperative or has sold consistently to the same pisteur) was calculated for both cooperative members and those that sell to pisteurs. For those planters who were not cooperative members, their selling habits were temporally categorized as follows: 1) always sells to the same pisteur, 2) usually sells to the same pisteur, 3) has recently switched pisteur(s), 4) frequently switches pisteur from season to season.

Decision-Making and Selling Behaviors

Both individual interviews and survey data were used to understand what factors influence selling behaviors. In individual interviews, each planter was asked why he or she had joined or not joined a cooperative. Those planters who sell only to pisteurs were asked further questions about how they make selling choices and their loyalty to individual pisteurs. Subsequently, during the household survey, cooperative members were asked about their personal experience in cooperatives, while those not in cooperatives were surveyed on perceived advantages and disadvantages of cooperative membership.

Factors Associated with Cooperative Membership

⁶ Due to a data recording issue, in cases where farmers have multiple fields, the data only includes the age of the first field. Given that less than 6% of farmers (7 of 125) have more than one field, this is unlikely to impact the results.

Finally, a logistic regression was performed on the survey data to explore factors associated with cooperative membership. Independent variables considered were social group (dummy variables for Bété, Mali/Benin, Baoulé, Northern Ivorian, and Burkinabé group membership), age of cocoa plantations, and total hectares. Prior to running the regression, correlation coefficients among quantitative independent variables were used to test for collinearity. A pairwise comparison of means was applied to variable pairs to test for collinearity between social group membership and quantitative variables. All regression models retained lacked collinear independent variables with residuals analyzed to ensure constancy of variance, independence, normality of error terms.

III. Results

Current Selling Behaviors and Temporal Patterns

Of the 125 planters surveyed, about sixty percent were members of a cooperative, while the rest sold to one or more pisteurs. A key informant estimated that approximately two thirds of the inhabitants of Baleyo were cooperative members, suggesting that the sample is representative of selling patterns in the village as a whole. There was little difference between surveyed cooperative members and non-members in terms of total area of cocoa fields (3.24 and 3.16 ha, respectively) or the average age of planted cocoa trees (14.8 and 14.4 years).

Qualitative interviews suggest that farmers stay in cooperatives longer than non-members stay with the pisteurs they sell to (5.3 years vs. 3.9 years). Farmers in cooperatives rarely switch from one cooperative to another, except in cases where the cooperative dissolved due to mismanagement and members were forced to find or form a new

cooperative or sell only to pisteurs. Indeed only one respondent had left a cooperative that was still operational in the village in which he lived – the rest remained permanent members once they joined, except in cases of moving away from the village. However, while farmers switched between pisteurs more frequently than between cooperatives, nearly half of respondents (13 of 28) sold exclusively to one pisteur every season, while an additional six usually sold to the same one, except in cases where he is out of town, or doesn't have money to pay for the cocoa. Several farmers had recently switched pisteurs, either because the one with whom they'd had a longstanding relationship had retired, or because their former pisteur wouldn't give credit and they found someone who would. These results indicate some level of loyalty to pisteurs.

Decision-Making and Selling Behaviors

Joining a Cooperative or Selling to a Pisteur

Farmers in individual interviews gave three primary reasons for having joined cooperatives: 1) training in agricultural practices, 2) the monetary per kilo premium, or “prime”, received on top of the nationally established price for certified cocoa, and 3) the provision of agricultural inputs like pesticides (table 5). Non-members generally chose not to join based on feelings that cooperatives were dishonest, particularly when weighing and/or paying for cocoa, or because of a negative prior experience with a cooperative (e.g. cooperative management not distributing products like pesticides to members)(table 6). Indeed several respondents explained that managers of a previous cooperative had sold the pesticides intended for members for personal profit. More than one third of respondents not currently in a cooperative indicated that they would be interested in joining one. These planters either actively planned to join a cooperative in the future or would if a cooperative

representative invited them. The rest were unable to join because their fields were in a protected area, which violates the requirements of certification programs with which most cooperatives are affiliated.

Reasons Member Joined Cooperative	Total
(n=18 interviews, multiple response question)	
Cooperatives provide training	7
Cooperatives provide monetary premium	6
Cooperatives provide inputs (e.g., pesticides)	6
Cooperatives weigh cocoa fairly/honestly	3
There are benefits to being in a group	2
Cooperatives provide equipment (e.g., machetes)	2
Cooperatives market the cocoa well	1
His/her parents were in a cooperative	1
Cooperatives transport the cocoa from field	1
Payment from cooperatives is immediate	1

Table 5: *Reasons cooperative members originally decided to join*

Reasons not to be in a Cooperative	Total
(n=28 interviews, multiple response question)	
Cooperatives are dishonest/don't pay correctly	3
Cooperatives don't distribute products to members	3
Had a bad prior experience with a cooperative	2
Family members/husband aren't members	2
Theoretical pros of cooperatives don't materialize	2
Only has small quantity of cocoa	2
Is loyal to his/her pisteur	1
Cooperatives don't give credit	1
There isn't a cooperative nearby	1
<i>Would join</i>	
...and plans to	5
...if someone came and invited him	3
... but can't because fields are in protected area	3

Table 6: *Reasons non-members decided not to join a cooperative*

Among interviewed planters who aren't cooperative members and instead sell to pisteurs, the provision of credit is far and away the most important factor in selecting a pisteur (table 7). Aside from credit, the next most important characteristics are trust in the pisteur and timing, i.e. arriving with money when the farmer's cocoa is dry and ready to be transported. This, combined with the temporal patterns described above, suggests that planters generally fall into two camps: those that place a high value on building a relationship of trust with their pisteur, and those that are driven by the immediate availability of payment. Not surprisingly, the farmers who value trust sell either always or usually to the same pisteur. Interestingly, there is no significant overlap between those farmers that cited a bad prior experience or dishonest view of cooperatives as a reason not to join, and those farmers who cite trust as an important factor in choosing a pisteur. This indicates that trust as a priority selection criterion is a result of different individual value systems, as opposed to the result of a negative prior experience with a cooperative.

Factors in Pisteur Selection	Total
(n=28 interviews, multiple response question)	
Provision of credit/loans	11
Trust	7
Arrival with money when cocoa is dry	6
Immediate payment	4
Provision of inputs (e.g. pesticides)	2
Provision of receipt at weighing	1
His son buys cocoa	1

Table 7: *How farmers not in cooperatives select a pisteur*

Personal and Perceived Experiences in Cooperatives

There were noticeable differences between responses to interview questions about why farmers *joined* cooperatives and survey responses to questions about farmers'

experience once in a cooperative. While interview respondents cited training, the monetary premium, and the provision of inputs as the most common reasons they joined a cooperative, when surveyed about the positive aspect of being in a cooperative, respondents cited “paying honestly” most frequently by a large margin (table 8). Throughout discussions with farmers and key informants, the importance of weighing and paying honestly emerged as a significant theme. Farmers must dry their cocoa well because pisteurs and délégués from cooperatives pay by weight; if the cocoa is wet, buyers are paying more for the same volume of cocoa. If cocoa is insufficiently dried, farmers may be unable to sell it and will be told to take it back and dry it for an additional period of time. Farmers also rely on pisteurs and cooperative representatives to weigh it accurately and pay what they are legitimately owed, which introduces opportunities for dishonesty by buyers, especially in cases where farmers are illiterate. There was a general sentiment that the weighing and payment for cocoa could be a moment of tension, which may explain the cooperative members’ survey responses as well as the value that many non-members place in trust. Price premium, training, and inputs were the next most common answers by survey respondents, but these lagged far behind honesty in payments in terms of frequency mentioned.

The most significant negative aspect of being a cooperative member was a delay in payment. When coupled with the 21% of interviewed farmers who sell to a pisteur based on whichever one arrives with money when their cocoa is ready for sale (table 7), this suggests that timeliness of payment is a priority both for cooperative members and non-members. Because cooperatives often have contracts with downstream buyers for a specific quantity of certified cocoa, once this quota is reached, some cooperatives stop buying cocoa for the season, particularly during the smaller of the two harvest seasons, forcing cooperatives to sell

to pisteurs or, more rarely, to store their cocoa for the subsequent season. In many cases, cooperatives will continue to buy cocoa from farmers, but will sell it as standard – not certified – cocoa if they can't find a buyer for certified (see Chapter 3 for additional discussion of certified cocoa). Frustration over the cooperative not buying additional cocoa once reaching the quota was the second most commonly cited negative aspect of being in a cooperative by survey respondents.

Cooperative Member Experience (n=76 surveys, multiple responses)		
	Count	%
Positive		
Honesty in payments	69	90.8
Prime	10	13.2
Training	6	7.9
Inputs	2	2.6
Credit	1	1.3
Honest weighing	1	1.3
None	1	1.3
Negative		
Delay in payment	9	11.8
Stop buying once reach quota	3	3.9
Lack of credit	2	2.6
Don't provide sacs for cocoa	1	1.3
None	62	81.6

Table 8: *The positive and negative aspects of being in a cooperative*

The surveyed farmers that sell to pisteurs had a fairly complete understanding of the purported benefits of being in a cooperative, but were much less likely to cite honesty as a positive than actual cooperative members (table 9). The most common perceived negative was cooperatives not actually paying out the price premium expected by certified cooperative members. This may also be reflected in the responses of cooperative members. While in

interviews cooperative members listed the premium as one of the top reasons to join a cooperative, this was a much less common response among surveyed members when describing their actual experiences with a cooperative. Some interviewees did explicitly mention that they did not receive the expected premium every year, likely for the reasons discussed above regarding contract quotas.

Non-Member Perceived Cooperative Experience		
(n=37 survey respondents, multiple responses)⁷		
Positive	Count	%
Price premium	12	32.4
Inputs	8	21.6
Training	4	10.8
Social/infrastructure projects in village	4	10.8
Guaranteed payment	3	8.1
Credit	2	5.4
Respected institution, "grandeur"	2	5.4
Honest weighing	1	2.7
Member assistance	1	2.7
Buy regularly (each season)	1	2.7
None	15	40.5
Negative	Count	%
Don't provide prime	7	18.9
Delay in payment	6	16.2
Disputes among members	5	13.5
No credit/difficulty obtaining	4	10.8
Dishonesty/mismanagement	2	5.4
Favoritism/jealousy	2	5.4
Don't give inputs	1	2.7
Stop buying once reach quota	1	2.7
None	12	32.4

Table 9: *Non-members' perceived positives and negatives of being in a cooperative*

⁷ Due to a data recording issue, only responses from 37 of 49 non-member survey responses are included here.

Factors Associated with Cooperative Membership

Summary statistics performed on the survey data collected in Baleyo revealed that generally the Bété and groups that emigrated from other countries participated in the local cooperative at a higher rate than groups from elsewhere in Côte d'Ivoire (the Baoulé, groups from northern Côte d'Ivoire like the Senoufo and Mandé)(table 10). Members of the Bété group had slightly larger cocoa landholdings than other groups. This is to be expected as the Bété are the original inhabitants of the area and have a history of serving as “tuteurs”, or landlords in customary long-term land transfers, who grant land to newcomers.

Social Group	Selling Patterns		Total area of cocoa fields (ha)		Avg. age of cocoa field (yr)	
	Coop.	Pisteur	Avg.	St. Dev.	Avg.	St. Dev.
Bété (n=26)	22	4	4.35	3.77	16.6	8.84
Mali/Benin (n=11)	7	4	2.45	1.01	14.82	4.09
Burkinabé (n=35)	22	13	3.23	1.6	16.8	6.95
Northern Ivorian (n=24)	13	11	2.88	1.87	11.67	4.76
Baoulé (n=29)	12	17	2.74	1.54	12.69	7.25
Total (n=25 surveys)	76	49	3.21	2.29	14.63	7.13

Table 10: *Summary statistics by social group*

Factors that were considered as possible independent variables to explain cooperative membership were total area of cocoa fields, age of cocoa plantations, and the five social groups. The total area of cocoa fields and age of cocoa plantations were found to be correlated, with an r value equal to 0.45 at $p < 0.000$, so age of cocoa fields was excluded. An evaluation of the full model found that membership in the Bété group was the only social group variable with a significant relationship to cooperative participation, so this variable was retained.

	Coefficient	p-value
Total Hectares Cocoa	-0.01	0.58
Bété Group Membership	0.32	0.004
Intercept	0.58	7.77
Adjusted R-squared	0.05	

Table 11: *Results of logistic regression of cooperative membership*

The variable hectares of cocoa was unrelated to cooperative participation (table 11), but membership in the Bété social group had a significant relationship to cooperative status ($p = 0.004$). The positive relationship indicates that Bété are more likely to join cooperatives than to sell to pisteurs.

IV. Discussion

Data from interviews indicates that there is much more movement of farmers between pisteurs than movement between cooperatives, even in Dobré, where there are a number of cooperatives to choose from. This is unsurprising given that selling to a pisteur doesn't require any additional steps prior to sale, while cooperatives generally require membership. Furthermore, most people joined a cooperative at least in part to receive the monetary premium for selling certified cocoa. Becoming certified through a cooperative is an additional step beyond membership, and requires attaining an individual certification after an audit by the certifying body. Therefore, joining a cooperative, and particularly becoming certified by that cooperative, presents a higher barrier to entry than selling to pisteurs. It's likely that the initial investment of time in becoming a member and then certified, discourages members from switching between cooperatives frequently.

However, it's notable that while cooperative members listed the price premium as one of the top reasons to join a cooperative, this was a much less common response among

surveyed members when describing their actual lived experiences in a cooperative. That some interviewees did not receive the expected prime every year – which also emerged in surveys of the perceived negatives of cooperatives by non-members – may explain why cooperative members didn't often list receiving the monetary premium as a positive of membership. This is likely directly linked to the frustration over the contract quota discussed above. Cooperatives only receive a premium to distribute to members for selling certified cocoa. When they reach the contract quota for certified cocoa, some stop buying cocoa at all, while others will still buy members' cocoa but are forced to sell it as non-certified, "regular" cocoa if they can't find another certified buyer. In such cases, members are not eligible for a monetary prime because their cocoa is not purchased as certified (for a further discussion of certification, see Chapter 2).⁸ During interviews cooperative key informants said that they do their best to explain to farmers who don't receive a premium why they don't. However, cooperative representatives were split on whether farmers understood or were frustrated over these circumstances. Among those interviewed farmers who did broach not receiving a premium, they were unsure why they didn't receive one. According to them, they were simply told by *délégués* that the decision was made higher up the ladder. For many there was a general sentiment of skepticism over these claims by *délégués* and cooperative representatives, unsurprising given cooperatives' history of poor management and extortion (Woods 1999). This clearly contributes to non-members cynicism about joining a cooperative, and is tightly linked with another important factor: trust.

⁸ In rare cases, the cooperative will pay certified farmers the premium even when their cocoa was sold as standard; the money for premiums in these cases would come from the cooperatives' own budgets not the downstream buyers.

Trust and honesty emerged both among cooperative members and non-members as influential over selling behaviors. Historically, trust, or lack thereof, of cooperative management has heavily influenced selling behaviors by cooperative members, who often sold their cocoa elsewhere if they didn't trust the cooperative, or GVC as they were named previously, to operate aboveboard (Sissoko 1994). Today, mistrust of cooperative management has decreased, though not disappeared altogether; middle aged and older farmers still reference dishonest behaviors by GVC managers decades ago. That cooperatives weigh and pay for cocoa honestly was the most important benefit of membership listed by members in this study, and recent literature on cocoa cooperatives in Côte d'Ivoire and Ghana corroborates this (Calkins and Ngo 2010). This same sentiment is equally visible among non-members, who listed trust as second only to providing credit as the criteria by which they choose a pisteur. Much of the current research on trust in agriculture focuses on developed nations and explores trust relations in agribusiness (Ladebo 2006). For example, scholars often cite Hansen, Morrow, and Batista's work on grain and cotton cooperatives in the United States as evidence of the importance of trust cooperative management by cooperative members (2002). However, less comparable research has been conducted in the global south. The results of this study suggest that trust is equally applicable in the rural West African context. In the Ivorian cocoa sector, trust appears to be an essential component of decision-making for many, but not all, smallholders. Additional research is needed to better understand personal preferences and value-systems and the individual value placed on honesty by a large subset of farmers.

On the flip side, among farmers who sell to pisteurs and not through cooperatives, there exist those who value immediacy of payment over building a trust-based selling

relationship. This prioritization of convenience – selecting whichever pisteur arrives with cash and means of transport when their cocoa is ready – simultaneously translates not only to pisteur choice but to a disinterest in cooperative membership. Many respondents, both members and non-members indicated that the delay in payment was a negative aspect of cooperative participation. The literature suggests that this has long been a cost of cooperation – the bureaucracy of operating a sizable organization has historically prevented cooperatives from paying in cash on the spot like pisteurs do (Sissoko 1994). This has also led some cooperative members to sell cocoa to pisteurs when they needed immediate access to money, which the cooperative wasn't able to provide (Sissoko 1994). Access to capital was also significant in the context of loans prior to harvest; many farmers get credit from a buyer earlier in the season (either long before harvest or often once the cocoa is drying, just days prior to sale) and repay the buyer at the moment of sale.

The provision of credit was cited, sometimes in direct contradiction, as selling motivation among all categories of respondents. While generally it was accepted that cooperatives do not provide credit and some, but not all, pisteurs do, this was not universally experienced across all respondents. Although cooperative non-members perceived a lack of credit as an important negative aspect of cooperative membership and several cooperative members expressed similar sentiments about their actual experiences, several members and non-members cited cooperatives giving credit as a benefit of membership. Key informant interviews suggest that though cooperatives, with some exceptions, don't generally provide credit, individual *délégués* employed by the cooperative may choose to make loans to those planters from whom they buy cocoa. Such transactions are not officially sanctioned by the cooperative, and can complicate the farmer's understanding of what services are being

provided by the cooperative. Furthermore there is literature to suggest that richer farmers are more likely to get loans, which would further explain the inconsistency with which credit seems to be allocated (Calkins and Ngo 2010). Since not all pisteurs provide loans, the most frequently cited characteristic when selecting a pisteur was access to credit. Indeed many planters explained that they switched pisteurs from season to season until they found one who would provide loans, at which point they would continue selling to that individual, more or less exclusively. Still others reported not knowing whether or not their pisteur(s) offer loans, since they'd never had a need and therefore never asked for one. This, along with the discussion of prioritizing immediacy in payments, above, suggests that economic constraints play a significant role in deciding to whom farmers will sell cocoa, but that the importance varies highly between individuals, and may vary from season to season, depending on personal financial needs.

Land characteristics (age of trees or hectares of cocoa) did not have any significant relationship with cooperative membership. This isn't entirely unexpected given that land characteristics didn't emerge as a consistent influence in the existing literature. For example, cashew farm size was inversely related to cooperative membership, likely because less land dedicated to cashews signified land dedicated to other crops and more diversified income (Mensah et al. 2012), while the reverse was true of coffee farmers. Those with more coffee trees, and hence higher coffee production, were more likely to join cooperatives in Rwanda (Mujawamariya, D'Haese, and Speelman 2013). This may indicate that the directional effect of land size (or another proxy for production level of a specific crop, like number of crop trees) is dependent on the level of income diversification.

Social group was a complicated variable to tease apart. While group interview participants and key informants insisted that social group played no role in determining whether people join cooperatives or which pisteur they sell to, the regression indicated that Bété people were more likely to join cooperatives than sell to pisteurs. Here, local village context must be carefully considered. In their study of cashew cooperatives in Benin, Mensah et al. found that commitments to cooperatives varied by district (2012), which suggests that there may be limits to how far my results can be applied. The survey data, on which the statistics were run, came only from the village of Baleyo, a relatively small village with a single active cooperative and where social groups live spatially clustered together. In Dobré, a larger village with multiple cooperatives and where the households of people of different social groups are relatively dispersed, these same statistical results may not have been replicated. Prior work on cooperatives in Benin found that people were more likely to join a cooperative if people in their nearby network joined (Mensah et al. 2012), which suggests that the difference in spatial clustering between the two villages may be critical. Furthermore, there is evidence that different social groups inhabit space differently in the areas to which they migrate. For example, historically Baoulé tended to live in encampments on the outskirts of villages (as seen in Dobré), while Burkinabé and other groups inhabited “neighborhoods” within autochtone villages (Chauveau 1997). This all suggests that social group and spatial distribution, which shape social interactions and relationships, likely influence cooperative membership to some degree.

V. Conclusion

Economic factors, like access to credit, immediacy of payment, and the price premium for certified cocoa, emerged as influential in terms of making selling decisions. However, equally important were non-price factors like social group and trust, which significantly shaped the likelihood that cocoa farmers would join a cooperative or remain loyal to a particular pisteur. Mismanagement by prior cooperatives operating in the area has left a legacy of mistrust and cynicism among some farmers, though my results suggest that current cooperative members exhibit high levels of trust in cooperative management. Broadly speaking, the assumption that farmers make selling decisions entirely based on financial considerations lacks a comprehensive understanding of the network of incentives and constraints in which smallholders operate. Social factors clearly play an important role in mediating supply chain dynamics upstream, and as such must be considered in any commodity analysis of cocoa production.

Chapter 3 Agroforestry and Certification: Initial Insights into Certification Programs as a Mechanism for Reforestation

I. Introduction

Growing concern over forest loss worldwide has led to diverse efforts to protect forests. This is visible in the increased prevalence of voluntary zero deforestation agreements, joint efforts between private companies and national governments that seek to halt the deforestation associated with the production of a particular commodity. Originally focused in Latin America with, for example, the much publicized soy moratorium (Gibbs et al. 2015), this style of approach has recently expanded to West Africa. The new Cocoa and Forests Initiative (CFI) is a voluntary collaboration between over 30 chocolate companies and the governments of Côte d'Ivoire and Ghana (World Cocoa Foundation 2019). However, in a country like Côte d'Ivoire, which has already experienced a significant reduction in forest cover – for example, in one forest reserve a recent census reported that 70% of the area was occupied by agriculture (IDH 2018) – deforestation prevention is only part of a necessarily multi-pronged approach. Agroforestry is an essential component to a comprehensive forest management plan because multiple use agroforests are flexible systems that provide many of the biodiversity and climatic benefits found in virgin forests while explicitly allowing for human use (McNeely 2004). Under the CFI, chocolate companies agree to no longer buy cocoa from newly deforested areas. In addition, the CFI “promotes sustainable livelihoods...including through food crop diversification, agricultural inter-cropping, development of mixed agro-forestry systems and shade-grown cocoa” (Ministère des Eaux et Forêts 2018, p.24).

And faced with intense pressure from environmental non-governmental organizations over the link between cocoa, forest loss, and threats to biodiversity (see e.g. Higonnet, Bellantonio, and Hurowitz 2017), chocolate companies also increasingly rely on third-party certification programs as a strategy to mitigate their roles in deforestation. Certified cocoa is recognized by an official certifying body like Fairtrade International, UTZ, or Rainforest Alliance (RA) as being responsibly sourced from an environmental or social perspective, according to the standards of the individual program. For example, Hershey, Mars, and Ferrero have all committed to exclusively sourcing certified cocoa by 2020 (Nieburg 2017b). The consumer goods giant Unilever, who by 2017 was using 98% Rainforest Alliance certified cocoa for one of its ice cream product lines, has also pledged to source 100% of its cocoa sustainably by 2020 (Unilever 2018).

The increased commitment to eco-friendly certified cocoa by individual companies coupled with the 33⁹ companies that signed on to the CFI, representing 85% of global cocoa usage, signifies an important change in the cocoa sector. As the CFI goes into effect on a rolling basis between 2019 and 2020, and companies buy larger percentages of certified cocoa to meet their pledges, farmers will be met with growing encouragement to practice agroforestry. This prioritization of agroforestry both by the state and by private enterprise represents a shift in production wisdom in Côte d'Ivoire. In the early days of cocoa production in Africa, cocoa was grown under canopies of virgin and secondary forests and fruit trees, but this began to change in the mid to late 20th century. National research and extension services promoted full-sun cultivation as a way to maximize short-term yields and boost production during the country's cocoa boom (N'Goran 1998, Ruf and Schroth 2004).

⁹ As of May 2019

Simultaneously, new cocoa strains that flourished in low shade were introduced to the area, and immigration to cocoa producing regions increased (see Chapter 1 for a discussion of the history of migration and the Ivorian cocoa sector). Unlike the indigenous “forest people” who used shifting cultivation on tree crops, many migrants favored clearing entire patches of forest to plant cocoa and food crops (Ruf and Schroth 2004, p.116). Only recently has ANADER, the national extension service, begun to change their messaging to farmers and promote agroforestry over full-sun systems (Gyau, Smoot, Diby, et al. 2014).

Agroforestry Engagement

Agroforestry is presented in the literature as a strategy to combat the declining productivity of aging cocoa trees (Gyau, Smoot, Kouame, et al. 2014, Obiri et al. 2007), protect cocoa trees from pests and disease (Bros, Desdoigts, and Kouadio 2018, Andres et al. 2016), provide habitat for a diverse range of wildlife species (Rice and Greenberg 2000, Clough et al. 2009, Sonwa et al. 2007, Marjokorpi and Ruokolainen 2003), and, in some cases, reduce deforestation by increasing yields and thus reducing conversion pressure on uncultivated areas like forests (Clough et al. 2011, Tschardt et al. 2012). Indeed, the willingness of farmers to adopt shade-grown cocoa has important implications for forest conservation and the protection of biodiversity. While there is a lack of consensus over the exact conservation value of agroforestry in relation to natural forests, locally managed agroforests can be an important tool in the modern management of forest ecosystem biodiversity (McNeely 2004). Agroforests have been shown to conserve tree species richness at a level similar to natural forest patches, though easily dispersed and established species are over-represented (Marjokorpi and Ruokolainen 2003). And cocoa agroforests in particular have been shown to support higher levels of mammal, bird, and insect biodiversity than many

non-shade tropical cash crop cultivation systems (Rice and Greenberg 2000). Shade-grown agriculture presents an alternative to formal protected areas as a mechanism for maintaining species diversity in human-dominated landscapes (Bhagwat et al. 2008). This approach shows particular promise in Côte d'Ivoire, where many protected areas have for some time been lost, fragmented, or severely degraded by the expansion of cocoa cultivation, at the expense of vulnerable species (Bi et al. 2012, Bitty et al. 2015).

However, in order for agroforestry systems to yield ecological benefits, farmers must first see the advantages of non-cocoa tree species and incorporate them into their plantations. Several scholars have emphasized the important first step of understanding farmers' perceptions of shade-grown agriculture and the incentives and disincentives they face for planting additional trees, both of which influence their land management decisions and willingness to adopt agroforestry practices (Atkins and Eastin 2012, Gyau, Smoot, Kouame, et al. 2014). One study in southwest Côte d'Ivoire found a variety of different tree species incorporated in cocoa plots and reported that 95% of farmers wanted additional trees and species. This was true regardless of whether or not the farmer had an ecological certification – though certified farmers had received information about shade cover requirements, unlike those without certification – and was not correlated with migrant status. Farmers felt most tree species were compatible with cocoa trees and, for those species that weren't, were in some cases willing to trade negative impacts on cocoa trees for other benefits to their livelihoods (Smith Dumont et al. 2014). Another study in Côte d'Ivoire reported that the top factor motivating tree planting was the perceived benefits of shade systems to cocoa trees (Gyau, Smoot, Kouame, et al. 2014). Fewer farmers were motivated by household consumption of forest products or certification requirements. Farmers resistant to planting

trees were unaware of the benefits of shade-grown cocoa, lacked space to do so, feared reduced cocoa yields, or lacked necessary inputs. However perceptions of agroforestry varied with the biophysical characteristics of farmers' land (rainfall and soil quality), geographic zone, presence of extension services and certification programs, and farmer age (Gyau, Smoot, Kouame, et al. 2014). Work in other geographic regions also found that training has a positive effect on agroforestry adoption (Adesina et al. 2000, Casey and Caviglia 2000). These studies suggest that the introduction of certification schemes is one potential step – along with the accompanying farmer trainings and improved understandings of the benefits of shade grown cocoa – toward increasing the adoption of agroforestry practices.

Certification Requirements and Background

Currently 16% of the world's cocoa is sold as certified under one of the four standards applicable to cocoa: UTZ, Rainforest Alliance (RA), Fairtrade International, and IFOAM – Organics International (Lernoud et al. 2017).¹⁰ This is an increase from 3% in 2009, and proportions of certified cocoa are projected to continue to rise across certification standards (Matissek et al. 2012). However, there is some question of how much the volume of certified cocoa will actually increase, since the same cocoa can be certified by multiple standards (Matissek et al. 2012). If producers are certified by more than one standard, cooperatives and buyers have more flexibility to sell the cocoa if demand for one certification standard is lower than expected (KPMG 2012). Most farmers become certified through membership in a certified agricultural cooperative, which guides them through the certification process, provides training, and monitors their compliance. Other farmers attain

¹⁰ Organic certification does not have a significant presence in West Africa. Organic cocoa is more prevalent in Latin America, and cocoa is a very small share of its certified products portfolio more broadly, so the Organic standard won't be explore further.

certification through a certified “traitant,” or licensed buyer, who has been certified through an organization like UTZ. In the case of certified cooperatives, all of their members must themselves be certified or, if a newer member, soon to be in the process of attaining certification. If a member neglects certain certification requirements, the cooperative is tasked with alerting the certifying body and coming up with a strategic plan to get the farmer back to compliance. Certifying bodies generally contract with a third party auditing organization to conduct annual inspections, which consist of field visits of semi-randomly-selected farmers. All certification standards address monitoring slightly differently, but each relies on local monitoring by cooperative staff to ensure day-to-day compliance and annual or semi-annual external audits (Raynolds, Murray, and Heller 2007).

While there is much overlap in the values of third-party certification – for example, all three include provisions to support improvements to farmer livelihoods, regulate how pesticides and hazardous materials must be handled, and prohibit child labor – different standards emphasize different values (Sustainable Agriculture Network 2017, Fairtrade International 2019, UTZ 2015). Fairtrade International focuses on poverty alleviation of smallholders, and UTZ and RA (in the process of merging to form a new joint standard under the name Rainforest Alliance) prioritize biodiversity protection and sustainable land use. While UTZ and RA have minimum shade tree or shade cover requirements, Fairtrade can include agroforestry practices as part of individual farm improvement plans but doesn’t have specific shade requirements (Sustainable Agriculture Network 2017, Fairtrade International 2017, UTZ 2015). New Fairtrade requirements – not yet applicable during this project’s fieldwork period – prohibit deforestation and degradation of vegetation in protected areas and require members to protect and enhance biodiversity (one mechanism for which can be,

among other options, agroforestry)(Fairtrade International 2019). Certified farmers that we interviewed were all certified either by UTZ or RA or both. Those that were certified by Fairtrade International were also certified by UTZ. Therefore all certified respondents were responsible for following a specific set of rules pertaining to agroforestry (table 12). It's important to note that there are no species-specific rules for the shade trees required. The tree species composition of different agroforestry systems has differential implications for biodiversity conservation. As it stands, what constitutes agroforestry is broad under the current certification standards. Additional research and coordination among stakeholders is needed to define best practices for an ideal agroforestry system in cocoa cultivation systems in Côte d'Ivoire.

Rainforest Alliance/ Sustainable Agricultural Standard (SAN)	UTZ	Fairtrade International
<ul style="list-style-type: none"> ▪ 30% canopy cover ▪ 5 tree species ha⁻¹ ▪ Maintenance of existing shade tree cover and native trees 	<ul style="list-style-type: none"> ▪ Planted trees must be non-invasive, and/or nitrogen fixing, and/or highly nutritious and provide optimal canopy cover at maturity ▪ 12 trees ha⁻¹ 	<ul style="list-style-type: none"> ▪ No specific rule

Table 12: *Certification standards related to agroforestry and cocoa production¹¹*
Compiled from (Sustainable Agriculture Network 2017, Fairtrade International 2017, UTZ 2015)

Third-party certification programs in general show promise in many of their spheres of intervention. For example, studies have found certification programs to be making some strides combating child labor (Owusu-Amankwah et al. 2014) and in certain cases alleviating

¹¹ Applicable as of fieldwork period June-July 2018

farmer poverty through price premiums and improved yields (Bray and Neilson 2017). However, many studies have identified significant limitations of certification programs. These include uneven access to the benefits of certification (KPMG 2012) and a lack of information transfer and understanding of certification requirements by smallholders (Brandi et al. 2015, Maryudi et al. 2017). These challenges can lead to mixed outcomes from an environmental management perspective. Furthermore, the agroforestry components of certification standards present unique challenges. Agroforestry demands more investment by smallholders than other requirements typical of certification programs (e.g. restricted pesticide use or properly disposing of chemical waste), requires access to seeds or seedlings, and takes longer to implement. And even when farmers are able to access seedlings, it's difficult to add new tree species onto an existing cocoa plantation; young trees won't get sufficient sunlight under the dense canopy of mature cocoa trees. Given these obstacles, the success of agroforestry certification programs on tropical cash crops like coffee and cocoa¹² have been mixed.

Two studies of RA certified coffee farmers in Colombia found that certified farmers contributed to increased tree cover more than non-certified farmers (Rueda, Thomas, and Lambin 2015) and practiced incorporating tree diversity on their cocoa plantations and reforestation (Rueda and Lambin 2013). A study of organic certified cocoa plantations in Brazil reported that, while this particular organic certification didn't actually require agroforestry, certified organic planters were still more likely to practice agroforestry (Jacobi

¹² Coffee cultivation systems are included in this literature review along with cocoa because the systems are very similar. Many current cocoa farmers in Cote d'Ivoire previously grew coffee (Ruf and Siswoputranto 1995), and cooperatives have historically often traded both cocoa and coffee (Sissoko 1994).

et al. 2014). On the other hand, work conducted in Columbia on an organic coffee certification program that required following at least two of three specific eco-friendly practices, of which shade trees was one, found no significant relationship between certification and shade cover. However, most farmers in this area were already practicing high levels of agroforestry prior to certification (Ibanez and Blackman 2016). A study of shade certified coffee cooperatives in Mexico found that while shade certified plantations protected biodiversity more effectively than those with organic or Fairtrade certifications, none of the shade-certified cooperatives actually met all of the shade requirements (Philpott et al. 2007).

Finally, monitoring compliance with certification standards presents an additional challenge. Monitoring to ensure compliance is an important component of certification, but executing an effective and comprehensive monitoring system is complex and labor-intensive. Monitoring is complicated by the sheer number of certified producers and the need for monitoring infrastructure and local capacity (Potts et al. 2014). According to Potts (2014 p.153), “ensuring that sustainable practices being claimed are actually being applied is a task of monumental proportions.”

Statement of Research Questions

The growing body of literature on agroforestry and certification suggests that certification can be an important tool to promote agroforestry adoption, which in turn can provide valuable ecological benefits. However, given that much work to date on certification and tropical cash crops has focused on Latin America (Loconto and Dankers 2014) and coffee (KPMG 2012, Lemeilleur, N’Dao, and Ruf 2015), agroforestry in cocoa certification merits a closer look, particularly in the West African context. Furthermore, agroforestry is

particularly challenging to incorporate effectively into certification standards as compared to other environmentally friendly practices. This study seeks to better understand how cocoa smallholders view agroforestry and the potential role of certification standards to incentivize further adoption. This is an important relationship to understand given the growing interest in certification as a response to the need to more sustainably grow commodities like cocoa while simultaneously protecting and restoring forests.

Research Questions

1. *What is the species composition and density of non-cacao trees on cocoa plantations in the study area?*
2. *What are the benefits and disadvantages of agroforestry for farmers?*
3. *What are certified farmers' understandings of agroforestry requirements and monitoring efforts?*
4. *Which social and demographic factors are associated with higher agroforestry adoption?*

II. Methods - Data Analysis

Data was collected through two methods: 1) individual semi-structured interviews with cocoa producers and key informants and 2) a brief survey of cocoa producers.

Supply Chain Relationships

Key informants, including five pisteurs, three “délégués” and “producteurs relais” (individuals employed by cooperatives to work with planters and transport cocoa), one certification label employee, seven cooperative representatives and two union of cooperative representatives, were interviewed about their relationships with other actors along the supply chain. Qualitative data from these interviews were combined with responses from individual interviews of farmers (described below) to understand supply chain dynamics and, more

specifically, the incentive structure related to producing and selling both certified and non-certified cocoa.

Variation in Tree Density

The brief survey of cocoa producers was conducted to create an inventory of cocoa fields in the village of Baleyo. For each of their fields within the village territory, 88 certified and 37 noncertified farmers were asked about field size and the number of non-cacao trees in their fields (distinguishing between fruit and forest tree species and defined as mature trees). In this way, data from 132 fields were collected. Using the tree counts and field sizes, the forest, fruit, and total tree density was calculated for each farmer's land planted in cocoa using weighted averages by field size for those individuals with multiple fields.

In order to assess the accuracy of the self-reported tree counts, ten farmers were randomly selected for field verification. The field(s) of each farmer was visited and the numbers of forest and fruit trees were counted and compared to the numbers reported in the survey. The cooperative in Baleyo provided production statistics for each member. These data were used to verify the total hectares planted with cocoa reported by each farmer who was a member of the cooperative.

Farmers' Knowledge of Agroforestry

Longer interviews of 13 certified and 33 noncertified cocoa farmers were conducted in the villages of Baleyo, Dobré, and Agnikro. Because farmers in Agnikro cannot be certified since the majority of them cultivate cocoa in the nearby protected area, the interview dataset contains more non-certified than certified farmers. Informants were selected by a combination of snowball sampling and random sampling. Buyers' lists of farmers from

whom they purchase were used to select respondents across social groups and magnitudes of cocoa landholdings. Snowball sampling was used to identify respondents who sold cocoa to buyers from whom we had no list of farmers. Questions were focused on informants' views of agroforestry and its benefits, disadvantages, and challenges. Informant responses to the benefits of agroforestry were categorized as being specific to cocoa production or more generally applicable, and certified and non-certified farmer responses were tallied separately for comparison. Responses to the question of problems associated with agroforestry were similarly tallied for both certified and non-certified farmers. In order to assess certified farmers' understanding of the agroforestry requirements of their certification programs, responses to the question "is there a [certification] rule for agroforestry?" were coded as one of four response categories: 1) no rule, 2) mixing in other trees with cocoa is suggested, 3) planters are encouraged not to cut trees but there is no minimum requirement, 4) yes there is a rule, along with the minimum requirement. These responses were further supplemented with qualitative information from interviewees' responses to questions about the monitoring of agroforestry practices by certifying bodies.

Factors Associated with Differences in Certification Status and Tree Density

To further explore the themes identified in the qualitative data derived from interviews, statistics were performed using the field inventory data. Univariate regressions of certification status were run on each social group and significant variables were retained. Multivariate linear regressions of certification status were then run on significant social groups, total hectares and age of trees. Linear regressions were then run on forest, fruit and total tree density in order to identify factors associated with agroforestry engagement. Variables considered were the farmer's social group, certification status, total hectares of

cocoa cultivated, and age of planted cocoa trees. All regression models were retained that lack collinear independent variables with residuals analyzed to ensure constancy of variance, independence, and normality of error terms.

III. Results

Supply Chain Relationships

Some farmers in the study area were certified by multiple standards (i.e. both Fairtrade and UTZ or UTZ and Rainforest Alliance). In these cases farmers were members of cooperatives that had multiple certifications. Key informants from cooperatives explained that they chose to be certified by multiple certification labels because it allowed more flexibility in contracts. Prior to the harvest season, cooperatives establish contracts with exporters, or occasionally directly with chocolate companies themselves, for a specific volume of cocoa of a particular certification. In seasons where the cooperatives' members produce more certified cocoa than specified in the contract, the cooperative will attempt to find a buyer for that label of certified cocoa, a task made easier if the cocoa was grown following the rules of multiple standards. If the cooperative cannot find a buyer for that extra volume of certified cocoa, it will sell it as non-certified or "cacao ordinaire", for which no monetary premium will be received (see Chapter 2 for a discussion of cooperatives, premiums and contract quotas). Cooperatives and certified buyers sometimes switch certifications over time to meet the preferences of the exporters to whom they sell, but that isn't frequent.

Variation in Tree Density

All farmers practiced a low level of agroforestry. None of the farmers surveyed had zero non-cocoa trees, and only 11 of the 125 had an average density of fewer than three total trees ha⁻¹ (table 13). Fruit trees were found at a slightly higher density than forest trees, and while fruit trees were generally planted, only six respondents had actively planted forest species (table 14). The rest of the forest trees found on cocoa fields had naturally regenerated or been planted by a parent. There was little difference in tree densities between certified and non-certified farmers. Both groups on average fell far below the minimum agroforestry requirement for UTZ certified farmers. Less than 14% of certified farmers and 20% of non-certified farmers had the required 12 trees ha⁻¹, and notably the rate of compliance was lower among certified planters compared to non-certified planters.

	Forest Tree Density		Fruit Tree Density		Total Tree Density		UTZ Compliant
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Count
Certified (n=88)	3.52	3.10	4.67	3.62	8.20	5.82	12
Non-Cert. (n=36)	2.69	2.41	5.83	4.48	8.53	6.29	7

Table 13: *Average tree density by certification status and UTZ compliance*

Common Fruit Trees	Common Forest Trees
orange (<i>Citrus sinensis</i>)	*fromager (<i>Ceiba pentandra</i>)
avocado (<i>Persea americana</i>)	*akpi (<i>Ricinodendron heudelotii</i>)
mango (<i>Mangifera indica</i>)	iroko (<i>Milicia excelsa</i>)
kola (<i>Cola nitida</i>)	*fraké (<i>Terminalia superba</i>)
coconut (<i>Cocos nucifera</i>)	baobab (<i>Adansonia spp.</i>)
oil palm (<i>Elaeis guineensis</i>)	ilomba (<i>Pycnanthus angolensis</i>)
mandarine (<i>Citrus reticulata</i>)	parasolier (<i>Musanga cecropioides</i>)
guava (<i>Psidium guajava</i>)	
grapefruit (<i>Citrus paradisi</i>)	
papaya (<i>Carica papaya</i>)	
petit kola (<i>Garcinia cola</i>)	
mirabelle (<i>Prunus domestica</i>)	
lemon (<i>Citrus limon</i>)	

Table 14: Common fruit and forest tree species on farmers' cocoa fields

The field verification of self-reported tree counts confirmed that a large fraction of the counts reported by farmers was relatively accurate. Five farmers reported the exact number of forest trees and four reported the exact number of fruit trees (table 15). The majority of farmers were within 20% of the actual number and only one farmer over-reported by more than 70%. This farmer over-estimated his forest trees by 30 because he, unlike most farmers, counted very small saplings as “trees”. He and one other farmer reported total tree densities of approximately 60 trees/ha and were extreme outliers to the rest of the data set. For this reason, the self-reported tree counts of the farmer whose actual tree numbers were collected as part of the field verification were replaced by the field data. The other farmer was excluded from the analysis. Furthermore, there was a high degree of correspondence between the hectares reported by cooperative members and those numbers in official cooperative documents (figure 7). In a handful of cases, the number of hectares reported by the farmers was much lower than that found in the cooperative list. However, the cooperative list contains all fields in the area managed by the farmer, while we only surveyed farmers

about their fields in the village territory, which likely explains these outliers. That this subset – cooperative members (n=77 fields) – was highly accurate in reporting their land holdings suggests that the self-reported hectares of cocoa can be used to calculate tree densities. Taken as a whole we can be confident in conducting statistical analyses using this self-reported data.

Self-reported tree count			Field visit tree count			Difference		
Forest	Fruit	Total	Forest	Fruit	Total	Forest	Fruit	Total
5	13	18	5	15	20	0	-2	-2
5	17	22	8	7	15	-3	10	7
4	15	19	4	14	18	0	1	1
3	5	8	3	5	8	0	0	0
5	10	15	4	10	14	1	0	1
7	3	10	9	7	16	-2	-4	-6
5	5	10	7	6	13	-2	-1	-3
10	30	40	10	31	41	0	-1	-1
5	22	27	5	22	27	0	0	0
41	16	57	11	16	27	30	0	30

Table 15: Field verification of self-reported tree counts

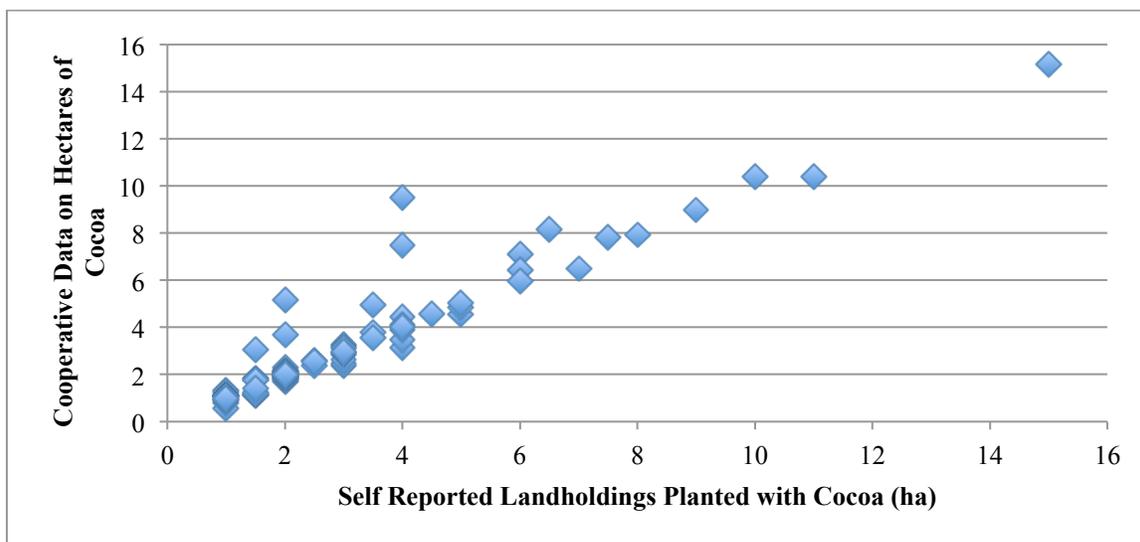


Figure 7: Verification of self-reported hectares of cocoa using cooperative records

Farmers' Knowledge of Agroforestry

When interviewed about the benefits of planting other tree species on cocoa plantations, certified planters more heavily emphasized benefits specific to cocoa production like the protection of cocoa from the sun or microclimatic benefits of shade trees (table 17). Non-certified farmers, on the other hand, were more likely than their certified counterparts to cite general benefits of trees, like the role of edible trees in household consumption or use of trees as fuel and building materials.

	Benefits (multiple response question)	Certified (n=13)		Non-Cert. (n=33)	
		Count	%	Count	%
Cocoa-Specific	Protects cocoa from sun/provides shade	9	69.2	12	36.4
	Leaves and fruit fertilize soil	4	30.8	0	0.0
	Trees keep soil damp	1	7.7	3	9.1
	Roots prevent erosion	2	15.4	0	0.0
	Improves cocoa production/longevity	1	7.7	4	12.1
	Yams grow on other trees, sparing cocoa	0	0.0	3	9.1
	Species-specific	0	0.0	2	6.1
General	Trees bring rain	4	30.8	3	9.1
	Edible	0	0.0	4	12.1
	Aesthetics	0	0.0	1	3.0
	Fuel wood/building materials	0	0.0	4	12.1
	Reforestation	1	7.7	0	0.0
	Medicines	1	7.7	0	0.0
	Teach kids about trees	0	0.0	1	3.0
	None	1	7.7	9	27.3

Table 16: *Benefits of non-cocoa trees by certification status*

Both certified and non-certified farmers mentioned a variety of problems with incorporating other tree species onto cocoa plantations, most commonly responding that too much shade can be harmful for cocoa production (table 18). The major difference was that over half of

certified farmers interviewed named no negatives associated with planting trees, compared to less than 20% of non-certified farmers.

Problems (multiple response question)	Certified (n=13)		Non-Cert. (n=33)	
	Count	%	Count	%
Too much shade harmful	5	38.5	16	48.5
Attracts pests	1	7.7	4	12.1
Damage from timber extraction	2	15.4	0	0.0
Wind damage	1	7.7	1	3.0
Non-compatibility	1	7.7	5	15.2
Compete for water	1	7.7	0	0.0
Young cocoa can't grow in shade	0	0.0	1	3.0
None	7	53.8	6	18.2

Table 17: *Problems associated with planting non-cocoa trees on cocoa plantations*

Individual interviews indicated a significant lack of understanding on the part of certified farmers in terms of the agroforestry requirements of their certification programs. Only two of sixteen were confident that there was in fact a minimum requirement, as opposed to a “suggestion” to either not cut or actively plant non-cocoa trees (table 19). This parallels a more fundamental lack of familiarity with certification in general. When asked about the requirements of their certification, certified farmers often conflated cocoa quality standards required by the national Conseil du Café-Cacao with certification rules. Furthermore, several planters were not actually sure whether or not they were certified, or by whom. Of the 88 certified planters, 45 didn’t know by whom they were certified and named the cooperative as opposed to a specific certification standard, and 15 were not familiar with the concept of certification or didn’t believe they were certified. Nonetheless, the planters

were treated as certified in the context of this study if their names were found on the list of a certified cooperative or pisteur.

When certified interviewees were asked about the monitoring of their agricultural practices as part of their certification program, the responses were mixed. Nearly all planters were familiar with some level of monitoring and explained that external auditors arrive annually or semi-annually and visit a subset of farmers' cocoa fields. However whether these individuals were from the certified cooperative, a certifying body like Rainforest Alliance or UTZ, or a downstream buyer was often not clear to farmers. When questioned about monitoring of agroforestry, specifically, the responses differed. While many explained that their agroforestry practices aren't monitored at all, others explained that they needed to show progress over time (i.e. by having planted additional trees from prior years or having an intention to plant in the near future), but that meeting the minimum shade requirement wasn't really required. Still others weren't sure at what level agroforestry adoption was monitored. As one planter pointed out, how would he know what an auditor was writing on his clipboard? Auditors could be counting and recording the number of trees without any verbal indication.

Agroforestry Rule	Total (n=13)
None	5
Encouraged not to cut them, but no min. requirement	5
Suggested to mix other trees in with cocoa	1
18/ha minimum ¹³	2

Table 18: *Understanding of agroforestry rules by certified farmers*

¹³ UTZ previously required 18 trees ha⁻¹, but moved to a minimum of 12 trees in 2015 (UTZ 2015)

Factors Associated with Differences in Certification Status and Tree Density

Certification Status

To understand social drivers of certification status, univariate logistic regressions of certification status (0=not certified, 1=certified) were run on all social groups. Both Bété and Baoulé group membership had significant relationships with certification status (p-values of 0.01 and 0.001, respectively) and were thus retained in the multivariate analysis, the results of which are presented in table 20. Members of the Bété social group were more likely to be certified than not, while those that identified as Baoulé had a negative relationship with certification status.

	Coefficient	p-value
Bété Membership	2.3	0.03
Baoulé Membership	-1.12	0.01
Intercept	0.92	3.46
Pseudo R-squared	0.13	

Table 19: *Multivariate logistic regression of certification status*

Tree Density

A comparison of mean tree densities across social groups in Baleyo found that the group comprised of individuals from Mali and Benin had a higher fruit tree density than the other social groups, but also had a much higher variance (table 21). Generally there was more variation in fruit tree density than forest tree density across groups.

	Certification Status		Forest Tree Density		Fruit Tree Density		Total Tree Density	
	Cert.	Non-Cert.	Avg.	St. Dev.	Avg.	St. Dev.	Avg.	St. Dev.
Bété (n=26)	25	1	3.5	4.18	3.53	3.65	7.03	7.41
Etranger (n=11)	8	3	3.33	2.47	7.79	5.72	11.12	7.8
Burkinabé (n=35)	26	9	3.72	3.2	5.17	4.22	8.89	6.22
N. Ivorian (n=24)	16	8	3.26	2.45	5.45	3.37	8.7	5.17
Baoulé (n=29)	13	16	2.58	1.46	4.74	2.79	7.31	3.23
	88	37	3.28	2.93	5.01	3.91	8.29	5.94

Table 20: Summary statistics by social group calculated from survey responses

To better understand factors associated with tree density, the total hectares of cocoa, age of cocoa trees, certification status, and all social groups were considered as independent variables. An evaluation of the full model found that no social groups was significantly correlated with any type of tree density, and so linear regressions of tree density were run on total hectares of cultivated cocoa and certification status (age of cocoa trees was excluded because it was found to be correlated with total hectares with a correlation coefficient equal to 0.45 at $p < 0.000$). The results of the three tree density regressions – fruit trees, forest trees, and total trees – are reported in table 22. For all three regressions, total hectares was found to have a significant negative relationship with tree density. Certification status had a negative relationship with fruit tree density, but was not correlated to forest or total tree density.

	Forest Tree Density		Fruit Tree Density		Total Tree Density	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Certification status	0.91	0.1	-1.06	0.16	-0.15	0.9
Hectares cocoa	-0.36	0.001	-0.47	0.002	-0.84	<0.0001
Intercept	3.81	<0.0001	7.28	<0.0001	11.09	<0.0001
Adj. R-squared	0.08		0.08		0.09	

Table 21: Regression results of forest, fruit, and total tree density

IV. Discussion

There were some gaps in farmer understandings of which standard they were certified by, certification as compared to cooperative membership, and the exact rules with which they had to comply. However, it's important to note that relationships between producers, cooperatives, buyers, and exporters predate the introduction of certification programs (Lemeilleur, N'Dao, and Ruf 2015). Certification standards were super-imposed on a pre-existing set of social and economic relationships between upstream supply chain actors, which suggests that farmers' confusion doesn't represent an explicit failure of information transfer on the part of any specific party, but rather is a function of the complicated and evolving system in which these actors operate.

Certification is strongly shaped by social group, suggesting not a preference inherent to a particular ethnic identity, but rather the influence of social networks in the context of this study area. Many certified farmers are also members of cooperatives and prior work in economics has demonstrated a link between social learning and participating in collective action (i.e. participation is higher among those that have a large proportion of people participating around them), further corroborating these findings (Mensah et al. 2012). See the discussion section in Chapter 2 for a full discussion of the limitations of applying such socio-spatial results using data from a spatially clustered village like Baleyo to a village where social groups are more dispersed, like Dobré.

Notably, while social group clearly plays a significant role in the decision to become certified, group membership did not translate to differences in non-cocoa tree densities. The most statistically significant factor was the total hectares of cocoa fields, which had a negative relationship with all three densities, likely because non-cocoa trees serve a

subsistence or household purpose. Another study in Côte d'Ivoire similarly found that average non-cocoa tree densities depended in part on total hectares (Smith Dumont et al. 2014). Those with less land had higher concentrations of trees because cocoa fields were the only places where non-cocoa trees were grown to meet household needs for consumption, fuel, and building materials. The non-cocoa tree densities reported by Smith Dumont (2014) and by another study in the same region (Gyau, Smoot, Diby, et al. 2014) generally correspond to my data, which were lower than those found in other West African countries (Atkins and Eastin 2012, Jagoret et al. 2014). This indicates that farmers in Côte d'Ivoire, the world's largest cocoa producer, generally practice agroforestry at levels lower than neighboring cocoa-producing countries. Gyau et al. (2014) assessed the individual densities of five major tree species in the department of Soubré, and found that receiving extension services specifically increased the presence of akpi, which correlates with my finding that akpi was one of the few non-fruit tree species that is actively planted.

Though certification status was generally not found to be statistically correlated with non-cocoa tree densities in this study (except a negative relationship with fruit tree density, which just met the cutoff for statistical significance), theoretically there are three ways through which certification would promote agroforestry adoption: 1) outreach or training on the benefits of shade trees, 2) the price premium, and 3) compliance with certification rules because of monitoring mechanisms.

The literature generally supports the first mechanism; studies conducted across different agroforestry systems have found a positive connection between certification and training on the benefits of shade trees (Smith Dumont et al. 2014) and between training and agroforestry adoption (Adesina et al. 2000, Casey and Caviglia 2000). My results did

partially support the first mechanism, though the exact impact of additional training through certification appeared to be mixed in this study area. While both certified and non-certified farmers were familiar with a variety of advantages of incorporating different trees species into their cocoa plantations, certified planters cited more advantages specific to cocoa production, while non-certified planters emphasized more general benefits. This suggests that certified planters did receive training through their certification program and/or were better able to retain information received on the benefits of shade systems. Furthermore, non-certified farmers were far more likely than their certified counterparts to answer that there were no benefits of incorporating other tree species, which suggests that the training certified planters received on good agricultural practices did affect their perceptions of shade trees and increase their knowledge of the ecological and production benefits. However, that 7% of certified farmers could not name an advantage of alternative tree species is noteworthy, and suggests that there is work to be done to improve agroforestry extension. This was emphasized by a key informant from a union of cooperatives who explained that a major challenge was that many farmers need to be trained multiple times in order to fully absorb the material presented, though this might simply reflect a weakness in the training itself as opposed to a failure on the part of the farmers. This finding is important given that the perceived positive benefits of agroforestry have been shown to significantly influence adoption (Neupane, Sharma, and Thapa 2002).

In terms of disadvantages to practicing agroforestry, more certified planters than non-certified said there were none. Though one NGO employee explained that farmers were hesitant to plant other trees on their cocoa plots for fear that loggers will extract the timber and destroy the cocoa trees in the process, only two of 46 interviewees mentioned this as a

disadvantage. A new law on timber rights prohibits the extraction of timber without farmer consent. Once fully enacted and communicated to all parties, it is likely to further reduce this barrier to agroforestry adoption. Instead, the most commonly cited disadvantage was that too much shade could impede cocoa production. Counter to Smith Dumont's (2014) finding that farmers almost universally wanted more trees on their farms, most planters in my study area explained that they didn't want any more trees on their cocoa plantations because what they already had was sufficient or they feared hurting their cocoa production. Interestingly, while in another study in Côte d'Ivoire on cocoa farmer perceptions of agroforestry respondents cited similar advantages of shade trees, less than 5% of these farmers mentioned reduced cocoa yields as a disadvantage of shade (Smith Dumont et al. 2014). Though the literature is divided on the exact effects of agroforestry practices on cocoa production, all farmers in this study were well below the levels considered to be true "shade grown cocoa" or the levels of agroforestry found to impact yields in studies on production tradeoffs (Koko et al. 2013, Gockowski and Sonwa 2011, Bisseleua, Missoup, and Vidal 2009). Therefore farmers in this region, nearly all of whom are practicing low shade cocoa cultivation, could safely incorporate additional trees onto their plantations without adverse consequences for production. The fact that certified and non-certified farmers both cited this concern at similar levels suggests that additional training is needed. My results indicate that while certified farmers are better equipped than non-certified growers to name advantages of shade systems, they are no more informed about the numbers of shade trees that provide these benefits.

Furthermore, other work has found that certification status impacts the *intention* to plant trees, through training on the benefits (Gyau, Smoot, Kouame, et al. 2014), but not the current number of non-cocoa trees (Gyau, Smoot, Kouame, et al. 2014, Smith Dumont et al.

2014). My results – that certification status was found to be statistically unrelated to non-cocoa tree densities – are therefore unsurprising, especially considering that these non-cocoa trees typically predate the attainment of certification status and the time investment required to grow additional non-cocoa trees.

The intention to plant non-cocoa trees has also been found to be positively influenced by receiving a monetary premium from certification in the prior year (Gyau, Smoot, Kouame, et al. 2014). These results, that farmers intend to plant trees to stay compliant with certification rules and therefore continue receiving a price premium lend support to the second mechanism by which certification could promote agroforestry. However, my results did not support this mechanism as a major factor impacting agroforestry adoption. While my data showed that receiving a premium was a major reason for joining a cooperative (see Chapter 2), no farmer brought up the premium when discussing the advantages of having more shade trees or during discussions of monitoring and compliance. This may reflect the uneven receipt of price premiums among the certified farmers in this study.

The third theoretical mechanism, compliance monitoring systems, also appeared not to play an important role in agroforestry adoption. While it might be expected that fear of sanctions for non-compliance would encourage farmers to adopt a practice required by certification, this did not emerge as a major motivating factor. The incentives to incorporate non-cocoa shade trees onto plantations listed by farmers were very focused on the pros and cons of the trees themselves, not fear of non-compliance. Furthermore, there was a clear gap in knowledge about the agroforestry requirements of certification standards by certified farmers. Only a few could confidently name a minimum number of trees, while the rest expressed that they were encouraged to keep existing trees on their plantations and/or plant

additional non-cocoa trees, but didn't believe there was a minimum number required. Smith Dumont's (2014) findings on eco-certified farmers and their knowledge of agroforestry requirements were similarly confused, though half were able to correctly identify the minimum required. In their study one third said they didn't know and the rest reported numbers from 7 to 70 trees per hectare as the minimum requirement (Smith Dumont et al. 2014). Farmers we interviewed were much more consistent in responding to questions about other certification requirements, like pesticide application or pruning, than agroforestry. This indicates that agroforestry requirements were poorly understood, which was also visible in responses to questions about monitoring. Farmers had a relatively clear understanding of how certification audits worked, though the exact party conducting the inspections was frequently unclear. However, farmers were not sure how, if at all, their compliance with agroforestry requirements was monitored. A key informant from one certifying organization explained that auditors eyeball the number of trees to get a sense of whether the planter is meeting the minimum, but don't ask farmers to self-report numbers or count each tree. It's unsurprising, therefore, that farmers are unclear on the level of agroforestry monitoring specifically. The key informant further emphasized that certifying organizations understand that agroforestry takes more time to implement than more straightforward requirements whose execution is immediate. They work to provide saplings and training to overcome obstacles to implementation but simultaneously have less stringent expectations of farmers' compliance with the tree minimums, which suggests that farmers aren't inaccurate when they describe the tree minimum as more of a suggestion than a firm rule.

V. Conclusion

Overall, certification shows some promise for the promotion and adoption of agroforestry in cocoa cultivation systems in Côte d'Ivoire. However, given the many barriers to adoption – fear of shade trees harming production, difficulty of planting new trees under a mature cocoa canopy, and high level of investment – it is unlikely to meaningfully impact agroforestry engagement in the short- or medium-term. Certification has the most potential to impact agroforestry practices through the mechanism of training on the benefits of shade systems; neither monitoring of compliance nor the continued receipt of a price premium seemed to increase the incorporation of non-cocoa trees in the study area. However, cooperative and certification standard representatives explained that farmers often require several repeated trainings on the same topic to retain the information presented. And while certified planters were well informed about the advantages of agroforestry there were still some gaps in knowledge. This suggests that although training via certification offers important benefits, these benefits are unlikely to be realized immediately. Retention and implementation of the ideas presented in trainings is a long-term process.

Certification programs stand to be most impactful by tailoring trainings to directly counter farmers' fear of decreased yields due to the incorporation of shade trees, which was the most widespread concern among farmers in this study area and is the legacy of full-sun promotion by national research and extension services over many decades. In addition to following longstanding advice to clear forests and cultivate cocoa in full-sun systems, agroforestry-promoting certification programs are complicated by the pre-existing social and economic relationships between supply chain actors. This can lead to confusion in the source of specific production standards (certification requirements versus national quality standards

enacted by the Conseil du Café-Cacao, for example) and the source of external monitoring. Certification programs therefore must continue to work closely with certified organizations – either cooperatives or licensed buyers – and farmers to ensure clear communication between all parties and improved knowledge transfer to farmers.

Additionally, certification programs should focus on incorporating non-cocoa trees into cocoa fields at the moment of initial planting or re-planting, thereby avoiding the issue of planting new tree species under a mature cocoa canopy. Many of the fields in the study area are planted with aging trees that are no longer very productive. Farmers will soon need to replant existing or establish new fields if they hope to continue growing cocoa. This represents an important opportunity to shift the cultivation systems in place from low-shade to more diverse agroforests. Targeting training and farmer outreach to this moment of transition has significant potential to increase uptake of agroforestry practices across the study area, and in other regions of Cote d’Ivoire facing similar realities.

Conclusion

Social groups play a significant role both in the decision to join a cooperative and to become certified. Social learning leads individuals to follow similar practices to those in their social networks, and several non-members expressed interest in joining a cooperative if someone were to invite them. This suggests that outreach to farmers of different social groups will be crucial to reach more farmers overall. Cooperatives seeking to expand membership would benefit from targeting outreach to non-autochtone populations. Given that Bété group members in the study area were more likely to both join cooperatives and be certified, additional recruitment among the autochtone population may be redundant.

Mismanagement by prior cooperatives has left a legacy of mistrust in the minds of some planters, which also influencing membership decisions. Rebuilding trust will take time, but that the most frequently cited benefit of being in a cooperative was honesty in payment is telling. It suggests that the current cooperatives, at least in this study area, are perceived as trustworthy by those who join. Furthermore, once individuals joined cooperatives, they were very unlikely to switch, while those that remained independent switched between pisteurs more frequently. This suggests that social group connections may encourage not only cooperative membership, but also member retention. People may be less likely to leave a cooperative, even under imperfect circumstances, if their social connections remain members.

One of the major frustrations with cooperative membership was the delay in payment for cocoa. If the goal is to encourage farmer participation in cooperatives, given that smallholders are more easily reached by reform initiatives when they're affiliated with a cooperative organization, then capacity building at the level of the cooperative may be

beneficial. This would allow for more transparency, encouraging trust among members – which may reach non-members indirectly, helping to engender trust among potential members as well – and may prevent, or at least reduce, delays in payments for harvested cocoa. Increased transparency may also help resolve frustration over the failure to receive monetary premiums in cases where the contract quota is met and the cooperative (or other certified buyer) is unable to find a buyer for additional certified cocoa.

Farmers across the study area, both certified and non-certified, already practiced low levels of agroforestry and were aware of many benefits of shade trees. Certified farmers were more familiar with benefits specific to cocoa production, likely the results of training received through certification. However, farmers in both groups, regardless of certification, listed that too much shade was harmful to cocoa production as the most common negative of including shade trees on cocoa fields. Therefore additional training is needed, targeted specifically at this concern. The levels of low shade agroforestry practiced in the study area were generally far below the level of shade required to negatively impact cocoa yields. This point is crucial to emphasize in order to overcome one of the major barriers to agroforestry adoption.

Training should also focus on moments of transition, i.e. during the replanting of cocoa trees on an existing field or the establishment of new field, because incorporating non-cocoa trees is challenging once cocoa trees have matured and formed a dense shade canopy, which inhibits growth of other trees. It is well understood that training impacts intention to plant, but not necessarily the current number of trees. To ensure that the intention to incorporate additional non-cocoa trees is eventually implemented, trainings must be targeted to the temporal realities of the cocoa lifecycle.

There are many social and economic factors that mediate farmers' decision to join cooperative organizations, participation in certification programs, and adoption of agroforestry practices. An in-depth understanding of the complex network of incentives and constraints in which farmers operate can help inform effective policies that have the potential to overcome barriers to change.

Appendix

FARMER INTERVIEW QUESTIONNAIRE

Infos sur le ménage

1. Les membres du ménage participent à quelles activités économiques (pour le ménage, pas eux-mêmes)?

2. Pour chaque culture vivrière/culture de base (par exemple, le riz, le manioc):

Culture	Pour combien de mois est-ce que la récolte a suffit?	Quantité de production?

3. Vous avez gagné combien de revenu en espèce *l'année dernière* pour chaque activité économique?

Activité	Revenu en espèce
a. Production de cacao	
b.	
c.	
d.	

Stratégies de production

4a. Vous êtes ici depuis combien de temps ? _____

4b. Vous êtes membre de quel communauté ? _____

4c. Vous cultivez le cacao depuis combien de temps? _____

4d. Toujours ici ou d'ailleurs?

5. Vous avez fait autre chose avant le cacao ? Pourquoi cacao maintenant? 6. Pour chaque champ de cacao

Champ	Taille	Taille (ha)	Site	Comment avez-vous obtenu l'accès ?	Circonstances avant (cultivé, forêt, cacao) ?	Age des arbres (ans)	Autres espèces (O/N)	Quelles espèces ?	#
1									
2									
3									

7a. (*Faire référence à l'âge des arbres*) Quand les arbres ne produisent plus, qu'est-ce que vous allez faire ? (Replanter ? Ici ou ailleurs ? Cacao ou autre culture ?)

7b. Est-ce qu'on peut replanter une plantation de cacao sur une ancienne plantation de cacao ou est-ce que la terre devienne épuisée? Sinon, pourquoi ? (Au niveau des sols, de maladies, etc.) On peut planter d'autres cultures là-bas? Lesquelles ?

8a. Les jeunes hommes du ménage (*s'il y en a*), est-ce qu'il veulent établir leurs propres plantations de cacao quand ils établissent leur propres ménages ? Sinon, ils veulent faire quoi pour gagner la vie ?

8b. Si cacao, qu'est-ce qu'ils vont faire quand ils veulent établir leur propre plantation de cacao ? (accès à la terre, lieux des champs) ?

9a. Parlez moi des rendements. Quels sont les problèmes le plus grands en ce qui concerne les rendements (insectes nuisibles, les maladies) ?

9b. C'est pareil pour tous les champs ?

10. Autres défis par rapport à la production de cacao ? L'importance dans le village ?

11. Vous utilisez les intrants comme l'engrais ou les pesticides ? Vous les obtenez d'où ?

L'agroforesterie

12a. Si oui, vous les avez planté ou ils ont régénéré naturellement ?

12b. Si non, est-ce que vous avez jamais planté d'autres arbres avec le cacao ? Pourquoi ou pourquoi pas ? Pourquoi est-ce que vous avez arrêté ?

13a. Quels sont les avantages d'avoir d'autres espèces d'arbres sur les champs de cacao ?

13b. Est-ce qu'il y a des problèmes ?

14a. Vous souhaitez avoir plus d'arbres sur les champs de cacao ? Pourquoi ou pourquoi pas ?

14b. Si oui, quels sont les obstacles?

15. D'où est-ce que vous obtenez les arbres d'ombrage ?

Coopératives et Certification

16a. Vous êtes membre d'une coopérative? [O N]

16b. Laquelle/Lesquelles ? _____

16c. Vous êtes membre depuis combien de temps ? _____

17. Pourquoi est-ce que vous avez décidé de devenir membre ? Quels sont les avantages ? (Ou pourquoi pas être membre d'une coopérative ?)

18. Avant, est-ce que vous étiez membre d'une autre coopérative ? Si oui, pourquoi est-ce que vous avez changé ?

19. Est-ce que vous vendez le cacao aux plusieurs personnes, exclusivement une seule coopérative, etc. ?

20. Comment est-ce que votre cacao est transporté à l'acheteur ?

21a. Est-ce que vous êtes certifié ? [O N] Par qui ? _____

21b. Depuis combien de temps ? _____

22. Pourquoi est-ce que vous avez décidé de participer (ou pas) ? Quels étaient les avantages ? → Est-ce qu'il faut être certifié pour vendre à cette coopérative ?

23a. Quelles sont les règles de participation ?

23b. Est-ce qu'il a une règle par rapport à l'agroforesterie ?

24. Quelles règles sont les plus difficiles à suivre ? Pourquoi

25a. Est-ce qu'ils surveillent vos pratiques agricoles afin de vérifier que vous respectiez les règles du programme ? Si oui, comment ?

25b. En particulier, l'agroforesterie ?

26. Vous recevez le crédit ? De qui ? Si oui, est-ce qu'il y a des obligations liées au crédit ? Il faut vendre le cacao à la personne qui vous l 'avez donné

27. Est-ce que le programme vous avez donné des intrants agricoles?

Conclusion

Votre expérience est typique ? Quelqu'un d'autre à qui je dois parler ?

Est-ce qu'il y a d'autres choses que vous voulez me dire par rapport à la production de cacao?

HOUSEHOLD SURVEY

Nom			Groupe		Coop O N		Cert O N	
Oui	an	avant						
Pos/neg:								
Non	qui	Coop passé O N			ans	Cert O N		
Pos/neg:								
champs	#	ha	age	# forest	# fruit	CSSVD O N	Pour O N	

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