

Effects of Fairtrade on Farm Household Food Security and Living Standards

Isabel Knöblsdorfer ^{a*}, Jorge Sellare ^b, Matin Qaim ^a

^a Department of Agricultural Economics and Rural Development, University of Goettingen,
Germany

^b Center for Development Research (ZEF), University of Bonn, Germany

Funding:

This research was financially supported by the German Research Foundation (DFG), grant number RTG1666 (GlobalFood).

Effects of Fairtrade on Farm Household Food Security and Living Standards: Insights from Côte d'Ivoire

Abstract

Fairtrade certification has recently gained in importance for various export crops produced in developing countries. One of Fairtrade's main objectives is to improve the social conditions of smallholder farmers. Previous research showed that Fairtrade has positive effects on farmers' sales prices and incomes in many situations. However, more detailed analysis of the effects on food security and other dimensions of household living standard is rare. Here, we use data from a survey of cocoa farmers in Côte d'Ivoire to analyze how Fairtrade certification affects aggregate household consumption expenditures and the consumption of specific types of consumer goods and services. We also differentiate between poor and non-poor households. Regression models with instrumental variables suggest that Fairtrade increases aggregate consumption expenditures by 9% on average. For poor households, the effect is even larger (14%). These effects are driven by increases in non-food expenditures. We do not find significant effects on food consumption and dietary diversity. In poor households, Fairtrade primarily increases spending on other basic needs such as housing and clothing, whereas in non-poor households positive effects on education and transportation expenditures are found. We conclude that Fairtrade improves farm household living standards, but not food security.

Key words: Fairtrade; sustainability standards; cash crops; small farms; gender roles; poverty

1 Introduction

Fairtrade has recently gained in importance for agri-food exports from developing countries, especially for crops such as coffee, tea, cocoa, and banana (DeFries et al., 2017; Dragusanu et al., 2014; Meemken 2020; Minten et al., 2018). One of the main objectives of the Fairtrade standard is to improve the economic and social conditions of small-scale producers through a guaranteed floor price and an additional premium to foster community development (Fairtrade International, 2020). Fairtrade also bans child labor and forced labor. Moreover, Fairtrade-certified cooperatives often assist farmers in terms of training and input supply (Sellare et al., 2020a). But can Fairtrade really enhance the living conditions of smallholder farmers beyond agricultural output prices and access to inputs? Does Fairtrade certification improve food security and the fulfillment of other basic needs? And, if so, do poor households benefit to the same extent as non-poor households? These are important questions for development policy because smallholder farmers make up a large fraction of the world's poor and undernourished people. These questions are addressed here with survey data from cocoa farmers in Côte d'Ivoire.

Recent research showed that Fairtrade certification is associated with higher output prices and higher incomes among smallholder farmers in many situations (Dragusanu, et al., 2014; Karki, et al., 2016; Meemken, 2020; Sellare et al., 2020b). Several studies also showed positive effects of Fairtrade on aggregate household living standards (Becchetti, et al., 2012; Chiputwa, et al., 2015). However, higher prices in certified markets are not always sufficient to raise household incomes and living standards (Beuchelt and Zeller, 2011; Akoyi and Maertens, 2018). A few studies also went beyond aggregate living standards and analyzed effects of Fairtrade on food security and gender equity, sometimes finding positive impacts (Becchetti and Constantino, 2008; Chiputwa and Qaim, 2016; Meemken and Qaim, 2018). But the picture is mixed. Meemken et al. (2017) used data from coffee farmers in Uganda

showing that Fairtrade increased overall household consumption expenditures, but not food expenditures. In their recent systematic review, Schleifer and Sun (2020) conclude that food security remains a relatively blind spot in the literature on certification impacts. Research on other dimensions of poverty and household welfare – including living conditions, health, or child education – is even rarer. Furthermore, to our knowledge no previous study analyzed whether the effects of Fairtrade differ between poor and non-poor households.

Here, we address some of these knowledge gaps. First, we analyze whether Fairtrade certification increases aggregate household living standards measured in terms of total per capita consumption expenditures. Consumption expenditures are a more reliable indicator of living standard than income, especially in the context of smallholder farm households. The reason is that consumption can be smoothed, so that it fluctuates less than income with seasonal or annual patterns of crop production and prices. Second, we analyze the effects of Fairtrade on different dimensions of household living standard, such food security, health, education, and housing. We do this by disaggregating total consumption expenditures into different expenditure categories. In addition, we use household-level dietary data to examine effects on undernourishment and dietary diversity. Gains in aggregate incomes and consumption expenditures do not necessarily mean that all dimensions of living standard are affected equally. The effects may also depend on the type of income and who in the household controls the revenues and makes purchase and expenditure decisions (Duflo and Udry, 2004; Hoddinott and Haddad, 1995; Meemken et al., 2017). Third, we differentiate between effects of Fairtrade on farm households above and below the poverty line.

The cocoa sector in Côte d'Ivoire is an interesting empirical example for this analysis. Côte d'Ivoire is the largest cocoa producer and exporter worldwide, and the share of Fairtrade certified cocoa has increased significantly in recent years (Meemken et al., 2019; Sellare et al., 2020b). We use data from a survey of cocoa farmers in 50 different certified and non-

certified cooperatives collected in 2018. Regression models with instrumental variables are used to identify the Fairtrade effects while controlling for possible confounding factors.

2 Conceptual Framework

Fairtrade can affect household living standards through different mechanisms (Fig. 1). Positive effects on crop incomes can be expected through higher output prices and yields. Fairtrade guarantees a minimum floor price for output sold in certified markets, which leads to positive price and revenue effects especially when prices in non-certified markets are low (Chiputwa, 2015; Fairtrade International, 2020). Positive price incentives can also lead to higher input intensities and yields. In addition, Fairtrade encourages collective action at the cooperative level to improve farmers' access to agronomic training, inputs, and technology, which can also lead to higher crop yields (Dragusanu et al., 2014; Sellare et al., 2020a). Additional costs for such cooperative services and for the certification process itself are typically borne by the cooperatives, so that the cost differences with and without certification for individual farmers are low.¹

Higher prices and yields through Fairtrade without significant cost increases imply higher crop incomes and thus more cash available for household consumption expenditures. However, on what types of goods and services the additional crop income is spent depends on various factors. Fairtrade typically involves cash crops, such as cocoa and coffee, the income of which is seasonal and mostly controlled by male household members (Chiputwa and Qaim, 2016; Hill and Vigneri, 2014; Meemken et al., 2017). Male household members tend to spend income differently than females: while women are often responsible for the purchase of food, men tend to spend more on non-food goods and services (Duflo and Udry, 2004; Fischer and

¹ Fairtrade prohibits the use of certain toxic chemicals and of child and forced labor, which can lead to cost increases in situations where such inputs and types of labor are commonly used in the production process. This is not the case in our setting in Côte d'Ivoire.

Qaim, 2012; Hoddinott and Haddad, 1995). Hence, gains in crop income and total household expenditures through Fairtrade may have uneven effects on food security and other dimensions of welfare and living standard.

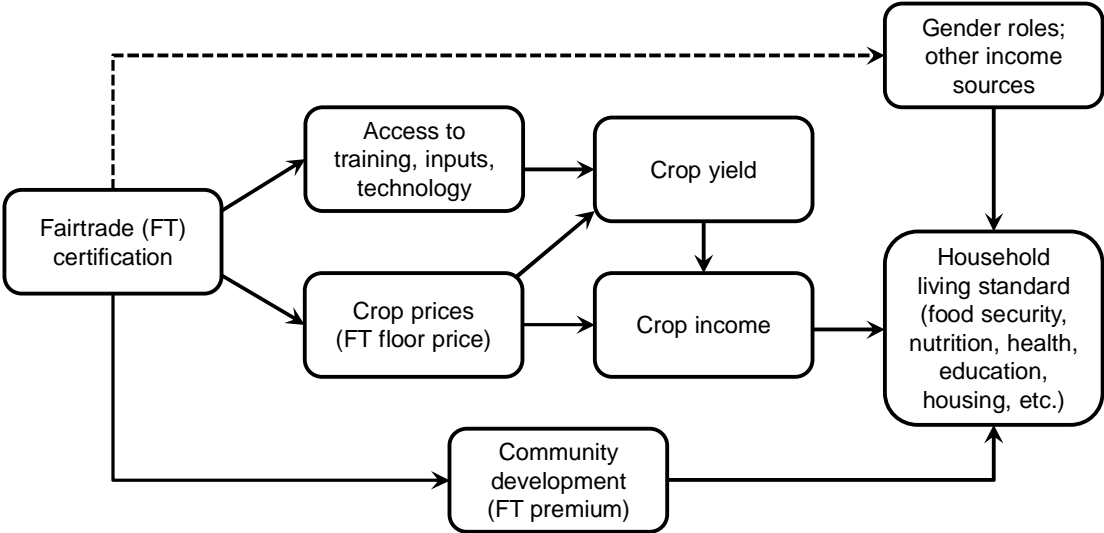


Fig. 1: Effects of Fairtrade on different dimensions of household living standard

As Fig. 1 indicates, Fairtrade may indirectly also affect gender roles within farm households and other income sources through resource reallocation (Meemken and Qaim, 2018). Furthermore, the Fairtrade premium, which is paid to certified cooperatives for community development projects, may also have indirect effects on household living standards. In the empirical analysis below, we compare crop yield, price, and income data between Fairtrade certified and non-certified households and identify the causal effects of certification on different dimensions of living standard.

3 Materials and Methods

We compare differences in crop prices, yields, incomes, and living standards between farm households with and without Fairtrade certification. In addition to descriptive statistics, we run regression models to control for possible confounding factors. Potential issues of self-

selection into certification are addressed through instrumental variables. The data and statistical approaches used are explained in more detail below.

3.1 Farm Household Survey

We use data from cocoa-producing farm households in Côte d'Ivoire. The data were collected through a survey of cooperatives and farm households carried out in 2018 in the southeastern parts of the country belonging to the traditional cocoa belt. In total, we identified 59 Fairtrade certified cooperatives and 74 non-certified cooperatives located in the three districts of Comoe, Lacs, and Lagunes. From these total lists of cocoa cooperatives, we randomly selected 25 certified and 25 non-certified cooperatives.² In each of these 50 cooperatives, we randomly selected 10 farm households, resulting in a total sample of 500 household observations, of which half are Fairtrade certified and the other half are not. Further details of the sampling framework are described by Sellare et al. (2020b).

In all sampled households, personal interviews were held with the household head, using a structured questionnaire. The questionnaire included sections on general farm, household, and contextual characteristics, asset ownership, income, production and marketing of cocoa, details on other farm and non-farm enterprises, and a specific module to capture food and non-food consumption. Food consumption data were collected using a 7-day recall period and covering a large number of food items from own production, market purchases, and other sources. Non-food expenditures were collected for all relevant other consumer goods and services, using monthly or annual recall periods, depending on typical expenditure patterns. The specific expenditure categories considered in this study are explained below.

² Of the 25 Fairtrade certified cooperatives in the sample, 16 are additionally certified by UTZ and/or Rainforest Alliance. In a robustness check, we test whether the Fairtrade effects change when additionally controlling for double or triple certification.

In addition to the household-level interviews, we also conducted cooperative-level interviews with the leaders of each of the 50 cooperatives to collect data on cooperative characteristics, such as size, membership structure, assets owned, and types of services provided.

3.2 Outcome Variables

We use total consumption expenditures per capita as our aggregate measure of household living standard. Consumption expenditures are the most commonly used quantitative indicator of living standard, especially in developing countries (OECD, 2015). As mentioned above, unlike income, consumption can be smoothed, so that it fluctuates less seasonally and annually and therefore represents household welfare more reliably. We calculate daily per capita expenditures by summing up all of the household's expenditures on consumption goods and services and dividing by the number of household members. Expenditures also include the market value of goods consumed from own production or received as gifts or through transfers. All expenditures are expressed in francs CFA, the local currency in Côte d'Ivoire.

In addition to total consumption expenditures, we look at food and non-food expenditures separately. Food expenditures are used as a first indicator of the household's food security and economic access to food. Rising food expenditures would indicate that the food quantity and/or the quality of the food consumed in the household increase, meaning that food and nutrition security is improved. More detailed dietary data from the 7-day consumption recall are used to calculate additional food security indicators. Calories consumed are calculated based on the food quantities reported and using a food composition table for West Africa (FAO, 2012). We compute calorie consumption per male adult equivalent (AE) and consider households with a daily consumption of less than 2400 kcal per AE as undernourished (Fongar et al., 2019). Furthermore, we calculate the household dietary diversity score (HDDS)

and the food consumption score (FCS) as indicators of household-level dietary diversity (Kennedy et al., 2011).

Non-food consumption expenditures are disaggregated further using categories as described by the UN Department of Economic and Social Affairs (2018), namely: (1) basic living expenditures, including housing and clothing; (2) health expenditures, including medical costs, hygiene products, and health insurance fees; (3) education expenditures, including any school fees and learning materials; (4) transport expenditures; (5) social expenditures, including communication and social events; (6) financial expenditures, including financial services and interest rates; and (7) miscellaneous expenditures, including other goods and services not included in any other category.

3.3 Regression Models

To identify Fairtrade effects on household living standards while controlling for possible confounding factors, we estimate regression models of the following type:

$$Y_{ik} = \beta_0 + \beta_1 FT_{ik} + \beta_2 X_i + \beta_4 D_i + \beta_5 C_k + \varepsilon_{ik} \quad (1)$$

where Y_{ik} is daily per capita consumption expenditure of farm household i in cooperative k , and FT_{ik} is a dummy variable indicating whether or not the farmer and the cooperative are Fairtrade certified. A positive and significant coefficient β_1 would confirm the hypothesis that Fairtrade improves aggregate household living standards. We run separate models for total consumption expenditures and different food and non-food expenditure categories, as explained above. In addition, we estimate models with the food security indicators as dependent variables.

In equation (1), we control for farm, household, and contextual variables that could jointly influence Fairtrade certification and household living standards. The vector X_i includes variables such as age, sex, education, and ethnicity of the household head, farm size, soil quality, asset ownership, income from sources other than cocoa, and infrastructure conditions. D_i is a vector of district dummies to control for unobserved regional factors, and C_k is a vector of cooperative characteristics, such as cooperative size, governance structure, assets owned, and education of the cooperative leader. Sellare et al. (2020b) showed that cooperative characteristics can differ considerably and matter when estimating certification effects. ε_{ik} is a random error term. We estimate all models with robust standard errors to account for possible heteroskedasticity.

In a first step, we estimate the models in equation (1) with the full sample, including all farm households. In a second step, we re-estimate all models with two subsamples, namely poor and non-poor households, in order to see whether the effects of Fairtrade differ by income group. We use the international moderate poverty line of 3.20 purchasing power parity (PPP) dollars to split the sample into poor and non-poor households. This threshold is relatively near to the official national poverty line in Côte d'Ivoire, which was equivalent 2.96 PPP dollars in 2015 (World Bank, 2020). Moreover, the 3.20 PPP dollar poverty line splits the sample into two subsamples of almost equal size, which is advantageous for efficient statistical estimation. In a robustness check, we also use quantile regression models to estimate effects of Fairtrade on different household expenditure segments.

One possible problem in the estimation of equation (1) is non-random self-selection of households into Fairtrade certification. Only households that are member of a Fairtrade-certified cooperative can participate in Fairtrade supply chains, but households can join, leave, or switch cooperatives. The decision which cooperative to join is likely determined by

observed and unobserved characteristics, which need to be controlled for in order to avoid selection bias in the estimated Fairtrade effects.

We use an instrumental variable (IV) approach to address potential issues of selection bias. Building on recent previous work (Meemken et al., 2019; Sellare et al., 2020b), we use two instruments for Fairtrade certification, namely (1) the proportion of Fairtrade certified farmers in a certain radius around the household and (2) the mobile phone network provider of the cooperative leader. These instruments exploit the fact that information about Fairtrade spreads locally through personal communication channels. Both instruments are significantly correlated with individual Fairtrade certification and do not influence household living standards through other mechanisms, as we show and explain in more detail in the Online Appendix. Hence, the two instruments fulfill the conditions of instrument relevance and validity.

4 Results

4.1 Descriptive Statistics

Table 1 shows descriptive statistics of various farm, household, and contextual characteristics. The average farm in our sample has a size of about 10 ha, of which half is grown with cocoa and the other half with other crops such as maize and cassava. Cocoa is clearly the most important source of income for most of the households, accounting for 76% of total household income on average. Fig. 2 shows that Fairtrade certified farm households obtain significantly higher cocoa yields and prices than non-certified households, as expected. Higher yields and prices also lead to significantly higher cocoa incomes among certified household. In contrast, for non-cocoa income (including all other farm and non-farm income sources), no significant differences are observed between the two groups (Table 1).

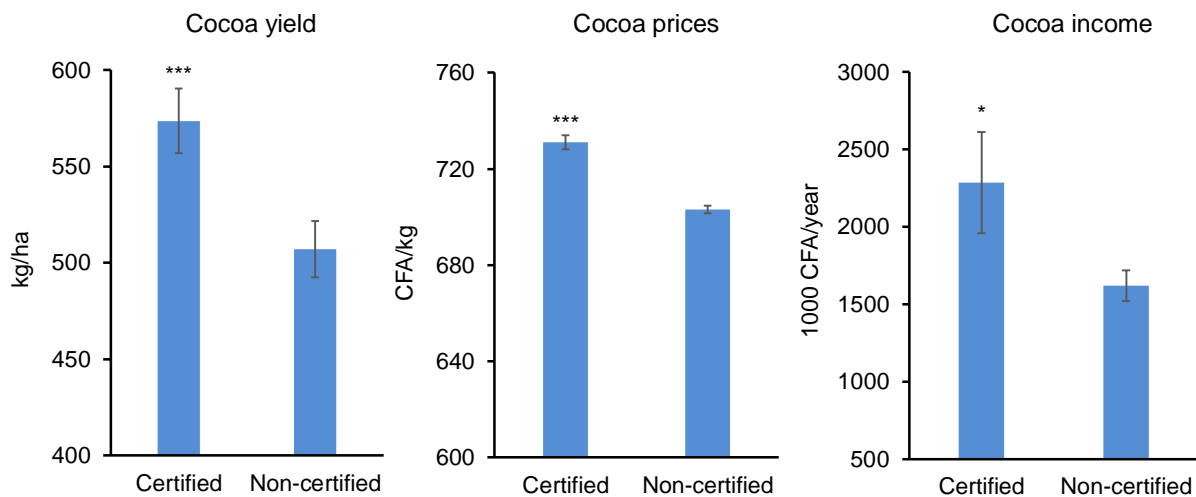


Fig. 2: Cocoa yield, prices, and incomes among Fairtrade certified and non-certified households

Notes: Mean values are shown with standard error bars. * Mean difference significant at 10% level. *** Mean difference significant at 1% level.

Overall income levels are higher among Fairtrade certified than among non-certified households (Table 1). Nevertheless, poverty rates do not differ significantly between the two groups (Table A5 in the Online Appendix). Around 29% of all households fall below the extreme poverty line of 1.90 PPP dollars, whereas 52% of the households fall below the moderate poverty line of 3.20 PPP dollars per capita and day.

For many of the sociodemographic variables in Table 1 (household size, age, sex, and education of the household head), differences between certified and non-certified households are small and not statistically significant. One significant difference is observed for distance to the closest tarmac road. Interestingly, Fairtrade-certified households are located further away from tarmac roads than non-certified households.

The lower part of Table 1 shows the food security indicators, suggesting that household food insecurity is high and dietary diversity is relatively low. Close to 50% of the households are classified as undernourished based on the 2400 kcal per male AE threshold. A mean FCS of 26 is also pointing at nutritional issues. Generally, a FCS of above 35 is considered acceptable

for healthy nutrition, whereas scores between 21.5 and 35 are categorized as ‘borderline’ (Kennedy, et al., 2011). We observe no significant differences between Fairtrade certified and non-certified households in terms of these food security indicators.

Table 1: Farm household characteristics and food security

	(1) Full sample	(2) Fairtrade certified	(3) Non-certified	(4) Mean difference
Land owned (ha)	9.807 (10.118)	9.591 (11.289)	10.023 (8.811)	-0.432
Land cultivated with cocoa (ha)	4.958 (4.553)	5.345 (5.626)	4.572 (3.097)	0.774*
Household income in past 12 months (1000 CFA)	2559.577 (4422.281)	2938.555 (5890.756)	2180.599 (2049.944)	757.956*
Cocoa income in past 12 months (1000 CFA)	1951.410 (3836.663)	2284.677 (5179.354)	1618.142 (1565.359)	666.536*
Non-cocoa income in past 12 months (1000 CFA)	608.167 (1644.260)	653.877 (2051.550)	562.457 (1097.720)	91.420
Size of household	7.126 (3.918)	7.308 (3.846)	6.944 (3.988)	0.364
Age of household head	49.556 (10.872)	49.672 (10.558)	49.440 (11.197)	0.232
Female household head (1/0)	0.038 (0.191)	0.052 (0.222)	0.024 (0.153)	0.028
Education of head (years)	6.110 (4.913)	5.867 (4.841)	6.352 (4.981)	-0.485
Distance to tarmac road (km)	15.436 (17.033)	17.540 (18.319)	13.333 (15.394)	4.208***
Undernourished (1/0) ^a	0.476 (0.499)	0.496 (0.500)	0.456 (0.499)	0.04
Household dietary diversity score (HDDS) ^b	8.562 (1.510)	8.564 (1.496)	8.560 (1.526)	0.004
Food consumption score (FCS) ^c	26.100 (9.852)	26.414 (9.623)	25.786 (10.085)	0.628
Observations	500	250	250	

Notes: Sample mean values are shown with standard deviations in parentheses. Food security indicators calculated from 7-day food consumption data at the household level. ^a Household is defined as undernourished when daily calorie consumption is below 2400 kcal per male adult equivalent (AE). ^b HDDS counts the number of food groups consumed with a maximum of 12. ^c FCS counts food groups but gives more weight to groups with high nutritional value. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Table 2 shows descriptive statistics for per capita consumption expenditures. Aggregate expenditures are somewhat higher for Fairtrade certified households than for non-certified households, but the difference is not statistically significant. Likewise, we do not observe a significant difference in terms of food expenditures, which is consistent with the food security indicators discussed above, which also did not differ significantly between the two groups.

However, we observe significant differences in terms of non-food consumption expenditures. Non-food expenditures are 31% higher among certified households, which is primarily driven by higher basic living expenditures (including housing and clothing), higher education expenditures, and higher social expenditures. These descriptive results suggest that Fairtrade may have positive effects on household living standards but influences various dimensions of living standard differently. These patterns are analyzed more rigorously in the next subsections, using the regression models discussed above.

Table 2: Daily per capita consumption expenditures (CFA)

	(1) Full sample	(2) Fairtrade certified	(3) Non- certified	(4) Mean difference
Total expenditures	1422.152 (1089.682)	1496.182 (1149.353)	1348.122 (1023.507)	148.060
Food expenditures	770.186 (621.447)	756.505 (570.220)	783.867 (669.640)	-27.362
Non-food expenditures	651.966 (681.337)	739.677 (785.552)	564.255 (545.678)	175.422***
<i>Categories of non-food expenditures</i>				
Basic living expenditures (housing, clothing, etc.)	126.919 (135.006)	139.814 (158.390)	114.025 (105.382)	25.789**
Health expenditures	84.130 (121.547)	92.939 (135.521)	75.320 (105.283)	17.620
Education expenditures	163.292 (284.943)	197.746 (335.181)	128.838 (219.047)	68.907***
Transport expenditures	94.123 (146.443)	99.251 (153.309)	88.994 (139.358)	10.257
Social expenditures (communication, social events, etc.)	107.038 (158.138)	123.389 (189.635)	90.687 (116.694)	32.701**
Financial expenditures	18.639 (256.859)	36.642 (362.670)	0.635 (6.160)	36.008
Miscellaneous expenditures	57.826 (156.132)	49.895 (110.326)	65.756 (191.191)	-15.861
Observations	500	250	250	

Notes: Sample mean values are shown with standard deviations in parentheses. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

4.2 Average Effects of Fairtrade

Estimation results of the full-sample regression models are summarized in Table 3 (complete model results are shown in Tables A6-A8 in the Online Appendix). Due to non-random self-selection of farm households into Fairtrade certification, the IV model results in column (2) are more reliable than the OLS results in column (1) of Table 3. The effects of Fairtrade on

consumption expenditures can be interpreted in percentage form (semi-elasticities).³ After controlling for possible confounding factors, Fairtrade certification increases total consumption expenditures by 8.5%. This estimate is statistically significant at the 95% confidence level.

Table 3: Effects of Fairtrade certification on per capita consumption expenditures and food security

	(1) OLS model results	(2) IV model results
Total consumption expenditures	0.0697** (0.03)	0.0854** (0.04)
Food expenditures	0.00515 (0.04)	0.00319 (0.04)
Non-food expenditures	0.146*** (0.04)	0.182*** (0.05)
<i>Food security indicators</i>		
Undernourished (1/0) ^a	0.136 (0.16)	0.162 (0.21)
HDDS	-0.0676 (0.18)	0.0781 (0.22)
FCS	-0.544 (1.24)	0.409 (1.46)
<i>Categories of non-food expenditures</i>		
Basic living expenditures	0.0656 (0.05)	0.112* (0.06)
Health expenditures	0.0104 (0.06)	0.0598 (0.07)
Education expenditures	0.244** (0.11)	0.330** (0.13)
Transport expenditures	0.208* (0.12)	0.282** (0.14)
Social expenditures	0.107* (0.06)	0.121* (0.07)
Financial expenditures	0.143** (0.07)	0.188** (0.09)
Miscellaneous expenditures	-0.0111 (0.12)	-0.121 (0.15)
Observations	500	500

Notes: The effects on consumption expenditures are semi-elasticities that can be interpreted in percentage terms. The effects on the food security indicators are marginal effects. Robust standard errors are shown in parentheses. Separate models were estimated for each outcome variable as shown in Tables A6-A8 in the Online Appendix. ^a Probit specifications were used for the binary outcome variable 'undernourished'. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

The positive effect of Fairtrade on total consumption expenditures is entirely driven by increases in non-food expenditures. Fairtrade increases aggregate non-food expenditures by

³ For the regression analysis, all consumption expenditures were transformed using the inverse hyperbolic sine (IHS) transformation for better empirical fit (Friedline et al., 2015). The IHS is similar to the log transformation but helps to preserve zero observations, which occur for some of the expenditure categories. Semi-elasticities for percentage interpretation were calculated as described in Bellemare and Wichman (2019).

18.2%, with significantly positive effects in terms of most non-food expenditure subcategories. For instance, Fairtrade increases the spending on basic living (housing, clothing) by 11%, on education by 33%, on transportation by 28%, and on communication and social events by 12% (lower part of Table 3). These are clear indications that Fairtrade improves various dimensions of household living standard.

However, the estimates in Table 3 also show that Fairtrade has no significant effects on food expenditures. Also when we use calorie undernourishment, HDDS, or FCS as dependent variables we do not find significantly positive effects of Fairtrade, suggesting that Fairtrade certification does not improve food security.

That income and expenditure elasticities are larger for many non-food goods and services than for foods is unsurprising and consistent with Engel's law: when households get richer, the expenditure share spent on food tends to decline. However, zero effects on food expenditures in spite of significant Fairtrade income gains are surprising, especially given that many of the households in the sample suffer from undernourishment and low dietary diversity. The null effects on food expenditures are probably due to the fact that Fairtrade mostly increases cocoa income, which occurs seasonally and is hardly used for regular household food purchases. This interpretation is further supported by the significantly positive effect of non-cocoa income on food expenditures in Table A7 (Online Appendix). Interesting to observe in Table A7 is also that a female household head increases food expenditures, implying that more is spent on food and nutrition when the income is controlled by women. Issues of gendered control of cocoa income and possible implications for the food security effects of Fairtrade are discussed further below.

Food expenditures, as defined here, include food consumption from market purchases, own production, and other sources. Beyond expenditures, an interesting question is whether Fairtrade certification has any influence on what share of the food consumed is obtained from

what particular source. As Fairtrade certified households may specialize more on cocoa production, it is possible that their income from cash cropping increases at the expense of own food production (Meemken et al., 2017; Schleifer and Sun, 2020). This could mean that Fairtrade households rely more on food market purchases and obtain less of their food consumed from own production. However, Table 4 shows that such shifts in the food sources are not observed among cocoa farmers in Côte d’Ivoire. Both, certified and non-certified farm households obtain around two-thirds of all the food items consumed from market purchases and the rest mostly from own production. The share of foods from own production is even somewhat higher among Fairtrade certified households, although the differences between the groups are small.

Table 4: Sources of foods in Fairtrade certified and non-certified households

	Certified	Non-certified	Mean difference
Share of food items from market purchases	0.646	0.670	-0.024
Share of food items from own production	0.331	0.300	0.030**
Share of food items from gifts	0.022	0.029	-0.007*
Share of food items from mixed sources	0.001	0.000	0.001
Observations	250	250	

* $p < 0.10$; ** $p < 0.05$

One aspect that deserves some further attention is the fact that of the 25 Fairtrade certified cooperatives in our sample 16 are additionally certified by UTZ and/or Rainforest Alliance. Hence, it is interesting and important to analyze whether double or triple certification has additional effects or changes any of the Fairtrade effects discussed so far. We tested this by re-running the regression models and additionally including a dummy variable for double or triple certification (Table A9 in the Online Appendix). This additional dummy variable is not

significant in any of the models, while the Fairtrade effects on food and non-food expenditures remain robust.⁴

Another potential issue in our regression models is that individual control variables – especially non-cocoa income – may possibly be endogenous and correlated with Fairtrade certification, which could bias the estimated Fairtrade effects. We tested this by excluding non-cocoa income and found the Fairtrade results to be robust.

4.3 Effects of Fairtrade on Poor and Non-Poor Households

We now analyze the effects of Fairtrade certification separately for poor and non-poor households, using the 3.20 PPP dollar poverty line as the threshold to split the sample. Table A10 in the Online Appendix shows that in both subsamples Fairtrade certified households have higher cocoa yields, prices, and incomes than non-certified households. Interestingly, the percentage difference in cocoa income between certified and non-certified households is larger among poor households (69%) than among non-poor households (23%).

The IV regression results for the two subsamples are summarized in Table 5 (complete model results are shown in Tables A8, A11, and A12 in the Online Appendix). As can be seen, Fairtrade has a significantly positive effect on aggregate consumption expenditures of poor households (13.6%), but not of non-poor households. This sizeable gain in aggregate living standards for households below the poverty line indicates that Fairtrade certification is a pro-poor market intervention. It should be stressed that our sample is confined to commercial

⁴ Note that insignificance of the double or triple certification dummy in Table A9 cannot be interpreted as UTZ and/or Rainforest Alliance having zero effects on farm household living standards. We only show that these other standards have no *additional* effects on top of the Fairtrade effects discussed above. A more detailed comparison of the effects of different standards would require observations of cooperatives and households that are certified only under UTZ or Rainforest Alliance and not also under Fairtrade. Our sample does not include such observations. Another interesting question is why cooperatives and households decide to be certified under various standards, if double or triple certification does not lead to additional benefits. The reason is that different standards focus on different sustainability dimensions. For instance, while Fairtrade concentrates primarily on economic and social dimensions, Rainforest Alliance has a stronger focus on environmental criteria. Some cocoa processors and exporters require certification under specific standards.

cocoa producers, who do not necessarily belong to the poorest of the poor, but within this group of farmers Fairtrade seems to benefit the poorer ones over-proportionally.⁵ This is a welcome finding from a social development perspective.

Table 5: Effects of Fairtrade on poor and non-poor households (IV model results)

	(1) Poor households	(2) Non-poor households
Total consumption expenditures	0.136*** (0.05)	0.00421 (0.05)
Food expenditures	0.0392 (0.05)	-0.0754 (0.07)
Non-food expenditures	0.228*** (0.07)	0.118* (0.06)
<i>Food security indicators</i>		
Undernourished (1/0)	0.0670 (0.30)	0.167 (0.31)
HDDS	0.376 (0.28)	-0.0494 (0.33)
FCS	0.819 (1.81)	0.681 (2.20)
<i>Categories of non-food expenditures</i>		
Basic living expenditures	0.137* (0.07)	0.0285 (0.09)
Health expenditures	0.153 (0.10)	-0.0481 (0.10)
Education expenditures	0.253 (0.18)	0.509** (0.20)
Transport expenditures	0.173 (0.20)	0.388** (0.18)
Social expenditures	0.107 (0.10)	0.0928 (0.08)
Financial expenditures	0.146 (0.14)	0.152 (0.09)
Miscellaneous expenditures	-0.0207 (0.20)	-0.269 (0.22)
Observations	262	238

Notes: The effects on consumption expenditures are semi-elasticities that can be interpreted in percentage terms. The effects on the food security indicators are marginal effects. Robust standard errors are shown in parentheses. Poor households are those with a per capita income of less than 3.20 PPP dollars per capita and day; non-poor households have incomes above this threshold. Separate models were estimated for each outcome variable as shown in Tables A8, A11, and A12 in the Online Appendix. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Another notable result in Table 5 is that – despite the large positive effects on total consumption expenditures of the poor – Fairtrade has no significant effect on food expenditures or the food security indicators of this group. The aggregate Fairtrade gain is

⁵ A larger effect of Fairtrade on the consumption expenditures of poor households alone would not necessarily mean that poor households benefit more, as it is possible that non-poor households save a larger fraction of their income gains. However, given that we also observe larger income differences between certified and non-certified households in the poor subsample, our cautious conclusion of over-proportional benefits for poor households seems to be justified.

primarily due to non-food expenditures, which increase by almost 23% among the poor. Further disaggregation of non-food expenditures in the lower part of Table 5 suggests that Fairtrade significantly increases basic living expenditures of the poor, including basic needs such as housing and clothing. Effects on several other non-food expenditure categories are also positive but not statistically significant among poor households.

While Fairtrade has no significant effects on total consumption expenditures of non-poor households, it increases their non-food expenditures by 11.8% (column 2 of Table 5). For non-poor households, we do not observe significant effects on basic living expenditures or health expenditures, but especially their education and transport expenditures are increased considerably through Fairtrade certification. This is plausible, as for non-poor households the most basic needs are already satisfied. In this situation, the Fairtrade income gains are used to further improve life quality and invest more into child education.

In addition to this analysis with two subsamples (poor and non-poor households), we used the whole sample to run quantile regressions and compare the effects of Fairtrade on household living standards for different expenditure segments. Results of these quantile regressions are summarized in Table A13 in the Online Appendix. These additional findings support the main results and conclusions: for all segments, Fairtrade leads to significant increases in non-food consumption expenditures, but not in food expenditures. The effects on aggregate living standards are particularly large for the poorer households and statistically insignificant for the richest segment of cocoa farmers.

5 Discussion and Conclusion

We have analyzed the effects of Fairtrade certification on farm household living standards and food security with survey data from the cocoa sector in Côte d'Ivoire. While the concrete

results are specific to Côte d'Ivoire, some broader lessons can also be learned, as the conditions of cash cropping and Fairtrade certification are similar also in many other countries of Africa. We should also stress that our survey data were collected in 50 different and randomly selected cooperatives, thus representing a broad variety of institutional conditions and allowing statements beyond a narrow case-study setting. In this final section, we discuss our main findings in the light of the existing empirical literature on Fairtrade and sustainability certification.

First, we found that Fairtrade certification increases aggregate living standards of participating farm households. We measured living standards in terms of per capita household consumption expenditures and estimated an average gain of around 9%. Positive effects of Fairtrade on farm household living standards were also found in previous studies for cocoa in Côte d'Ivoire and for coffee in Uganda (Chiputwa et al., 2015; Meemken et al., 2017; Sellare et al., 2020b). These positive effects are primarily the result of higher output prices in Fairtrade certified markets and higher yields through better access to inputs, technologies, and agricultural training. However, Mitiku et al. (2017) found no positive living standard effects of Fairtrade among coffee farmers in Ethiopia, largely because the coffee cooperatives there were not efficiently organized. Well-managed cooperatives or farmer groups are an important precondition for smallholders to benefit from Fairtrade and other sustainability standards, because individual certification is hardly possible in the small farm sector due to excessive transaction costs.

Second, we found that Fairtrade has larger positive effects for poor than for non-poor farm households. Fairtrade increases total consumption expenditures of farm households below the poverty line by 14%. This is a welcome finding from a social development perspective, indicating that Fairtrade can contribute to poverty reduction and pro-poor rural development. While another study in Uganda also suggested that Fairtrade helps to reduce poverty in the

small farm sector (Chiputwa et al., 2015), we are not aware of previous research that analyzed differential effects of Fairtrade on poor and non-poor farm households. Whether Fairtrade really reaches the poorest households is a different question, as Fairtrade focuses on cash crops that are not always grown on a significant scale by marginalized farms. But among those who grow cash crops and who are Fairtrade certified, the social development effects are clearly positive.

Third, in spite of positive effects on total consumption expenditures, we found no significant effects of Fairtrade on food expenditures and food security. This is surprising because many of the farm households in our sample suffer from food insecurity and undernourishment. However, Fairtrade primarily increases the cash revenue and income from cocoa sales, whereas our data show that non-cocoa income is more relevant for food purchases and food consumption. As cocoa cash revenues accrue only twice a year after the cooperatives have sold the harvested quantities at the end of the season, these revenues are typically not used for regular food purchases but for larger occasional expenses such as durable consumer goods or education-related costs. This is what many local farm households confirmed in informal discussions. The same was also observed for Fairtrade coffee certification in Uganda, which was shown to increase education expenditures but not food expenditures in smallholder farm households (Meemken et al., 2017).

Another likely reason why Fairtrade income gains are less relevant for food expenditures is that revenues from cash crops are mostly controlled by male household members, whereas food purchases and food preparation are typically female responsibilities. While in our survey we did not collect data on who in the household controls the income generated from different sources, it is well established in the literature on smallholder farming in Africa that cash crop revenues are mostly in the male domain (Chiputwa and Qaim, 2016; Duflo and Udry, 2004; Fischer and Qaim, 2012; Hill and Vigneri, 2014). It is equally well established that female-

controlled income tends to have more positive effects on food expenditures and household diets than male-controlled income (Fischer and Qaim, 2012; Hoddinott and Haddad, 1995; Ogutu et al., 2020). These patterns should not be interpreted as if income gains from cash cropping could never contribute to improved food security and nutrition. But the gender dimensions need to be considered. Chiputwa and Qaim (2016) showed that Fairtrade certification in Uganda involves gender awareness training and specific support measures for women, contributing to female empowerment and improved nutrition in certified households. But such gender equity measures are voluntary in Fairtrade certification and therefore not implemented everywhere (Meemken and Qaim, 2018). Including gender equity measures more generally in sustainability certification, and combining them with nutrition training, could be useful for improving food security and dietary quality in smallholder farm households.

Fourth, the effects of Fairtrade on different categories of non-food expenditures differ between poor and non-poor households. For poor households, positive effects are primarily observed in terms of increased basic living expenditures, such as clothing and housing. For non-poor households, larger effects are observed for education and transport expenditures. Positive effects of Fairtrade on child education were also shown in a few previous studies (Akoyi et al., 2020; Becchetti et al., 2012; Meemken et al., 2017). Fairtrade prohibits the use of child labor, which may possibly contribute to higher school attendance in certified households. Moreover, the Fairtrade premium is sometimes used by cooperatives to increase awareness for the importance of education and improve schooling conditions in local communities. Finally, rising incomes tend to increase the demand for child schooling, at least when households are beyond a certain minimum income threshold where child labor becomes less common (Basu and Van, 1998; Fan, 2011). This latter point is consistent with our finding that Fairtrade increases education expenditures only for households above the poverty line.

In conclusion, our findings suggest that Fairtrade helps to improve living standards of farm households when evaluated in aggregate form, but tends to have uneven effects on different dimensions of living standard. Differences are partly due to the seasonal patterns and gendered control of cash crop revenues. Food security and food expenditures are less affected by Fairtrade than non-food related dimensions of household welfare. One research implication is that studies seeking to understand the social effects should go beyond just looking at aggregate income or consumption values, as these aggregate measures can mask important facets of social welfare. One policy implication is that Fairtrade and other sustainability standards should be further improved to avoid potential tradeoffs between different welfare and sustainability dimensions.

References

- Akoyi, K.T., Maertens, M., 2018. Walk the talk: private sustainability standards in the Ugandan coffee sector. *Journal of Development Studies* 54, 1792–1818.
- Akoyi, K. T., Mitiku, F., Maertens, M. 2020. Private sustainability standards and child schooling in the African coffee sector. *Journal of Cleaner Production* 264, 121713.
- Basu, K., Van, P.H., 1998. The economics of child labor. *American Economic Review* 88, 412-427.
- Becchetti, L., Constantino, M., 2008. The effects of Fair Trade on affiliated producers: an impact analysis on Kenyan farmers. *World Development* 36, 823-842.
- Becchetti, L., Conzo, P., Gianfreda, G., 2012. Market access, organic farming and productivity: the effects of Fair Trade affiliation on Thai farmer producer groups. *Australian Journal of Agricultural and Resource Economics* 56, 117-140.
- Bellemare, M. F. & Wichman, C. J., 2019. Elasticities and the inverse hyperbolic sine transformation. *Oxford Bulletin of Economics and Statistics* 82, 50-61.
- Beuchelt, T. D., Zeller, M., 2011. Profits and poverty: certification's troubled link for Nicaragua's Organic and Fairtrade coffee producers. *Ecological Economics* 70, 1316–1324.
- Chiputwa, B., Qaim, M., 2016. Sustainability standards, gender and nutrition among smallholder farmers in Uganda. *Journal of Development Studies* 52, 1241-1257.
- Chiputwa, B., Spielman, D.J., Qaim, M., 2015. Food standards, certification, and poverty among coffee farmers in Uganda. *World Development* 66, 400-412.
- DeFries, R.S., Fanzo, J., Mondal, P., Remans, R., Wood, S.A., 2017. Is voluntary certification of tropical agricultural commodities achieving sustainability goals for small-scale producers? A review of the evidence. *Environmental Research Letters*, 12, 033001.
- Dragusanu, R., Giovannucci, D., Nunn, N., 2014. The economics of Fair Trade. *Journal of Economic Perspectives* 28, 217-236.

- Duflo, E., Udry, C., 2004. Intrahousehold resource allocation in Côte d'Ivoire: social norms, separate accounts and consumption choices. NBER Working Paper No. 10498.
- Fairtrade International, 2020. How Fairtrade certification works. <https://www.fairtrade.net/about/certification> (accessed on 1 December 2020).
- Fan, S., 2011. The luxury axiom, the wealth paradox, and child labor. *Journal of Economic Development* 36(3), 25-45.
- FAO. 2012. West African Food Composition Table. Rome: Food and Agriculture Organization of the United Nations.
- Fischer, E., Qaim, M., 2012. Gender, agricultural commercialization, and collective action in Kenya. *Food Security* 4, 441-453.
- Friedline, T., Masa, R.D., Chowa, G.A.N., 2015. Transforming wealth: using the inverse hyperbolic sine (IHS) and splines to predict youth's math achievement. *Social Science Research* 49, 264-287.
- Fongar, A., Gödecke, T., Aseta, A., Qaim, M., 2019. How well do different dietary and nutrition assessment tools match? Insights from rural Kenya. *Public Health Nutrition* 22, 391-403.
- Hoddinott, J., Haddad, L., 1995. Does female income share influence household expenditures? Evidence from Cote d'Ivoire. *Oxford Bulletin of Economics and Statistics* 57, 77-96.
- Hill, R., Vigneri, M., 2014. Mainstreaming gender sensitivity in cash crop market supply chains. In: *Gender in Agriculture*. Dordrecht: Springer, pp. 315-341.
- Karki, S.K., Jena, P.R., Grote, U., 2016. Fair Trade certification and livelihoods: a panel data analysis of coffee-growing households in India. *Agricultural and Resource Economics Review* 45, 436-458.
- Kennedy, G., Ballard, T., Dop, M., 2011. Guidelines for measuring household and individual dietary diversity, Rome: Food and Agriculture Organization of the United Nations.

- Meemken, E.-M., 2020. Do smallholder farmers benefit from sustainability standards? A systematic review and meta-analysis. *Global Food Security* 26, 100373.
- Meemken, E.-M., Sellare, J., Kouame, C.N., Qaim, M., 2019. Effects of Fairtrade on the livelihoods of poor rural workers. *Nature Sustainability* 2, 635–642.
- Meemken, E.-M., Qaim, M. 2018. Can private food standards promote gender equality in the small farm sector? *Journal of Rural Studies* 58, 39-51.
- Meemken, E.-M., Spielman, D.J., Qaim, M., 2017. Trading off nutrition and education? A panel data analysis of the dissimilar welfare effects of Organic and Fairtrade standards. *Food Policy* 71, 74-85.
- Minten, B., Dereje, M., Engida, E., Tamru, S., 2018. Tracking the quality premium of certified coffee: evidence from Ethiopia. *World Development* 101, 119–132.
- Mitiku, F., de Mey, Y., Nyssen, J., Maertens, M., 2017. Do private sustainability standards contribute to income growth and poverty alleviation? A comparison of different coffee certification schemes in Ethiopia. *Sustainability* 9(2), 246.
- Ogutu, S.O., Gödecke, T., Qaim, M., 2020. Agricultural commercialisation and nutrition in smallholder farm households. *Journal of Agricultural Economics* 71, 534-555.
- OECD, 2015. *Households' economic well-being: the OECD dashboard*. Paris: Organisation for Economic Co-operation and Development.
- Schleifer, P., Sun, Y., 2020. Reviewing the impact of sustainability certification on food security in developing countries. *Global Food Security* 24, 100337.
- Sellare, J., Meemken, E.-M., Qaim, M., 2020a. Fairtrade, agrochemical input use, and effects on human health and the environment. *Ecological Economics* 176, 106718.
- Sellare, J., Meemken, E.-M., Kouamé, C., Qaim, M., 2020b. Do sustainability standards benefit smallholder farmers also when accounting for cooperative effects? Evidence from Cote d'Ivoire. *American Journal of Agricultural Economics*, 102, 681-695.

UN Department of Economic and Social Affairs, 2018. Classification of individual consumption according to purpose. New York: United Nations.

World Bank, 2020. Poverty and Equity Brief Côte d'Ivoire. Washington, DC: World Bank Group.

ONLINE APPENDIX

Effects of Fairtrade on Farm Household Food Security and Living Standards

Dealing with Endogeneity: IV estimation

The first instrument is the share of Fairtrade-certified farmers in a 5 km radius around the respective farmer's household, assuming that information about Fairtrade spreads from farmer to farmer in the same neighborhood. The second instrument is a dummy variable that takes a value of one if the mobile phone network provider of the cooperative leader is the company 'Orange', and zero if the leader uses other local network providers such as MTN or Moov. As phone calls and text messages within the same network are cheaper than across networks, more intensive within-network communication can be expected. In our data, we observe a significant positive relationship between a cooperative being certified and a cooperative leader using the network provider 'Orange', implying that within the 'Orange' network information about Fairtrade is likely exchanged more frequently than in the other mobile phone networks. Table A1 in this Online Appendix shows that both instruments are significantly associated with Fairtrade certification of the individual farmer and do not influence household consumption expenditures through other channels. As both instruments also capture regional differences (market access etc.), which could potentially influence household welfare in multiple ways, one could have expected a correlation between the instruments and consumption expenditures. However, after controlling for other regional factors, as explained in equation (1) in the paper, the instruments are not significantly associated with any of the outcome variables (Table A1).

Table A1: First-stage IV regression and instrument falsification tests

	(1)	(2)	(3)	(4)
	Fairtrade certified	Consumption expenditures	Non-food expenditures	Food expenditures
Share of certified farmers in 5km radius	0.822*** (0.03)	0.0488 (0.11)	0.138 (0.16)	-0.0291 (0.12)
Network of coop leader is Orange (1/0)	0.0657*** (0.02)	0.0878 (0.06)	0.100 (0.09)	0.0764 (0.07)
Age of household head	-0.00157 (0.00)	0.00145 (0.00)	-0.00209 (0.00)	0.00206 (0.00)
Female head (1/0)	0.173*** (0.04)	0.334** (0.13)	0.296 (0.19)	0.324*** (0.12)
Education of head (years)	-0.000136 (0.00)	-0.00191 (0.00)	0.00106 (0.00)	-0.00359 (0.01)
Experience in growing cocoa (years)	-0.00121 (0.00)	0.00109 (0.00)	0.00339 (0.00)	-0.000987 (0.00)
Household size	0.00131 (0.00)	-0.0734*** (0.01)	-0.0802*** (0.01)	-0.0623*** (0.01)
Non-cocoa income (million CFA)	0.00609 (0.00)	0.0578*** (0.01)	0.0646*** (0.02)	0.0584*** (0.02)
Value of assets 10 years ago (million CFA)	-0.00305 (0.00)	0.00393 (0.02)	0.0204 (0.03)	-0.00824 (0.01)
Akan ethnicity (1/0)	-0.00692 (0.02)	-0.0260 (0.06)	-0.0604 (0.08)	-0.00741 (0.07)
Land owned (ha)	0.000800 (0.00)	0.0105** (0.00)	0.0127*** (0.00)	0.00853** (0.00)
Good soil quality (1/0)	0.0471* (0.02)	-0.0351 (0.06)	-0.177** (0.07)	0.0494 (0.07)
Steep slope (1/0)	0.00502 (0.02)	-0.0959** (0.05)	-0.110* (0.06)	-0.0784 (0.05)
Distance to water source (km)	-0.0000140 (0.00)	0.00229 (0.00)	0.00124 (0.00)	0.00301 (0.00)
Distance to tarmac road (km)	-0.0000552 (0.00)	-0.00462*** (0.00)	-0.00464*** (0.00)	-0.00444*** (0.00)
Distance to primary school (1/0)	0.0000659 (0.00)	0.000663 (0.00)	-0.000591 (0.00)	0.00158*** (0.00)
Cooperative age (years)	0.00895*** (0.00)	-0.0115* (0.01)	-0.0172** (0.01)	-0.00572 (0.01)
Cooperative leader education (years)	0.000706 (0.00)	0.0144 (0.01)	0.0218* (0.01)	0.0122 (0.01)
Share of coop democratic decisions	-0.0592 (0.09)	-0.374* (0.21)	-0.244 (0.28)	-0.286 (0.24)
Cooperative size (before certification)	0.000172*** (0.00)	-0.0000789 (0.00)	-0.000158* (0.00)	-0.00000722 (0.00)
Cooperative leader grows cocoa (1/0)	-0.114*** (0.03)	0.0319 (0.07)	0.117 (0.09)	0.0138 (0.07)
Number of trainings provided by cooperative	0.00869 (0.01)	0.0307 (0.02)	0.0895*** (0.03)	-0.0101 (0.03)
Number of vehicles the cooperative owns	0.0110*** (0.00)	0.00115 (0.01)	-0.00495 (0.01)	0.00415 (0.01)
Fairtrade certified (1/0)		0.0849 (0.11)	0.168 (0.15)	0.0171 (0.11)
Constant	-0.0287 (0.09)	8.004*** (0.25)	7.084*** (0.31)	7.311*** (0.27)
Wald test on instruments (chi2/F)	857.87***	1.07	1.11	0.63
Observations	500	500	500	500

Notes: Coefficient estimates are shown with robust standard errors in parentheses. Expenditure variables in columns (2) to (4) are IHS-transformed. * p<0.10, ** p<0.05, *** p<0.01

Table A2 shows correlations between the outcome variables and the instruments for all non-certified households, and poor and non-poor uncertified households. None of the outcome

variables is correlated with the instruments. Hence, we conclude that the instruments are valid and that the IV models lead to unbiased estimates of the effects to Fairtrade certification on household living standards.

Table A2: Pairwise correlations between instruments and outcome variables for uncertified households (total, poor and non-poor), significance level 0.01

Outcome Variables	Total sample		Poor households		Non-poor households	
	(1)	(2)	(1)	(2)	(1)	(2)
	IV 1	IV 2	IV 1	IV 2	IV 1	IV 2
(1) IV1: Share of cert. coop. in 5km radius	1.000		1.000		1.000	
(2) IV2: Phone operator of coop. leader is Orange	0.162	1.000	0.169	1.000	0.153	1.000
(3) Total daily food exp. (p.p.)	-0.031	-0.002	0.047	0.032	-0.095	-0.019
(4) Total daily nonfood exp. (p.p.)	0.092	-0.030	0.196	0.035	0.032	-0.082
(5) Total daily exp. (p.p.)	0.034	-0.021	0.147	0.028	-0.039	-0.050
(6) Daily living exp. (p.p.)	0.082	0.020	0.163	0.044	0.029	0.018
(7) Daily social exp. (p.p.)	0.041	0.007	0.146	0.075	-0.058	-0.050
(8) Daily health exp. (p.p.)	0.092	0.027	0.212	0.049	-0.036	0.021
(9) Daily education exp. (p.p.)	0.116	-0.040	0.144	0.046	0.097	-0.113
(10) Other daily exp. (p.p.)	-0.009	0.050	0.014	0.128	-0.025	-0.022
(11) Daily transport exp. (p.p.)	0.057	-0.059	0.033	-0.012	0.105	-0.110
(12) Daily non-cons. Exp. (p.p.)	-0.076	0.044	-0.091	0.029	-0.056	0.066
(13) HDDS	0.106	0.106	0.101	0.158	0.129	0.059
(14) FCS	0.085	0.082	0.119	0.138	0.054	0.027
(15) Undernourished (1/0)	0.043	-0.026	0.037	-0.049	0.045	-0.005

Table A3 shows the instrument significance on our subsamples poor and non-poor. The instruments are significant in all cases, except for the second instrument in the non-poor subsample.

Table A3: Test of instrument significance on certification status for subsamples

	(1)	(3)	(2)
	Total sample	Poor	Non-poor
Share of certified cooperatives in 5km radius	0.822*** (0.03)	0.807*** (0.04)	0.852*** (0.05)
Phone operator of cooperative leader is Orange (1/0)	0.0657*** (0.02)	0.0872** (0.04)	0.0325 (0.03)
Observations	500	262	238

Standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01

Table A4 shows the results of underidentification, weak identification and overidentification tests. Following the model specification, the Kleinbergen-Paap rk LM Statistic is reported by `ivreg2` in Stata for underidentification, the Kleinbergen-Paap rk Wald F statistic for test of weak

identification and the Hansen J. statistic for the test of overidentification.

The first tests whether our equation is identified, i.e. our instruments are relevant or not. The null hypothesis here states that the equation is underidentified. As shown below, in column 1, we can reject the null in all cases, meaning our model is identified and the instruments relevant. The second tests whether our instruments are weak. Since the usual Cragg-Donald-based weak instruments test is no longer valid under the robust option, ivreg2 reports the Kleibergen-Paap rk Wald F statistic and Stock-Yogo critical values for the Cragg-Donald i.i.d. case. As long as the F-statistic is larger than the critical values, we can reject the assumption of our instruments being weak. As shown in the table below, this is the case for all the subsamples. The third tests whether our instruments are valid, i.e. uncorrelated with the error term. A rejection of the null would cast doubts of the instrument validity. We fail to reject the null in all cases and assume our instruments to be valid.

Table A4: Identification tests, total sample

	(1) Kleibergen-Paap rk LM Statistic	(2) Kleibergen-Paap rk Wald F Statistic	(3) Hansen J. statistic
<i>Total Sample</i>			
Total expenditures	183.697 (0.000)	408.348 (19.93)	1.741 (0.1871)
Total non-food expenditures	183.697 (0.000)	408.348 (19.93)	1.084 (0.2979)
Total food expenditures	183.697 (0.000)	408.348 (19.93)	1.281 (0.2577)
<i>Poor households</i>			
Total expenditures	91.391 (0.000)	244.984 (19.93)	0.062 (0.802)
Total non-food expenditures	91.391 (0.000)	244.984 (19.93)	1.133 (0.2872)
Total food expenditures	91.391 (0.000)	244.984 (19.93)	0.079 (0.7783)
<i>Non-poor households</i>			
Total expenditures	90.712 (0.000)	162.015 (19.93)	2.235 (0.1349)
Total non-food expenditures	90.712 (0.000)	162.015 (19.93)	0.009 (0.9245)
Total food expenditures	90.712 (0.000)	162.015 (19.93)	3.655 (0.0559)

Notes: (1) Chi-sq(2) P-value in brackets, (2) Stock-Yogo weak ID test critical value at 10% max IV size in brackets, (3) Chi-sq(1) P-value in brackets

Table A5: Poverty rates among Fairtrade-certified and non-certified households

	Certified households	Non-certified households	Mean difference
Income below \$1.90 PPP	0.304	0.272	0.032
Income below \$3.20 PPP	0.508	0.54	-0.032
Income below \$5.50 PPP	0.752	0.8	-0.048
Observations	250	250	

Table A6: Effects of Fairtrade certification on daily per capita consumption expenditures (full results of OLS models)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Total expenditures	Food expenditures	Non-food expenditures	Basic living expenditures	Health expenditures	Education expenditures	Transport expenditures	Social expenditures	Financial expenditures	Missellan. expenditures
Fairtrade certified	0.139** (0.07)	0.0103 (0.07)	0.292*** (0.09)	0.131 (0.10)	0.0208 (0.11)	0.487** (0.22)	0.417* (0.23)	0.214* (0.12)	0.286** (0.13)	-0.0222 (0.24)
Age of household head	0.00163 (0.00)	0.00212 (0.00)	-0.00177 (0.00)	-0.00234 (0.00)	0.00865** (0.00)	0.0117 (0.01)	-0.0228** (0.01)	-0.0148*** (0.00)	-0.00307 (0.00)	-0.00252 (0.01)
Female household head	0.321** (0.13)	0.321*** (0.12)	0.272 (0.19)	0.308 (0.19)	0.170 (0.18)	0.455 (0.50)	-0.289 (0.51)	0.0705 (0.25)	0.540 (0.51)	0.150 (0.39)
Education of household head	-0.00166 (0.00)	-0.00342 (0.00)	0.00139 (0.00)	0.0138*** (0.00)	-0.0151 (0.01)	-0.00583 (0.01)	-0.00207 (0.01)	-0.000532 (0.01)	-0.00200 (0.00)	0.00864 (0.01)
Experience in growing cocoa	0.00119 (0.00)	-0.000929 (0.00)	0.00353 (0.00)	-0.00113 (0.00)	-0.00806* (0.00)	0.000952 (0.01)	0.00330 (0.01)	0.00693 (0.00)	0.00429 (0.00)	-0.0106 (0.01)
Size of household	-0.0725*** (0.01)	-0.0617*** (0.01)	-0.0790*** (0.01)	-0.0736*** (0.01)	-0.0645*** (0.01)	-0.0103 (0.02)	-0.0566** (0.02)	-0.0757*** (0.01)	0.00366 (0.01)	-0.0776*** (0.02)
Non-cocoa income	0.0588*** (0.02)	0.0595*** (0.02)	0.0656*** (0.02)	0.0895*** (0.02)	0.101*** (0.02)	0.0747** (0.04)	0.0888** (0.04)	0.0694** (0.03)	-0.0211 (0.01)	0.136** (0.05)
Value of assets 10 years ago	0.00401 (0.02)	-0.00816 (0.01)	0.0204 (0.03)	0.00241 (0.03)	0.0285 (0.03)	0.0170 (0.02)	0.0487 (0.06)	0.0421 (0.05)	0.00725 (0.01)	0.0543** (0.02)
Akan ethnicity	-0.0371 (0.06)	-0.0160 (0.06)	-0.0743 (0.07)	-0.130* (0.08)	0.0862 (0.10)	0.194 (0.20)	-0.107 (0.20)	-0.0662 (0.10)	0.155* (0.09)	-0.478** (0.22)
Land owned (ha)	0.0101** (0.00)	0.00821** (0.00)	0.0121** (0.00)	0.00985** (0.00)	0.00886 (0.01)	-0.00122 (0.01)	0.0280*** (0.01)	0.0192*** (0.01)	0.00454 (0.01)	0.0244*** (0.01)
Good soil quality	-0.0370 (0.06)	0.0477 (0.07)	-0.180** (0.07)	0.101 (0.08)	-0.266*** (0.09)	-0.256 (0.20)	-0.299 (0.20)	-0.295*** (0.10)	-0.142 (0.12)	-0.142 (0.21)
Steep slope	-0.0989** (0.05)	-0.0799 (0.05)	-0.115* (0.06)	-0.0714 (0.07)	-0.0898 (0.08)	-0.172 (0.16)	-0.479*** (0.18)	-0.0963 (0.08)	-0.0379 (0.08)	0.247 (0.18)
Distance to water source	0.00231 (0.00)	0.00309 (0.00)	0.00118 (0.00)	0.000363 (0.00)	-0.00195 (0.00)	0.00190 (0.01)	-0.00994 (0.01)	-0.00114 (0.00)	0.00574* (0.00)	-0.00109 (0.01)
Distance to tarmac road	-0.00457*** (0.00)	-0.00450*** (0.00)	-0.00445** (0.00)	-0.00735*** (0.00)	-0.00460* (0.00)	0.00364 (0.00)	0.000652 (0.01)	-0.00475* (0.00)	-0.00268 (0.00)	-0.00193 (0.01)
Distance to primary school	0.000695 (0.00)	0.00159*** (0.00)	-0.000531 (0.00)	0.000670 (0.00)	0.00254*** (0.00)	-0.00962*** (0.00)	-0.000805 (0.00)	-0.000422 (0.00)	-0.000564 (0.00)	-0.000829 (0.00)
Age of cooperative	-0.0136** (0.01)	-0.00724 (0.01)	-0.0201*** (0.01)	0.000230 (0.01)	-0.0376*** (0.01)	0.00497 (0.02)	-0.0603*** (0.02)	-0.0167 (0.01)	-0.00534 (0.01)	-0.0237 (0.02)
Education of coop leader	0.0129 (0.01)	0.00973 (0.01)	0.0215* (0.01)	0.0124 (0.01)	0.0220 (0.01)	0.0667** (0.03)	-0.00116 (0.04)	0.00963 (0.02)	-0.00796 (0.01)	0.0389 (0.04)

Coop democratic decisions	-0.365* (0.21)	-0.277 (0.24)	-0.236 (0.28)	-0.307 (0.34)	-0.112 (0.33)	-0.702 (0.70)	-0.949 (0.66)	0.224 (0.37)	-0.448 (0.54)	0.797 (0.67)
Cooperative size before certif.	-0.0000785 (0.00)	0.00000649 (0.00)	-0.000173** (0.00)	-0.000148* (0.00)	-0.000205** (0.00)	-0.000142 (0.00)	-0.0000710 (0.00)	-0.0000768 (0.00)	-0.0000947 (0.00)	-0.000484** (0.00)
Coop leader grows cocoa	0.0381 (0.07)	0.0151 (0.07)	0.129 (0.09)	0.156* (0.09)	0.125 (0.11)	0.0912 (0.22)	0.217 (0.24)	0.0667 (0.12)	-0.0989 (0.13)	-0.105 (0.23)
Trainings by cooperative	0.0273 (0.02)	-0.0147 (0.03)	0.0874*** (0.03)	0.00113 (0.03)	0.120*** (0.04)	-0.0551 (0.08)	0.249*** (0.09)	0.111*** (0.04)	0.0279 (0.04)	0.195** (0.08)
Vehicles coop owns	0.00298 (0.01)	0.00592 (0.01)	-0.00308 (0.01)	0.0132 (0.01)	0.0201* (0.01)	0.000589 (0.02)	-0.00593 (0.02)	-0.00798 (0.01)	-0.0123 (0.01)	-0.0139 (0.02)
Constant	8.090*** (0.24)	7.394*** (0.26)	7.171*** (0.28)	5.588*** (0.31)	4.663*** (0.39)	3.326*** (0.78)	6.029*** (0.76)	5.709*** (0.42)	0.436 (0.45)	3.602*** (0.79)
Observations	500	500	500	500	500	500	500	500	500	500

Notes: Coefficient estimates shown with standard errors in parentheses. All dependent variables are IHS-transformed. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Table A7: Effects of Fairtrade certification on daily per capita consumption expenditures (full results of IV models)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Total expenditures	Food expenditures	Non-food expenditures	Basic living expenditures	Health expenditures	Education expenditures	Transport expenditures	Social expenditures	Financial expenditures	Miscellan. expenditures
Fairtrade certified	0.171** (0.08)	0.00638 (0.09)	0.364*** (0.10)	0.223* (0.12)	0.120 (0.15)	0.659** (0.27)	0.564** (0.28)	0.243* (0.15)	0.376** (0.18)	-0.243 (0.30)
Age of household head	0.00166 (0.00)	0.00212 (0.00)	-0.00170 (0.00)	-0.00225 (0.00)	0.00874** (0.00)	0.0119 (0.01)	-0.0227** (0.01)	-0.0148*** (0.00)	-0.00299 (0.00)	-0.00273 (0.01)
Female household head	0.315** (0.12)	0.322*** (0.11)	0.257 (0.18)	0.289 (0.19)	0.150 (0.17)	0.420 (0.49)	-0.319 (0.50)	0.0647 (0.25)	0.522 (0.49)	0.194 (0.39)
Education of household head	-0.00170 (0.00)	-0.00342 (0.00)	0.00129 (0.00)	0.0137*** (0.00)	-0.0152 (0.01)	-0.00606 (0.01)	-0.00227 (0.01)	-0.000571 (0.01)	-0.00212 (0.00)	0.00893 (0.01)
Experience in growing cocoa	0.00126 (0.00)	-0.000939 (0.00)	0.00370 (0.00)	-0.000911 (0.00)	-0.00783* (0.00)	0.00136 (0.01)	0.00365 (0.01)	0.00700 (0.00)	0.00451 (0.00)	-0.0111 (0.01)
Household size	-0.0728*** (0.01)	-0.0616*** (0.01)	-0.0797*** (0.01)	-0.0745*** (0.01)	-0.0654*** (0.01)	-0.0119 (0.02)	-0.0580** (0.02)	-0.0759*** (0.01)	0.00282 (0.01)	-0.0756*** (0.02)
Non-cocoa income	0.0584*** (0.02)	0.0595*** (0.02)	0.0646*** (0.02)	0.0883*** (0.02)	0.0995*** (0.02)	0.0725** (0.04)	0.0868** (0.04)	0.0690** (0.03)	-0.0223 (0.01)	0.139*** (0.05)
Value of assets 10 years ago	0.00428 (0.02)	-0.00819 (0.01)	0.0211 (0.03)	0.00322 (0.03)	0.0294 (0.03)	0.0185 (0.02)	0.0500 (0.06)	0.0424 (0.05)	8.04e-09 (0.00)	0.0524** (0.02)
Akan ethnicity	-0.0349 (0.06)	-0.0163 (0.06)	-0.0690 (0.07)	-0.123 (0.08)	0.0934 (0.10)	0.206 (0.19)	-0.0958 (0.20)	-0.0641 (0.10)	0.162* (0.09)	-0.494** (0.22)
Land owned (ha)	0.0101** (0.00)	0.00821** (0.00)	0.0121** (0.00)	0.00986** (0.00)	0.00886 (0.01)	-0.00121 (0.01)	0.0280*** (0.01)	0.0192*** (0.01)	0.00455 (0.01)	0.0244*** (0.01)
Good soil quality	-0.0410 (0.06)	0.0482 (0.06)	-0.189*** (0.07)	0.0894 (0.08)	-0.278*** (0.09)	-0.278 (0.20)	-0.318 (0.20)	-0.298*** (0.09)	-0.154 (0.12)	-0.114 (0.21)
Steep slope	-0.0981** (0.05)	-0.0800 (0.05)	-0.113* (0.06)	-0.0689 (0.07)	-0.0872 (0.08)	-0.168 (0.16)	-0.476*** (0.18)	-0.0955 (0.08)	-0.0355 (0.08)	0.241 (0.17)
Distance to water source	0.00237 (0.00)	0.00309 (0.00)	0.00133 (0.00)	0.000552 (0.00)	-0.00175 (0.00)	0.00226 (0.01)	-0.00964 (0.01)	-0.00108 (0.00)	0.00593* (0.00)	-0.00154 (0.01)
Distance to tarmac road	-0.00467*** (0.00)	-0.00448*** (0.00)	-0.00468*** (0.00)	-0.00765*** (0.00)	-0.00491* (0.00)	0.00309 (0.00)	0.000186 (0.01)	-0.00484* (0.00)	-0.00296 (0.00)	-0.00123 (0.01)
Distance to primary school	0.000668 (0.00)	0.00159*** (0.00)	-0.000593 (0.00)	0.000590 (0.00)	0.00246*** (0.00)	-0.00977*** (0.00)	-0.000932 (0.00)	-0.000447 (0.00)	-0.000642 (0.00)	-0.000638 (0.00)
Age of cooperative	-0.0139** (0.01)	-0.00720 (0.01)	-0.0207*** (0.01)	-0.000593 (0.01)	-0.0385*** (0.01)	0.00343 (0.02)	-0.0616*** (0.02)	-0.0170* (0.01)	-0.00614 (0.01)	-0.0218 (0.02)
Education of coop leader	0.0118 (0.01)	0.00987 (0.01)	0.0190* (0.01)	0.00920 (0.01)	0.0186 (0.01)	0.0608** (0.03)	-0.00623 (0.04)	0.00863 (0.02)	-0.0111 (0.01)	0.0465 (0.03)

Democratic coop decisions	-0.360* (0.21)	-0.278 (0.24)	-0.223 (0.27)	-0.290 (0.33)	-0.0937 (0.33)	-0.671 (0.68)	-0.923 (0.65)	0.230 (0.36)	-0.432 (0.52)	0.757 (0.66)
Coop size before certification	-0.0000807 (0.00)	0.00000677 (0.00)	-0.000178** (0.00)	-0.000155* (0.00)	-0.000212** (0.00)	-0.000154 (0.00)	-0.0000815 (0.00)	-0.0000788 (0.00)	-0.000101 (0.00)	-0.000468* (0.00)
Coop leader grows cocoa	0.0436 (0.06)	0.0144 (0.07)	0.141* (0.08)	0.173* (0.09)	0.143 (0.11)	0.121 (0.22)	0.243 (0.23)	0.0718 (0.11)	-0.0830 (0.13)	-0.144 (0.22)
Trainings provided by coop	0.0252 (0.02)	-0.0144 (0.03)	0.0828*** (0.03)	-0.00479 (0.03)	0.114*** (0.04)	-0.0661 (0.08)	0.240*** (0.09)	0.109*** (0.04)	0.0221 (0.03)	0.209** (0.08)
Vehicles coop owns	0.00209 (0.01)	0.00603 (0.01)	-0.00511 (0.01)	0.0106 (0.01)	0.0173 (0.01)	-0.00426 (0.02)	-0.0101 (0.02)	-0.00880 (0.01)	-0.0148 (0.01)	-0.00764 (0.02)
Constant	8.096*** (0.23)	7.394*** (0.25)	7.184*** (0.28)	5.605*** (0.30)	4.681*** (0.38)	3.357*** (0.77)	6.055*** (0.74)	5.714*** (0.41)	0.453 (0.44)	3.562*** (0.77)
Observations	500	500	500	500	500	500	500	500	500	500

Notes: Coefficient estimates shown with standard errors in parentheses. All dependent variables are IHS-transformed. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Table A8: Effects of Fairtrade certification on consumption expenditures controlling for double and triple certification

	(1) Total expenditures	(2) Food expenditures	(3) Non-food expenditures	(4) Basic living expenditures	(5) Health expenditures	(6) Education expenditures	(7) Transport expenditures	(8) Social expenditures	(9) Financial expenditures	(10) Miscellan. expenditures
<i>OLS models</i>										
Fairtrade certified	0.122* (0.07)	-0.00870 (0.08)	0.273*** (0.09)	0.116 (0.10)	-0.0184 (0.12)	0.470** (0.23)	0.384 (0.24)	0.182 (0.13)	0.322** (0.15)	-0.0671 (0.25)
Certified under UTZ/RA	0.0726 (0.08)	0.0812 (0.08)	0.0819 (0.10)	0.0666 (0.10)	0.168 (0.13)	0.0744 (0.23)	0.139 (0.25)	0.135 (0.13)	-0.152 (0.16)	0.192 (0.25)
<i>IV models</i>										
Fairtrade certified	0.156* (0.08)	-0.0122 (0.09)	0.350*** (0.11)	0.213* (0.13)	0.0875 (0.16)	0.652** (0.28)	0.541* (0.29)	0.214 (0.16)	0.416** (0.20)	-0.299 (0.31)
Certified under UTZ/RA	0.0644 (0.08)	0.0820 (0.08)	0.0634 (0.10)	0.0429 (0.10)	0.142 (0.12)	0.0304 (0.23)	0.101 (0.25)	0.128 (0.13)	-0.175 (0.16)	0.248 (0.24)
Observations	500	500	500	500	500	500	500	500	500	500

Notes: Coefficient estimates shown with standard errors in parentheses. All dependent variables are IHS-transformed. RA, Rainforest Alliance. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Table A9: Effects of Fairtrade certification on daily per capita consumption expenditures of poor households (full results of IV models)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Total expenditures	Food expenditures	Non-food expenditures	Basic living expenditures	Health expenditures	Education expenditures	Transport expenditures	Social expenditures	Financial expenditures	Missellan. expenditures
Fairtrade certified	0.271*** (0.10)	0.0784 (0.11)	0.456*** (0.15)	0.274* (0.15)	0.306 (0.20)	0.507 (0.36)	0.347 (0.40)	0.213 (0.21)	0.292 (0.28)	-0.0414 (0.40)
Age of household head	0.00344 (0.00)	0.00341 (0.00)	-0.00126 (0.00)	-0.000597 (0.00)	0.00458 (0.01)	0.0143 (0.01)	-0.0306*** (0.01)	-0.0169*** (0.01)	-0.00411 (0.01)	-0.0153 (0.01)
Female household head	0.0115 (0.20)	0.0693 (0.20)	0.0484 (0.28)	0.679*** (0.23)	-0.197 (0.34)	0.251 (0.53)	-0.653 (0.62)	-0.548 (0.57)	1.052 (1.25)	0.501 (0.78)
Education of household head	-0.00999*** (0.00)	-0.0137*** (0.00)	-0.00257 (0.00)	0.0118** (0.00)	-0.0354*** (0.01)	-0.00684 (0.01)	-0.0148 (0.01)	-0.00993* (0.01)	-0.00592 (0.01)	0.0145 (0.01)
Experience in growing cocoa	-0.000203 (0.00)	0.000976 (0.00)	-0.00120 (0.00)	-0.00389 (0.00)	-0.0138** (0.01)	0.000439 (0.01)	-0.00976 (0.01)	0.000412 (0.01)	0.00804 (0.01)	-0.0119 (0.01)
Household size	-0.0424*** (0.01)	-0.0364*** (0.01)	-0.0419*** (0.01)	-0.0475*** (0.01)	-0.0238* (0.01)	-0.0305 (0.03)	0.0430 (0.04)	-0.0265* (0.02)	-0.0121 (0.01)	-0.0110 (0.03)
Non-cocoa income	0.00227 (0.10)	-0.0330 (0.11)	0.0406 (0.13)	0.157 (0.15)	0.257 (0.19)	-0.331 (0.36)	-0.456 (0.45)	0.387** (0.17)	-0.121 (0.15)	0.0942 (0.41)
Value of assets 10 years ago	-0.0103 (0.01)	-0.0143*** (0.00)	-0.000764 (0.01)	-0.0139 (0.01)	0.0194* (0.01)	-0.00724 (0.01)	0.0194 (0.03)	0.000252 (0.01)	0.0144* (0.01)	0.0546*** (0.02)
Akan ethnicity	0.0113 (0.07)	-0.0101 (0.08)	0.0151 (0.09)	-0.129 (0.10)	0.347*** (0.13)	-0.0638 (0.22)	0.133 (0.26)	-0.00173 (0.13)	0.152 (0.14)	-0.616** (0.26)
Land owned (ha)	0.00448 (0.00)	0.00430 (0.00)	0.00448 (0.01)	0.00374 (0.01)	-0.00164 (0.01)	0.0121 (0.01)	0.0136 (0.01)	0.00697 (0.01)	0.0144 (0.01)	0.0192 (0.01)
Good soil quality	-0.0201 (0.07)	0.116 (0.08)	-0.219** (0.09)	0.125 (0.10)	-0.309** (0.12)	-0.546** (0.21)	-0.324 (0.27)	-0.249** (0.12)	-0.0674 (0.17)	0.000147 (0.27)
Steep slopes	-0.0530 (0.06)	-0.0417 (0.06)	-0.0847 (0.08)	-0.0754 (0.08)	-0.00929 (0.11)	-0.286 (0.19)	-0.818*** (0.24)	-0.0669 (0.11)	-0.0502 (0.11)	0.281 (0.23)
Distance to water source	0.00226 (0.00)	0.00213 (0.00)	0.00130 (0.00)	-0.00405 (0.00)	0.000549 (0.00)	0.0140** (0.01)	0.00336 (0.01)	-0.00424 (0.00)	0.00244 (0.00)	-0.00887 (0.01)
Distance to tarmac road	-0.00135 (0.00)	-0.00140 (0.00)	-0.00162 (0.00)	-0.00480* (0.00)	0.00184 (0.00)	0.00584 (0.01)	0.0113 (0.01)	-0.00433 (0.00)	0.000213 (0.00)	-0.00718 (0.01)
Distance to primary school	0.000526 (0.01)	0.00733 (0.01)	-0.00819 (0.01)	-0.00310 (0.01)	0.0177* (0.01)	0.00271 (0.02)	-0.0286 (0.03)	-0.0104 (0.02)	-0.0125 (0.01)	-0.0308 (0.03)
Age of cooperative	-0.00705 (0.01)	-0.00127 (0.01)	-0.0146 (0.01)	0.00452 (0.01)	-0.0282** (0.01)	0.00375 (0.02)	-0.0429 (0.03)	-0.0175 (0.01)	-0.00386 (0.02)	-0.0298 (0.03)
Education of coop leader	0.0104 (0.01)	-0.00272 (0.01)	0.0366** (0.02)	0.0165 (0.02)	0.0154 (0.02)	0.103*** (0.04)	0.0308 (0.06)	0.0232 (0.02)	-0.00380 (0.02)	0.0941* (0.05)

Coop democratic decisions	-0.638** (0.28)	-0.436 (0.30)	-0.496 (0.38)	-0.584 (0.37)	-0.251 (0.48)	0.236 (0.74)	-2.086*** (0.81)	-0.750 (0.52)	-0.942 (0.84)	0.919 (0.88)
Members of coop before certif.	-0.000107 (0.00)	-0.0000170 (0.00)	-0.000206* (0.00)	-0.0000862 (0.00)	-0.000239 (0.00)	0.0000330 (0.00)	-0.000331 (0.00)	-0.000105 (0.00)	-0.000141 (0.00)	-0.000607** (0.00)
Coop leader grows cocoa	0.0580 (0.09)	-0.0103 (0.09)	0.209* (0.12)	0.110 (0.11)	0.0678 (0.16)	0.342 (0.28)	0.122 (0.36)	0.134 (0.17)	-0.147 (0.15)	0.259 (0.31)
Trainings provided by coop	-0.0265 (0.03)	-0.0865*** (0.03)	0.0747* (0.04)	-0.0532 (0.04)	0.0563 (0.06)	0.0722 (0.09)	0.169 (0.14)	0.0911 (0.06)	0.00691 (0.06)	0.301** (0.12)
Vehicles coop owns	0.00200 (0.01)	0.0129 (0.01)	-0.0114 (0.01)	0.0117 (0.01)	0.00762 (0.01)	-0.0413 (0.03)	0.00130 (0.03)	-0.000389 (0.01)	-0.00552 (0.01)	-0.00255 (0.03)
Constant	7.748*** (0.30)	7.210*** (0.31)	6.596*** (0.40)	5.313*** (0.37)	4.439*** (0.56)	2.437*** (0.92)	5.793*** (1.14)	5.496*** (0.63)	0.641 (0.66)	2.570** (1.09)
Observations	262	262	262	262	262	262	262	262	262	262

Notes: Coefficient estimates shown with standard errors in parentheses. All dependent variables are IHS-transformed. Poor households are those with incomes of less than 3.20 PPP dollars per capita and day. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Table A10: Effects of Fairtrade certification on daily per capita consumption expenditures of non-poor households (full results of IV models)

	(1) Total expenditures	(2) Total food expenditures	(3) Total non-food expenditures	(4) Basic living expenditures	(5) Health expenditures	(6) Education expenditures	(7) Transport expenditures	(8) Social expenditures	(9) Financial expenditures	(10) Miscellan. expenditures
Fairtrade certified	0.00842 (0.10)	-0.151 (0.14)	0.237* (0.12)	0.0571 (0.18)	-0.0961 (0.20)	1.017** (0.40)	0.776** (0.36)	0.186 (0.16)	0.303 (0.19)	-0.539 (0.44)
Age of household head	-0.000868 (0.00)	-0.000178 (0.00)	-0.00265 (0.00)	-0.00576 (0.01)	0.0123** (0.01)	0.00614 (0.02)	-0.0186 (0.01)	-0.0129** (0.01)	-0.0000366 (0.00)	0.00890 (0.02)
Female household head	0.255* (0.15)	0.266* (0.14)	0.154 (0.21)	0.0325 (0.24)	0.0787 (0.18)	0.343 (0.68)	-0.432 (0.54)	-0.0130 (0.25)	0.440 (0.48)	-0.0571 (0.46)
Education of household head	-0.000336 (0.00)	0.000598 (0.00)	-0.000793 (0.00)	0.00925*** (0.00)	-0.00168 (0.00)	-0.0115 (0.01)	-0.00540 (0.01)	0.00467 (0.00)	-0.00358 (0.00)	0.00823 (0.01)
Experience in growing cocoa	-0.00119 (0.00)	-0.00644 (0.00)	0.00397 (0.00)	-0.00165 (0.00)	-0.00545 (0.01)	0.00576 (0.01)	0.0146 (0.01)	0.00592 (0.01)	-0.000617 (0.00)	-0.0210 (0.02)
Household size	-0.111*** (0.02)	-0.0925*** (0.02)	-0.121*** (0.02)	-0.107*** (0.02)	-0.111*** (0.02)	0.0732 (0.05)	-0.154*** (0.04)	-0.130*** (0.02)	-0.000425 (0.02)	-0.156*** (0.05)
Non-cocoa income	0.0419*** (0.01)	0.0519*** (0.01)	0.0379** (0.02)	0.0705*** (0.02)	0.0704*** (0.02)	0.0401 (0.04)	0.0269 (0.03)	0.0255 (0.03)	-0.000470 (0.01)	0.132*** (0.04)
Value of assets 10 years ago	0.0828*** (0.03)	0.0271 (0.03)	0.134*** (0.04)	0.0964*** (0.03)	0.0998** (0.05)	0.0269 (0.07)	0.183*** (0.07)	0.263*** (0.05)	0.0306 (0.05)	0.120* (0.07)
Akan ethnicity	-0.0832 (0.08)	-0.0282 (0.10)	-0.163 (0.10)	-0.129 (0.11)	-0.168 (0.13)	0.614* (0.33)	-0.315 (0.27)	-0.160 (0.14)	0.0779 (0.08)	-0.490 (0.37)
Land owned (ha)	0.00764** (0.00)	0.00809** (0.00)	0.00737 (0.00)	0.00435 (0.01)	0.00878 (0.01)	-0.0156 (0.02)	0.0407*** (0.01)	0.00274 (0.01)	-0.00514 (0.00)	0.0137 (0.01)
Good soil quality	-0.132* (0.08)	-0.0885 (0.10)	-0.227** (0.09)	0.0131 (0.12)	-0.332** (0.13)	0.00174 (0.33)	-0.472* (0.27)	-0.363*** (0.12)	-0.275* (0.16)	-0.376 (0.32)
Steep slopes	-0.129* (0.07)	-0.105 (0.08)	-0.120 (0.09)	-0.0377 (0.10)	-0.159 (0.10)	-0.157 (0.26)	-0.148 (0.23)	-0.0155 (0.10)	-0.0286 (0.08)	0.294 (0.27)
Distance to water source	0.000960 (0.00)	0.00288 (0.00)	-0.000136 (0.00)	0.00382 (0.00)	-0.00475* (0.00)	-0.00508 (0.01)	-0.0282** (0.01)	0.00116 (0.00)	0.00910 (0.01)	0.00335 (0.01)
Distance to tarmac road	-0.00548*** (0.00)	-0.00517** (0.00)	-0.00596*** (0.00)	-0.00907*** (0.00)	-0.00757*** (0.00)	0.000183 (0.01)	-0.00574 (0.01)	-0.00189 (0.00)	-0.00462 (0.00)	0.000962 (0.01)
Distance to primary school	-0.000166 (0.00)	0.000841* (0.00)	-0.00145** (0.00)	-0.000175 (0.00)	0.00119 (0.00)	-0.00956*** (0.00)	-0.00235** (0.00)	-0.00139* (0.00)	-0.000503 (0.00)	-0.00138 (0.00)
Age of cooperative	-0.0116 (0.01)	-0.00382 (0.01)	-0.0171* (0.01)	0.00375 (0.01)	-0.0396*** (0.01)	0.0130 (0.03)	-0.0654** (0.03)	0.00351 (0.01)	-0.00926 (0.01)	0.00914 (0.03)

Education of coop leader	0.00571 (0.01)	0.0145 (0.01)	-0.00214 (0.01)	0.000858 (0.02)	0.00582 (0.02)	0.0286 (0.04)	-0.0797** (0.04)	-0.0142 (0.02)	-0.00496 (0.01)	0.0165 (0.05)
Coop democratic decisions	-0.0754 (0.30)	-0.308 (0.37)	0.253 (0.38)	0.0974 (0.55)	0.0767 (0.41)	-1.564 (1.21)	0.777 (1.01)	1.295*** (0.44)	0.130 (0.51)	0.960 (1.05)
Members of coop before certification	-0.000123* (0.00)	-0.0000403 (0.00)	-0.000185* (0.00)	-0.000240** (0.00)	-0.000167 (0.00)	-0.000352 (0.00)	0.000275 (0.00)	-0.0000895 (0.00)	-0.0000889 (0.00)	-0.000371 (0.00)
Coop leader grows cocoa	-0.123 (0.09)	-0.156 (0.11)	-0.00144 (0.12)	0.135 (0.15)	0.0668 (0.16)	0.0411 (0.38)	0.246 (0.30)	-0.124 (0.14)	-0.0116 (0.16)	-0.603* (0.34)
Trainings provided by cooperative	0.0288 (0.03)	0.0128 (0.04)	0.0507 (0.04)	-0.00664 (0.04)	0.112** (0.05)	-0.205 (0.13)	0.222** (0.11)	0.0549 (0.05)	0.0253 (0.04)	0.114 (0.11)
Vehicles cooperative owns	0.00559 (0.01)	0.00356 (0.01)	0.00144 (0.01)	0.0150 (0.01)	0.0308* (0.02)	0.0171 (0.03)	-0.0238 (0.02)	-0.0160 (0.01)	-0.0166 (0.01)	-0.0206 (0.03)
Constant	8.906*** (0.33)	8.135*** (0.39)	8.036*** (0.37)	6.240*** (0.44)	5.356*** (0.50)	3.798*** (1.23)	6.894*** (0.97)	6.355*** (0.47)	0.307 (0.40)	4.866*** (1.11)
Observations	238	238	238	238	238	238	238	238	238	238

Notes: Coefficient estimates shown with standard errors in parentheses. All dependent variables are IHS-transformed. Non-poor households are those with incomes of more than 3.20 PPP dollars per capita and day. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Table A11: Effects of Fairtrade certification on Food Security Indicators of different sample groups (full results)

	Total sample						Poor			Non-poor		
	OLS HDDS	OLS FCS	Probit Undernourished	IV HDDS	IV FCS	IV Probit Undernourished	IV HDDS	IV FCS	IV Probit Undernourished	IV HDDS	IV FCS	IV Probit Undernourished
Fairtrade certified	-0.0676 (0.18)	-0.544 (1.24)	0.136 (0.16)	0.0781 (0.22)	0.409 (1.46)	0.162 (0.21)	0.376 (0.28)	0.819 (1.81)	0.0670 (0.30)	-0.0494 (0.33)	0.681 (2.20)	0.167 (0.31)
Age of household head	0.00169 (0.01)	0.00998 (0.04)	-0.0141** (0.01)	0.00182 (0.01)	0.0109 (0.04)	-0.0141** (0.01)	-0.00527 (0.01)	-0.0579 (0.06)	-0.0233** (0.01)	0.00979 (0.01)	0.0776 (0.06)	-0.00629 (0.01)
Female household head	0.626*** (0.24)	6.762*** (1.76)	-0.515 (0.33)	0.597** (0.24)	6.569*** (1.74)	-0.521 (0.32)	0.377 (0.51)	7.296*** (2.26)	0.453 (0.70)	0.408 (0.27)	4.848** (2.18)	-0.738* (0.41)
Education of household head	-0.00973 (0.01)	-0.0624* (0.04)	0.0137* (0.01)	-0.00992 (0.01)	-0.0637* (0.03)	0.0136 (0.02)	-0.0148* (0.01)	-0.0890* (0.05)	0.0167 (0.02)	-0.000621 (0.01)	-0.0258 (0.04)	0.0247 (0.03)
Experience in growing cocoa	-0.000941 (0.01)	0.0199 (0.04)	0.00374 (0.01)	-0.000596 (0.01)	0.0222 (0.04)	0.00380 (0.01)	-0.00699 (0.01)	-0.00853 (0.05)	0.00730 (0.01)	0.00256 (0.01)	0.0344 (0.07)	0.00522 (0.01)
Household size	0.0157 (0.02)	0.263** (0.13)	0.0465*** (0.02)	0.0143 (0.02)	0.254* (0.13)	0.0463*** (0.02)	0.0309 (0.03)	0.384** (0.18)	0.0467* (0.03)	0.00517 (0.03)	0.194 (0.22)	0.117*** (0.04)
Non-cocoa income	0.139*** (0.05)	1.211*** (0.33)	0.0258 (0.04)	0.137*** (0.05)	1.198*** (0.33)	0.0256 (0.04)	1.246*** (0.34)	9.085*** (2.45)	-0.349 (0.32)	0.0745* (0.04)	0.751*** (0.24)	0.0200 (0.04)
Value of assets 10 years ago	-0.0125 (0.04)	-0.109 (0.25)	0.0984* (0.05)	-0.0113 (0.04)	-0.100 (0.25)	0.0981 (0.06)	-0.0356** (0.01)	-0.275*** (0.08)	0.109 (0.24)	0.0861 (0.05)	0.534 (0.38)	0.0736 (0.08)
Akan ethnicity	-0.378** (0.16)	-1.298 (0.96)	0.222 (0.14)	-0.367** (0.16)	-1.229 (0.94)	0.224 (0.14)	-0.326 (0.22)	-1.246 (1.33)	0.353* (0.20)	-0.369 (0.23)	-0.626 (1.38)	0.0543 (0.22)
Land owned (ha)	0.00984 (0.01)	0.0698 (0.07)	-0.0150** (0.01)	0.00984 (0.01)	0.0698 (0.07)	-0.0150** (0.01)	-0.0123 (0.01)	-0.0986 (0.09)	-0.0271* (0.02)	0.00305 (0.01)	0.0654 (0.07)	-0.00362 (0.01)
Good soil quality	-0.0649 (0.16)	-0.302 (1.03)	-0.0267 (0.14)	-0.0832 (0.16)	-0.422 (1.01)	-0.0305 (0.14)	0.0210 (0.21)	0.360 (1.32)	-0.316 (0.21)	-0.156 (0.24)	-0.435 (1.56)	0.350 (0.23)
Steep slopes	-0.373*** (0.14)	-3.053*** (0.85)	0.102 (0.12)	-0.369*** (0.13)	-3.027*** (0.83)	0.103 (0.12)	-0.240 (0.18)	-2.734** (1.10)	0.0575 (0.17)	-0.396** (0.19)	-2.662** (1.18)	0.143 (0.18)
Distance to water source	-0.00478 (0.01)	0.0212 (0.03)	-0.00495 (0.00)	-0.00448 (0.01)	0.0232 (0.03)	-0.00489 (0.00)	-0.000445 (0.01)	0.0354 (0.04)	-0.00721 (0.01)	-0.00510 (0.01)	0.0243 (0.05)	-0.00226 (0.01)
Distance to tarmac road	-0.00686* (0.00)	-0.0307 (0.02)	0.00291 (0.00)	-0.00732* (0.00)	-0.0338 (0.02)	0.00282 (0.00)	-0.00824 (0.01)	-0.0292 (0.03)	-0.00221 (0.01)	-0.00821 (0.01)	-0.0455 (0.03)	0.00751 (0.01)
Distance to primary school	0.00209** (0.00)	0.00786 (0.01)	-0.0119 (0.01)	0.00196** (0.00)	0.00704 (0.01)	-0.0119 (0.01)	0.0143 (0.02)	0.135 (0.14)	-0.0438* (0.02)	0.00144 (0.00)	0.00518 (0.01)	-0.00190 (0.01)
Age of cooperative	-0.00791 (0.01)	-0.0857 (0.09)	0.0140 (0.01)	-0.00921 (0.01)	-0.0942 (0.09)	0.0138 (0.01)	-0.00375 (0.02)	-0.0800 (0.11)	-0.0158 (0.02)	-0.0117 (0.03)	-0.0654 (0.17)	0.0399* (0.02)
Education of coop leader	-0.0254 (0.03)	-0.241 (0.16)	-0.00678 (0.02)	-0.0304 (0.03)	-0.274* (0.16)	-0.00770 (0.02)	-0.0283 (0.04)	-0.347 (0.24)	0.0232 (0.04)	-0.0398 (0.03)	-0.350 (0.24)	-0.0195 (0.04)

Coop democratic decisions	1.149*	3.014	0.303	1.175**	3.186	0.309	1.667**	2.953	0.328	0.750	2.914	0.575
	(0.59)	(3.64)	(0.46)	(0.58)	(3.57)	(0.47)	(0.83)	(4.83)	(0.70)	(0.78)	(5.19)	(0.72)
Members of coop before certification	-0.000294	-	0.000382**	-	-	0.000381**	-0.000498**	-	0.000281	0.0000828	0.000151	0.000631**
	(0.00)	0.00199**	(0.00)	0.000305*	0.00206**	(0.00)	(0.00)	0.00263**	(0.00)	(0.00)	(0.00)	(0.00)
		(0.00)		(0.00)	(0.00)			(0.00)				
Coop leader grows cocoa	0.253	0.291	-0.115	0.279	0.459	-0.111	0.359	-0.389	-0.115	0.325	1.715	0.0207
	(0.18)	(1.12)	(0.16)	(0.18)	(1.10)	(0.16)	(0.24)	(1.46)	(0.24)	(0.27)	(1.69)	(0.25)
Trainings provided by cooperative	0.0760	0.413	0.133**	0.0666	0.352	0.131**	0.131	0.378	0.255***	0.000873	0.192	0.0754
	(0.06)	(0.44)	(0.06)	(0.06)	(0.44)	(0.06)	(0.09)	(0.59)	(0.09)	(0.09)	(0.62)	(0.08)
Vehicles cooperative owns	0.0162	0.212*	-0.0540***	0.0121	0.185	-0.0547***	-0.00734	0.237	-0.0809***	0.0215	0.0842	-0.0439*
	(0.02)	(0.11)	(0.01)	(0.02)	(0.11)	(0.02)	(0.02)	(0.16)	(0.02)	(0.03)	(0.17)	(0.02)
Constant	8.581***	26.52***	-0.0686	8.607***	26.70***	-0.0639	8.181***	28.75***	0.600	8.803***	24.17***	-1.629**
	(0.63)	(3.98)	(0.54)	(0.62)	(3.89)	(0.53)	(0.92)	(5.53)	(0.82)	(0.83)	(5.40)	(0.81)
Observations	500	500	500	500	500	500	500	500	500	500		

Notes: Coefficient estimates shown with standard errors in parentheses. Non-poor households are those with incomes of more than 3.20 PPP dollars per capita and day, poor households are those with incomes of less than 3.20 PPP dollars per capita and day. A household is defined as undernourished when daily calorie consumption is below 2400 kcal per male adult equivalent. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Table A12: Effect of Fairtrade Certification status on Expenditures, Quantile Regressions

	OLS	Quantiles (0.25, 0.5, 0.75)		
		0.25	0.5	0.75
Total Expenditures	0.139**	0.155*	0.118*	0.0899
	(0.07)	(0.08)	(0.07)	(0.07)
Food Expenditures	0.0103	0.0764	0.0195	0.00188
	(0.07)	(0.08)	(0.08)	(0.10)
Non-Food Expenditures	0.292***	0.315***	0.307***	0.333***
	(0.09)	(0.10)	(0.09)	(0.09)
Observations	500	500	500	500

Notes: Coefficient estimates shown with standard errors in parentheses.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$