HISTORY, CULTURE AND CONTRACT FARMING
EMPIRICAL EVIDENCE FROM GHANA

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Abstract

We investigate whether colonial experiences in the Gold Coast still affect the performance of agribusiness in Ghana today. To this end, we surveyed 400 pineapple farmers in Ghana and connected this new dataset to data on the locations of Christian missionary schools and the performance of colonial cocoa cooperatives, from the first half of the 20th century. We find an effect of both historical variables on the performance of contract farming. The causal channel is a persistent change in culture: the performance of the colonial cocoa cooperatives changed peoples' belief in their own capabilities to achieve business success (self-efficacy). The Christian missionary schools, in contrast, are found to have reduced village social capital.

Introduction

Recent research suggests that history is an important explanation for cross-country-differences in economic performance (Nunn 2013). The main channels that are identified in empirical research are (a) that history affects the evolution of institutions (Acemoglu and Robinson 2001, Acemoglu et al. 2002, 2005) and (b) that history affects the evolution of culture (Sapienza et al. 2006, Nunn and Wantchekon 2009, Nunn 2012, Alesina and Giuliano 2013, Alesina et al. 2013).

In our research, we ask the question of whether it is possible to explain differences in economic performance *within* a country with historical variables. Specifically, we look at pineapple contract farming in Ghana, which is promoted by development agencies in collaboration with the government of Ghana, to overcome market imperfections, such as information dis-equilibria and financial constraints (German Society for International Cooperation 2005, USAID 2007, 2009, Millenium Development Authority 2011, World Bank 2011, USAID 2013). The performance of pineapple contract farming in Ghana has been heterogeneous in time and space so far (Fold and Gough 2008, Barrett et al. 2012, Gatune et al. 2013). A major problem that contract farming in Ghana faces is reliability. Some farmers frequently "side-sell" fruits, if they can get a better price, or faster payment, locally; and similarly, there were companies in the past that refused to pick up fruits or pay for them, when the market was troubled, which had a detrimental effect on how many farmers perceive contract farming and modern value chains. Overall, trust and confidence are low, which not only limits contract farming but the whole production process (Wuepper 2014, Wuepper et al. 2014).

Our hypothesis is that the farming contracts in Ghana are affected especially by two cultural variables, which in turn have been shaped by historical developments. The first is self-efficacy, which we hypothesize affects the individual, and the second is social capital, which we hypothesize to affect social groups. Self-efficacy might be defined as personal belief in one's capabilities to find courses of action to attain designated goals (Bandura 1977, 1997, Schwarzer 2014). This is closely related to the concepts of self-confidence (Bénabou and Tirole 2002, Filippin and Paccagnella 2012) and subjective human agency (Alkire 2005). The basic premise is that self-efficacy motivates people to aim for more ambitious goals, to persist longer in the face of adversity and to invest more effort to succeed. Given this, the concept of

self-efficacy seems highly relevant for entrepreneurial activities such as making contract farming work.

The second concept, social capital, might be defined as in Putnam et al. (1994) as "features of social organization, such as trust, norms and networks, that can improve the efficiency of society by facilitating coordinated actions". For this, social capital is likely important for the success of contract farming, and also because it helps people to overcome market imperfections and supports them when they need help (Knack and Keefer 1997, Woolcock and Narayan 2000, Feigenberg et al. 2010, Meijerink et al. 2014).

In the following we show that the success-rate of the colonial cocoa cooperatives shaped the evolution of peoples' self-efficacy, which they pass from generation to generation, and this cultural trait is important for the performance of current contract farming. We also show that the Christian missionary schools had a negative effect on village social capital, which is equally persistent and similarly important for the performance of current contract farming. Hence, we show that historically determined cultural variables are an important explanations for the observed variation in contract farming success.

Data

Our dependent variable, the income share from contract farming, and our current control variables come from a 2013 survey, representative for the pineapple farmers of Ghana. Export certified farmers were selected by stratified random sampling, starting with lists of certified farmer groups in the main pineapple region of Ghana, ending with proportional numbers of sampled farmers relative to their locations. Non-certified farmer were identified by extension agents and the German development agency and also sampled proportionally.

Our two historical variables come from Ghana's colonial period (when it was called "the British Gold Coast") and have been collected by other researchers. The first variable is the success-rate of colonial cocoa cooperatives. After the British government abolished the slave trade, they focused their attention of the export of cocoa. To improve production, they organized the cocoa farmers in cooperatives (Cazzuffi and Moradi 2010), which were in many ways similar to modern contract farming. Cooperatives were a true innovation for the approached farmers, and interestingly, the performance of these cooperatives varied greatly (as seen in map 1). This allows us to see, whether the performance of the colonial cooperatives in the 1930s and the performance of pineapple contracts in 2013 are correlated.

Map 1: Colonial Cocoa Cooperatives in the 20th Century
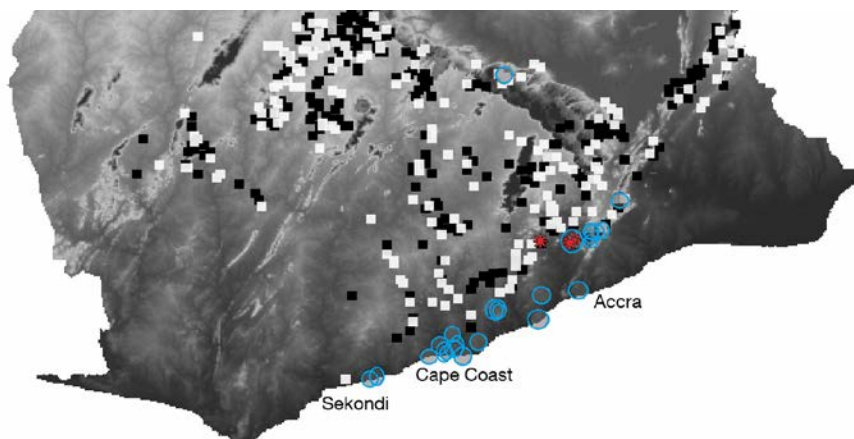
Black squares are successful cooperatives, white ones failed. Sampled farms are in the circles, companies are at the asterisks

TABLE 1. VARIABLES

Variable	Description	Mean	SD
cf_income	Income share received from contract farming (% per farmer)	22	40
cooperatives sr	Regional success rate of colonial cocoa cooperatives (% within 5 km)	.54	.18
schools	Number of Christian missionary schools around sampled farmers (w.10 km)	16	12
self-efficacy	Open ended question on past income determinants, coded into three categories according to whether farmers named internal factors, e.g., learning (=3) and external factors, e.g., rain (=1) or factors in between (=2).	1.9	.8
Social capital	How often the farmer attends social events in her or his village (scale 1–6)	4.4	1.8
age	The age of the sampled pineapple farmers in 2013 (in years)	44	11
education	The education level of the sampled pineapple farmers in 2013 (1–6)	2.7	1.2
innovativeness	Whether the farmer has tried an innovation in the recent past (1/0)	.75	.69
time preference	A farmer's discount rate of the future; choice experiment (1–7)	4.5	1.4
risk aversion	A farmer's willingness to pay to avoid risk; choice experiment (1–6)	3.3	1.3
infrastructure	Number of roads around a farmer's location (number)	3.9	4.6
coast distance	Distance from the farms to the coast (in km)	239.10	320.29
company dist.	Distance from the farms to the next company (in km)	461.54	359.97
city distance	Distance from the farms to the next city (in km)	366.50	163.60
accra distance	Distance from the farms to the capital (in km)	530.65	381.40
agency distance	Distance from the farms to the next development agency (in km)	408.83	274.73
MD2 variety	Whether the farmer grows the MD2 variety (1/0)	.31	.46
SC variety	Whether the farmer grows the Smooth Cayenne variety (1/0)	.32	.47
tenure security	How secure the farmer beliefs his fields to be (1–6)	3.3	.78
quantity sold	Quantity of pineapple sold (in kg)	9.09	16.39
farmsize	Total land available to the farmer (in hectares)	3.1	3.2
training	Repeated training (at least three times per farmer) (1/0)	.12	.32
leader	Reported openness for new ideas of the local chief (1–6)	5.3	1.2
prices	Price differential between local and company price (in US-Dollars)	.03	.20
rain quantity	Reported rainfall quantity (1–6)	4.8	1.3
rain timing	Reported rainfall timing (1–6)	4.0	1.5
rain variability	Squared difference between reported annual rainfall quantities	341	1099
rainfall zone	General rainfall pattern in Ghana (1–4)	2.4	.8
soil fertility	Reported fertility of the fields of each farmer (1–5)	1.7	.8
organic matter	General organic matter content of the soil (1–3)	1.8	.6
elevation	Elevation of the farmer's region (in m)	85	61
ruggedness	Standard Deviation of the terrain (in m)	42	38
slavery	Number of slaves exported from each of Ghana's peoples (in thousands)	102	204
malaria	Malaria ecology index on the suitability of regions for the disease	129	802
rainfall1931	Local rainfall for cocoa farms in 1931 (in mm)	12915	2035
cocoa_soil1931	Soil suitability of farms for cocoa in 1931 (in %)	.49	.46
neighbor_SR_5	Success rate of neighboring cocoa cooperatives within 5 km radius	.30	.45
dist_railroad1931	Historical distance between farms and railroad tracks (in km)	.23	.18
wider_SR_20	Success rate of cocoa cooperatives within a radius of 20 km around farm	.53	.18

Using different instruments (as discussed below), we can furthermore test, if the experience with the cooperatives had a *causal* effect on the current contract farming performance.

Because our dataset covers many cultural traits, we can also investigate what causal mechanism might connect the colonial cocoa cooperatives with the current contract farming performance.

The second historical variable is the location of Christian missionary schools. Cogneau and Moradi (2011), Nunn (2010), Woodberry (2004) and Wantchekon et al. (2013) have investigated the effect of Christian missionaries and their schools in Africa. Most closely related to our research is the research by Wantchekon et al. (2013), who find that in neighboring Benin, the missionary schools persistently increased peoples' aspirations and their human capital, which together led to higher incomes today. However, this effect is potentially countered by another effect that is described often in the historical literature: Ward (1966), for example, writes that in 19th century Gold Coast

> "the introduction of Christianity and of western education brought fresh problems. Christianity and education went together, and there were inevitably many who acquired only a thin veneer. There was a good deal of trouble from semi-educated men whose scanty stock of learning led them to arrogance or downright rascality. In the early days, there was much antagonism – even sometimes rioting – between professing Christians and those who still followed the old ways"

and Claridge (1915) reports that some missions in the Gold Coast

> "adopted a policy of separating their converts entirely from the old life for fear lest the social and artistic attractions of the old life should lead them to forget their new religion: a policy which may have been inevitable from the point of view of the Christian evangelist, but which led to a most unfortunate cleavage in the life of the community"

Hence, before our analysis, we might expect a positive effect of the missionary schools, if we believe that human capital is more important than social capital, or we expect a negative effect, if we believe that social capital is more important than human capital, which is equally plausible (Eaton and Shepherd 2001, Kirsten and Sartorius 2002, Kumar and Matsusaka 2009, Barrett et al. 2012, Bellemare 2012). The location of the missionary schools can be seen in map 2.

Map 2: Christian Schools in the 20th Century
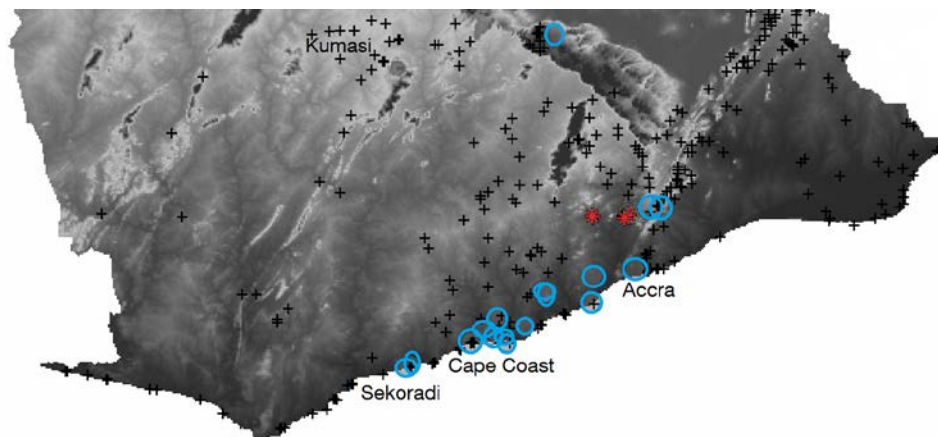
Crosses are Christian missionary schools. Sampled farms are in the circles, companies are at the asterisks

Table 1 explains our variables and presents their mean and standard deviation.

Method

In the following, we operationalize contract farming performance as percentage income share (cf_income) that the farmers receive through contract farming. This variable has the advantages that it is objectively measurable and it is independent from production quantity. Most

importantly, it reflects how much company managers and farmers value the contract relationship.

In the next section, we establish some baseline observations. As our dependent variable cf_income is in percentage, it is naturally bounded between zero and hundred. We hence use two models, first, ordinary least squares (OLS) regression. Second, a so-called fractional logit, which is a generalized linear model (GLM) with a logit link function and a binomial distribution (Papke and Wooldridge 1993, Ramalho et al. 2011).

After our baseline estimations, we turn to the causal mechanisms that explain our observations. Again, we use two approaches. The first is 2-stages-least-squares (2SLS), with instrumental variables explained in the section. The second approach uses control functions (CF), with the same instrumental variables (Wooldridge 2007, Wooldridge 2011). Finally, we turn to our final model, once more demonstrating the causal effect from two cultural traits on the success of pineapple contract farming. Once more, we use 2SLS and CF, to ensure that our estimations have a causal interpretation.

Baseline Results

Table 2 establishes some basic statistical observations. The dependent variable is always the income share from contract farming and we always control for a rich set of control variables, including prices offered by companies and the local "market women", the impact of the

Table 2: Baseline Results „Performance of Contract Farming"

	(1)	(2)	(3)	(4)	(5)
dep.var.	cf_income	cf_income	cf_income	cf_income	cf_income
model	OLS	OLS	GLM	GLM	GLM
coop_SR	0.161**	0.0919	0.978***	0.728	1.063**
	(0.0725)	(0.0597)	(0.349)	(0.492)	(0.465)
schools	-0.142**	-0.0837	-0.809*	-0.758	-1.098*
	(0.0726)	(0.0586)	(0.471)	(0.536)	(0.655)
self-efficacy		0.121***		0.801***	
		(0.0218)		(0.198)	
social capital		0.0683***		0.782**	
		(0.0195)		(0.385)	
risk aversion					-0.531**
					(0.232)
leader					0.663***
					(0.232)
quantity					0.381*
					(0.228)
prices	yes	yes	yes	yes	yes
farmsize	yes	yes	yes	yes	yes
capital dist	yes	yes	yes	yes	yes
envrionment	yes	yes	yes	yes	yes
slavery	yes	yes	yes	yes	yes
district fe	yes	yes	yes	yes	yes
N	398	398	398	398	398
(P)R2	0.39	0.51	0.38	0.51	0.44

Standard errors are bootstrapped. Significance levels are 10% (*), 5% (**) and 1% (***).

historical slave trade, farm characteristics and district fixed effects. Specification (1) indicates a positive correlation with the success-rate of the colonial cocoa-cooperatives and a negative correlation with the Christian missionary schools. Specification (2) shows that once we control for self-efficacy, the correlation with the cooperative success-rate loses its significance and once we control for village social capital, the same happens to the correlation with the Christian missionary schools. The same pattern is observable in specifications (3) and (4), in which the only difference is that we use a fractional logit instead OLS regression. Specification (5) shows that the correlation between contract farming performance and history really only depends on the two considered cultural traits, and this is robust to the inclusion of other explanatory variables, such as the farmers' level of risk-aversion, the openness of the local chief for change (leader) or the quantity produced (quantity).

Having discovered two cultural traits that seem important for our analysis, we take them as dependent variables and show the results in table 3. This is also important to understand what we really capture with our variables. Culture is persistent and slow-changing, so it should be long-term variables that explain our cultural traits. Consistent with this view and our results in table 2, it can be seen in table 3 that self-efficacy correlates positively with the performance of the colonial cocoa cooperatives and negatively with the missionary schools. The current variables agricultural training from development organizations (training), the openness of the local chief and current income from contract farming (cf_income; now as explanatory variable) are all significant, but smaller in magnitude than the historical variables. The same pattern can be seen for social capital. The main difference is that for self-efficacy, the main determinant is the performance of the cocoa cooperatives, while for social capital, the main determinant are the missionary schools.

Table 3: Baseline Results „Cultural Traits"

	(1)	(2)	(3)	(4)
dep.var.	self-efficacy	self-efficacy	social capital	social capital
model	OLOGIT	OLS	OLOGIT	OLS
coop_SR	2.001***	0.426***	1.093***	0.873***
	(0.678)	(0.107)	(0.292)	(0.270)
schools	-1.093*	-0.234*	-1.538***	-1.246***
	(0.632)	(0.120)	(0.417)	(0.313)
leader	0.727***	0.206***	0.616***	0.474***
	(0.218)	(0.0464)	(0.122)	(0.0913)
training	-0.372***	-0.119***	0.240***	0.158**
	(0.117)	(0.0236)	(0.0854)	(0.0751)
cf_income	0.839***	0.267***		
	(0.178)	(0.0383)		
prices	yes	yes	yes	yes
farmsize	yes	yes	yes	yes
capital dist	yes	yes	yes	yes
envrionment	yes	yes	yes	yes
slavery	yes	yes	yes	yes
district fe	yes	yes	yes	yes
N	398	398	398	398
(P)R2	0.232	0.397	0.115	0.313

Standard errors are bootstrapped. Significance levels are 10% (*), 5% (**) and 1% (***).

Causal Mechanism

The previous results are indicative but cannot be interpreted as causal, as both the success-rate of the colonial cocoa cooperatives and the location of the Christian missionary schools could be endogeneous.

If we want to explore whether the performance of the colonial cocoa cooperatives has a causal effect on the current contract farming performance, we must rule out that both performances are explained by an omitted (or noisily measured) variable. If, i.e., some villages are traditionally more trustworthy, better coordinated or more entrepreneurial, then this could explain why, across generations, farmers in these villages are successful with business partnerships. So, what we need is a source of exogenous variation that explains the performance of the colonial cocoa cooperatives but not the performance of current pineapple contract farming (except, of course, through the channel of the performance of the cocoa cooperatives). Cazzuffi and Moradi (2010) analyze the performance of the colonial cocoa cooperatives and provide explanatory variables that might work as instruments. First, there is the local rainfall in the year 1931[1]. Conditional on controlling for the local rainfall in the year 2013, it is plausibly uncorrelated with the current pineapple contract farming performance but does explain variation the cocoa cooperative performance. Second, there is the cocoa soil suitability in the year 1931, which, controlling for the pineapple soil suitability in the year 2013, plausibly works as an instrument similar to the rainfall variable. Thirdly, we use the colonial cocoa cooperative success-rate of neighboring villages as instrument. This arguably gets rid of persistent, local influences (assuming they were not present in the neighboring villages too) and is based on the assumption that the environment changes more continuously than village social variables.

These three instruments are used in our main specifications. All our instruments follow a similar logic: they all depend on the cocoa-specific natural environment, to condition out general environmental or social influences. The weakness is that if our logic is somehow flawed potentially all instruments fail. Hence, we also compare our estimates to an alternative specification, in which our instruments are the historical distance to the railroad and the cooperative performance in the wider region. The second instrument is basically just another variation of our third instrument. However, the historical distance between the farms and the rail-road has a completely different logic. While cocoa was transported via train, today's pineapples are transported with trucks. Hence, our argument that the historical distance to the railroad explains the performance of the colonial cooperatives but not of today's pineapple contract farming. However, this instrument is not as strong as our other instruments (in contrast to our application, it is not always significant in the estimates of Cazzuffi and Moradi (2010)) and it could also somehow influence the current contract farming because Jedwab and Moradi (2012) show that the railroad increased the income in the surrounding area. Whether this violates the exclusion restriction is not clear but for this reason we do not include the additional instruments in our main specifications.

The Christian missionary schools are plausibly exogenous. As Cogneau and Moradi (2011) describe, the location of the missions were influenced by several factors, such as disease environment and existing infrastructure. However, the missionary schools were spread out far and randomly (see map 2 and also Macdonald (1898), Claridge (1915) and Ward (1966) and recently, Nunn (2010) and Wantchekon et al. (2013)). Hence, as there is no obvious pattern, it seems to be valid to assume that the Christian missionary schools are exogenously given.

In this section we will assume that our cultural variables are determining the contract farming performance but there is no feedback from contract farming performance to culture. In the short term, this assumption is plausible because culture is slow-changing (Boyd and Richerson 1985,

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[1] Cazzuffi and Moradi 2010 provide this instrument, which is dated shortly before the cooperative performance is measured. Rainfall is exogenous to the farmers, changes only gradually and clearly impacts production.

1995, Richerson and Boyd 2008, Boyd et al. 2011). We will test our assumption by probing whether we can explain cultural variables with the current contract farming performance. In the following section, we will then also instrument culture with historical variables. But first, we turn to the causal mechanism linking history, culture and contract farming performance.

Consistent with our general analytical framework, in table 4 we show 6 specifications. In the first two, we estimate a 2SLS, in the following two we estimate a fractional logit with control functions. In the last two specifications, we estimate a 2SLS with alternative instruments and substitute the self-efficacy dummy for an ordinal variable (self-efficacy_alt) with three levels (1=low se;2=medium se;3=high se).

Table 4: Causal Mechanism Linking History, Culture and CF Performance

	(1)	(2)	(3)	(4)	(5)	(6)
2nd stage:	cf_income	cf_income	cf_income	cf_income	cf_income	cf_income
model	2SLS	2SLS	Contr-F. GLM	Contr-F. GLM	2SLS	2SLS
coop_SR	0.164*	0.102	2.422**	1.463	0.485**	0.354
	(0.0843)	(0.0785)	(1.026)	(1.173)	(0.204)	(0.276)
schools	-0.169*	-0.109	-1.872**	-1.302	-0.441**	-0.340
	(0.0864)	(0.0806)	(0.934)	(0.921)	(0.198)	(0.259)
self-efficacy		0.101***		0.766***		
		(0.0173)		(0.198)		
self-efficacy_alt						0.111***
						(0.0232)
social capital		0.0478***		0.760**		0.0582***
		(0.0168)		(0.296)		(0.0214)
1st stage:	Coop SR	Coop SR	Coop SR	Coop SR	Coop SR	Coop SR
model	2SLS	2SLS	OLS	OLS	2SLS	2SLS
rainfall1931	0.709***	0.706***	0.711***	0.709***		
	(0.0512)	(0.0512)	(0.0513)	(0.0512)		
cocoa_soil1931	0.487***	0.487***	0.462***	0.464***		
	(0.0465)	(0.0468)	(0.0434)	(0.0435)		
neighbor_SR_5	0.102***	0.1000***	0.102***	0.0996***		
	(0.0178)	(0.0178)	(0.0178)	(0.0178)		
dist_railroad1931					-0.245***	-0.229***
					(0.0547)	(0.0550)
coop_SR_20					0.232***	0.223***
					(0.0727)	(0.0720)
all covariates	yes	yes	yes	yes	yes	yes
prices	yes	yes	yes	yes	yes	yes
farmsize	yes	yes	yes	yes	yes	yes
capital dist	yes	yes	yes	yes	yes	yes
envrionment	yes	yes	yes	yes	yes	yes
slavery	yes	yes	yes	yes	yes	yes
district fe	yes	yes	yes	yes	yes	yes
N	398	398	398	398	398	398
2nd stage (P)R2	0.49	0.57	0.41	0.51	0.34	0.47
1st stage R2	0.97	0.97	0.97	0.97	0.92	0.92
1st stage F instrument	122.74	120.81	122.74	120.81	12.32	10.88

Standard errors are bootstrapped. Significance levels are 10% (*), 5% (**) and 1% (***).

Specification (1) indicates a positive causal effect of the performance of the colonial cocoa cooperatives and a negative causal effect of the Christian missionary schools. Specification (2) shows that, these causal effects lose their significance when we include self-efficacy and social capital. Specification (3) and (4) show that the pattern is robust to using a control function fractional logit instead the 2SLS. Specification (5) and (6) show that the results are robust to the substitution of the self-efficacy dummy with a three-level variable and different instruments.

Table 5: What Determines the Cultural Traits?

	(1)	(2)	(3)	(4)
2nd stage:	self-efficacy	self-efficacy	social capital	social capital
model	2SLS	CF O.LOGit	2SLS	CF O.LOGIT
coop_SR	0.452***	1.878**	0.403**	0.512***
	(0.152)	(0.736)	(0.192)	(0.175)
cf_income	0.306***	1.031***	0.587***	0.717***
	(0.0382)	(0.176)	(0.0810)	(0.154)
schools	-0.223	-0.901	-0.876***	-0.960***
	(0.148)	(0.661)	(0.207)	(0.252)
training	-0.126***	-0.427**	0.128	0.210
	(0.0352)	(0.170)	(0.0835)	(0.141)
dist Accra	0.280	2.062	-0.723**	-0.487
	(0.327)	(1.604)	(0.289)	(0.404)
infrastructure	0.0579	0.475	0.231	0.402
	(0.122)	(0.512)	(0.222)	(0.297)
tenure security	0.115***	0.405**	-0.122*	-0.134
	(0.0322)	(0.184)	(0.0735)	(0.124)
rain variability	-0.111***	-0.333**	-0.0908	-0.127
	(0.0329)	(0.167)	(0.125)	(0.209)
1st stage:	Coop SR	Coop SR	Coop SR	Coop SR
model	2SLS	OLS	2SLS	OLS
rainfall1931	0.702***	0.702***	1.164***	1.164***
	(0.0522)	(0.0522)	(0.0426)	(0.0426)
cocoa_soil1931	0.542***	0.542***	0.474***	0.474***
	(0.0412)	(0.0412)	(0.0519)	(0.0519)
neighbor_SR_5	0.112***	0.112***	0.122***	0.122***
	(0.0179)	(0.0179)	(0.0220)	(0.0220)
all covariates	yes	yes	yes	yes
prices	yes	yes	yes	yes
farmsize	yes	yes	yes	yes
capital dist	yes	yes	yes	yes
envrionment	yes	yes	yes	yes
slavery	yes	yes	yes	yes
district fe	yes	yes	yes	yes
N	398	398	398	398
2nd stage (P)R2	0.42	0.25	0.34	0.12
1st stage R2	0.97	0.97	0.95	0.96
1st stage F instrument	161.92	161.92	381.37	381.38

Standard errors are bootstrapped. Significance levels are 10% (*), 5% (**) and 1% (***).

Table 5 shows what determines the cultural variables self-efficacy and social capital. Specifications (1) and (2) indicate that the experience with the colonial cocoa cooperatives shaped the current level of self-efficacy of the farmers. The schools are not estimated to have had a significant effect. As to be expected, current context variables such as tenure security, rainfall variability and infrastructure also contribute to our measured self-efficacy. Interesting, the training of development agency is estimated to have a negative effect and research by Wuepper et al. (2014) suggests that this is not due to prior farmer selection. To test whether reverse causality could be present, we also include the contract farming income share as an explanatory variable, which we find significant but of a smaller magnitude that the effect of the colonial cooperatives.

Specifications (3) and (4) show what determines social capital. A large, negative effect is found for the missionary schools. Positive effects are indicated for the performance of the colonial cocoa cooperatives and possibly, also of current pineapple contract farming.

Overall, this suggests that the performance of the colonial cocoa cooperatives determined the farmers' self-efficacy and the Christian missionary schools affected the village social capital. Currently, both cultural variables shape the performance of pineapple contract farming. To conclude our analysis we then want to turn to a final point. If culture is the causal channel through which history impacts contract farming, we should be allowed to use the historical variables as instruments for the cultural variables, assuming that our historical variables do not affect contract farming through other channels – which is suggested by our analysis so far. This way, we explain the performance of contract farming with the variation in our cultural variables that is explained by our historical variables. This is presented in the next section.

The Effect of Culture on Contract Farming

Table 6 presents two specifications. In the first, we have to estimate three stages, to correctly estimate the effect of culture on contract farming. In the second specification, two stages are sufficient. For the first specification, we first estimate a probit to instrument high-self-efficacy with the cocoa cooperatives success-rate. We then estimate a regular 2SLS, in which we instrument self-efficacy with the fitted values from the probit estmation. The reason for this complicated estimation procedure is Hausmann's "forbidden regression", which means that only an OLS first stage is guaranteed to produce correct estimates for the second stage (Angrist and Pischke 2008, Greene 2008). If the first stage potentially has a non-linear conditional expectation function (CEF), our strategy of estimating three stages, in which the fitted values of a first-stage probit are used as instruments in a subsequent 2SLS, is a feasible trick. Because our dependent variable is still logically bound between zero and one hundred, the second specification is an important robustness check. Here, we estimate a fractional logit and control for endogeneity with control functions. The results of both specifications corroborate the story of this research: Both cultural variables, self-efficacy and social capital, are significant determinants of contract farming success and have been shaped by history.

Table 6: The Effect of Culture on the Performance of Contract Farming

	(1)		(2)	
3rd stage	cf_income		cf_income	
model	2SLS		Contr-F. GLM	
self-efficacy	0.260***		0.999***	
	(0.0891)		(0.323)	
social capital	0.189**		1.180**	
	(0.0773)		(0.586)	
price	0.619**		2.506	
	(0.259)		(2.936)	
farmsize	0.0370		0.336	
	(0.0253)		(0.216)	
2nd stage	self-efficacy	social capital		
model	2SLS	2SLS		
fitted self-efficacy	2.235***	0.851***		
	(0.317)	(0.235)		
schools	-0.0299	-0.320***		
	(0.0649)	(0.0480)		
1st stage	self-efficacy		self-efficacy	social capital
model	Probit		Probit	OLS
coops_SR	0.501***		0.501***	0.343***
	(0.182)		(0.182)	(0.0957)
schools	-0.131		-0.131	-0.669***
	(0.226)		(0.226)	(0.119)
all covariates	yes	yes	yes	yes
prices	yes	yes	yes	yes
farmsize	yes	yes	yes	yes
capital dist	yes	yes	yes	yes
envrionment	yes	yes	yes	yes
slavery	yes	yes	yes	yes
district fe	yes	yes	yes	yes
N	398		398	
3rd stage R2	0.18		0.49	
2nd stage R2	0.33	0.67		
2nd stage F instrument	27.14	184.36		
1st stage PR2	0.28		0.28	0.33

Standard errors are bootstrapped. Significance levels are 10% (*), 5% (**) and 1% (***).

Conclusion

We wanted to know whether culture explains variation the performance of contract farming in Ghana and whether culture can be explained with historical developments. Thus, in 2013 we conducted a survey amongst pineapple farmers in Ghana and connected their data to data from Ghana's colonial period. We find that self-efficacy – the belief of having the capabilities to achieve one's goals – and social capital – which facilitates coordinated actions – are important determinants of contract farming success. Notably, we find that the colonial experiences with missionary schools and cocoa cooperatives shaped the evolution of these cultural variables.

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