DRAFT PAPER

The local payoffs of coffee certification. Evidences from smallholder cooperative farmers in Jinotega, Nicaragua.

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Abstract

This paper concerns the local payoffs of coffee certification in a case study region in Jinotega, Northern Nicaragua. It aims to answer two questions. First, does certification significantly improve the income of smallholder coffee farmers in Nicaragua? Second, if yes, how far do these income improvements help coffee farmers to find a sustainable livelihood above the poverty line? In order to answer these questions, we carried out empirical field research in which we conducted a semi-structured household survey in the Jinotega Municipality of North-central Nicaragua. A total of 238 certified and non-certified coffee farmers were selected through a stratified random sampling procedure and interviewed. Certified farmers were taken as the treatment group and non-certified ones as the control group. Both the gross margin analysis and regression analysis are employed to show the likely income and poverty differences between the treatment and control groups controlling for other relevant factors. The results reveal that the coffee certification program of Jinotega municipality does indeed improve the income of the participating farmers. However, these income improvements are not sufficient to sustainably lift the poor farmers above the poverty line.

Keywords – Coffee certification, poverty reduction, price premium, gross margin

I. Introduction

The worldwide coffee business has changed significantly in the last two decades. The International Coffee Agreement (ICA), a set of agreements that regulated the global coffee market by a producer country-driven quota system since 1962, broke in 1989. Thereafter, the market dominance of large scale roasters and retailers in the consumers' countries increased (Bacon 2004; Ponte, 2004). Simultaneously, Vietnam entered the coffee market and Brazil doubled its production between 1993 and 2003 (Bacon 2004). As a consequence, world market coffee prices crashed alarmingly at the beginning of the new millennium. This diminished the opportunities of smaller coffee producing countries, particularly in Central America and Africa, to secure their benefits from coffee production for their socio-economic development and poverty reduction (Petit 2007).

Around the same time, other major changes occurred at the end of the value chain, at the consumer's side. Coffee drinkers in the major consumer countries became increasingly sensible and aware of what they are drinking and about the circumstances under which coffee is produced, processed and marketed. More and more consumers became willing to pay price premiums when certain attributes of the product and/or the production, processing and marketing processes are fulfilled. While the markets for conventional coffees stagnate, the demand for alternative specialty coffee increased in all major consumer countries. This trend is likely to continue in the future. The combination of changing environments in the worldwide coffee sectors pushed a trend towards specialization and diversification using the tool of certification to simultaneously providing the coffee producers with a better livelihood and the consumers with a product that embeds positive physical and non-physical characteristics.

Certification is an instrument to add value to a product, mostly addressing the consumer demand for healthier and more socially and environmentally-friendly products. It is based on the idea that consumers are motivated to pay price premia for products that meet certain precisely defined and assured standards (Ponte 2004). Certification standards mostly follow a comprehensive and multi-criteria life cycle approach which separately takes into account production, processing and marketing stages, and a variety of environmental aspects – resource and energy usage emissions, waste creation or nuisance. In addition, process attributes such as animal welfare, biotechnology, packaging, working conditions, and social welfare are increasingly being considered in certification schemes (Basu et al. 2003; Grote et al. 2007). It is likely, that in the future also other ecosystem services will gain more importance in this regard.

The distribution of values along the value chain is determined by how actors define, control and value the different attributes of the product (Daviron & Ponte 2005). Price premia can be used to support a more socio-economic and environmentally sustainable production, processing and marketing. Producers' benefits of certification relate not only to price premiums, but also to improved market access, longer-term supply contracts which may lead to stronger relationships between buyers and suppliers, or increased productivity in management. Costs refer to the initial costs of investing into organizational and technical infrastructure as well as knowledge and labor needed to meet certain requirements, but also to the recurrent costs of certification.
At the end of the 2010th century, a number of certification schemes have made it inroads into the mainstream global coffee market: organic, Fairtrade, Utz Certified, Rainforest Alliance, and Smithsonian "Bird Friendly" to name the major ones. Their background and objectives are, however, very different. Fairtrade, the most world-wide used standard for coffee, is defined as "an alternative approach to conventional trade that aims to improve the livelihoods and well-being of small producers by improving their market access, strengthening their organizations, paying them a fair price with a fixed minimum, and providing continuity in trading relationships" (Giovannucci and Koekoek, 2003). Organic standards are based on minimal use of off-farm inputs and on management practices that restore, maintain and enhance ecological sustainability. Shade-grown certifications like Rainforest Alliance and Bird friendly mainly target at conserving forest cover through the production of coffee under the shade of forest canopy. Although the

main objective of these certification schemes is different, they have recently aligned objectives of other certifications to provide an integrated certification that can address socio-economic and environmental sustainability.

Certification is a complex instrument. It puts high challenges to all actors involved in producing, processing, marketing and - last but not least – buying the product. Additionally it needs independent and continuous evaluation and monitoring. In general, the whole process needs more resources and input than conventional production. High levels of trust, transparency, knowledge and information, as well as proficient physical infrastructure are most important in this regard (Basu et al. 2003).

Furthermore, certification must be profitable in the long term; price premiums must be higher than the additional costs of certification. The certification of one coffee smallholder coffee cooperative, for example, costs several thousand US$ for one year. Some literature provided evidence that most of the economic benefits of certification are soaked up at the higher end of the value chain and do not trickle down to smallholder coffee producers (Fitter, 2001). Second, economic and ecological developments are sometimes contradicting. Price premia, for example, can have a negative impact on a forest ecosystem and biodiversity since higher prices provide incentives for the forest coffee producers to intensify their production by means of forest management activities that promote forest depletion and deforestation (Stellmacher, 2008). These structural concerns raise questions about the actual impacts of certification in smallholder coffee producing areas.

Against this backdrop, this paper aims to compare the yield, prices and incomes earned by conventional and certified farmers and to analyze the role of coffee certification schemes as an instrument to enhance their socio-economic livelihoods. Thereby the paper contributes to a growing body of interdisciplinary empirical research investigating household level effects of coffee certification activities worldwide.

II. Coffee in Nicaragua

2.1 Background

Nicaragua is the second poorest country in Latin America next to Haiti, when measured by per capita purchasing power parity of the GDP (UNDP 2009). The country is a ‘traditional’ coffee producing country, and coffee plays a central role for the economy in general and the livelihoods of the rural poor in particular. All coffee produced in Nicaragua is Arabica.

According to information available in FAOSTAT, total national coffee production in 2007 reached a volume of 2.2 million quintals. In 2008, production fell to 1.6 million quintals. The high productivity fluctuation is mainly due to the natural growth cycle of the crop. The total area under coffee cultivation in Nicaragua is estimated to be 139,500 and more than 80 percent of the production is exported (IICA 2001, 2004). The value of Nicaraguan coffee exports was 201 million USD in 2006, representing 19.5 percent of the countries’ total exports earnings (Central Bank of Nicaragua, 2007).

Nicaragua highly depends on the international coffee market which is dominated by five transnational corporations, namely Neuman Kaffee Gruppe (German), Volcafe (Swiss), Dryfus (French), ED&F Man / Mercon (UK) and Esteve (Brazilian). They trade approximately 40 percent of the worlds' green coffee (IIED, 2005). A similar oligopoly dominates the roasting sector. About 50 percent of the worlds' roasted coffee is traded by four companies: Nestlé, Kraft Foods, Procter and Gamble and Sara Lee (IIED, 2005). This concentration is mirrored in the Nicaraguan coffee value chain. Around 80 percent of all coffee from Nicaragua is exported by four export companies (IICA, 2004). Although 80 percent of the estimated 48,000 coffee farms have less than 3.5 ha of land for coffee cultivation, farms larger than 3.5 ha produce more than 85 percent to the total harvest in the country (Flores et al., 2002) Nearly 80 percent of Nicaragua's coffee is produced in the Northern highlands about 130 km North-east from Managua as showed in Figure 1 (IICA, 2004).

Figure 1: Coffee growing areas in Nicaragua

Source: Läderach et al., 2009

Jinotega is the hotspot of coffee production in Nicaragua. Administratively, the city is the capital of Jinotega Department and Municipality. At the Municipality level, Jinotega produces most coffee in the whole country, followed by Matagalpa, Nueva Segovia and Madriz. In Jinotega Municipality, coffee is grown between 700 and 1,500 meters above sea level. Annual precipitation is up to 1,700 millimeters with only 2-3 months of the year that can be considered relatively dry.

2.2 Coffee cooperative structure and rise of certification in Nicaragua

The production and certification of coffee in Nicaragua is inevitably interlinked with the emergence and existence of cooperatives. Coffee cooperatives group a number of 20 to 200 smallholder coffee producers in a specific region. It is estimated that about 80 percent of the 8,000 coffee farmers in Jinotega Municipality are members of coffee cooperatives. Many of them also work as daylabourer at larger coffee plantations, and grow cash crops as beans or banana. Most of these local coffee cooperatives are associated with central cooperatives (second level coops) that are in charge of commercialization function, credit and technical assistance. Second level cooperatives are in turn grouped in umbrella cooperatives (third level coops) who assist in marketing, promotion, lobbying, international representation, and higher level training.

While Nicaragua as a whole experienced an overall economic growth at the beginning of the 21st century, coffee producers saw large declines in their socio-economic outcomes at that time. This was mainly due to the dramatic plunge in coffee world market prices between from 1999 and 2004 when prices in real terms fell to their lowest levels in 100 years. Nicaraguan export revenues from coffee dropped by 50% in 2000/01 alone in comparison to the previous year (Varangis et al., 2003)

Since the 1990s the Fairtrade standard gradually gained widest significance in coffee certification in Nicaragua. By 2005, 20 percent of all coffee farmers in the country were connected to cooperatives selling into Fairtrade networks, one of the largest figures worldwide (TransFair USA, 2005). Most of these farmers, however, sold less than 20 percent of their coffee to the Fairtrade market (Bacon 2005). About half of the Fairtrade certified coffee was also certified organic (Valkila and Nygren 2009).

III. Data collection

80 percent of Nicaragua's coffee is produced in the highlands around Jinotega and Matagalpa (IICA, 2004). Jinotega is hence chosen as the area of survey for this study. In 2009, a pre-study has been undertaken in Jinotega in which interviews with experts from NGOs, coffee cooperatives, coffee trade, and scientists were conducted. In early 2010, a semi-structured questionnaire has been undertaken with 250 coffee farmer households in the Jinotega Municipality. A major concern of empirical field studies is their representativeness. There are approximately 139,000 coffee farmers in Nicaragua, out of which around 8,000 are located in Jinotega Municipality. Bearing this in mind, we followed a disproportionate stratified random sample selection. As mentioned above, the coffee cooperative value chain in Nicaragua is structured in a three-level hierarchical order in which local cooperatives are members of second level coffee cooperatives which are in turn members of third level coops. In the first step of sample selection, four second level coops were chosen based on the certification status of the local coops operating under their jurisprudence, namely UCASUMAN, SOOPPEXA, FUNJIDES, and La Cuculmeca. UCASUMAN and SOOPPEXA have adopted several coffee certification schemes such as organic, fair-trade certification, and Rainforest certification. On the other hand, FUNJIDES and La Cuculmeca were chosen as the control group since these are non-certified second level coops. Thereafter, we randomly selected local cooperatives under these second level ones. Finally, the coffee farmers to be interviewed were

randomly selected in the local level coops. However, this random selection of the coffee farmers under each local coop is disproportionate since the total number of farmers under each cooperative varies.

In general, the members of the local cooperatives are smallholders. Farmers who are certified Rainforest Alliance, however, are generally large-holding farmers who market their coffee independently of the cooperative. We included five large-holding farmers in our sample in order to add variation to the data and to compare the benefits of smallholder and large-holding farmers.

IV. Conceptual Framework

While the broad objective of this paper is to measure the welfare impacts of coffee certification on the smallholder coffee producers, the empirical part is carried out in three steps in this paper. First, the profitability of the certification schemes is examined followed by an econometric exercise for welfare estimation and, finally, an analysis of the nexus between certification and sustainable livelihoods of the coffee producers concerned.

4.1 Gross margin and marginal benefits of certification

The body of empirical literature on certification has increased tremendously within the last decade often trying to analyze how far certification can contribute to the improvement of the livelihood of smallholder farmers in developing countries. Literature particularly concerned with the role of certification in improving the livelihood of coffee farmers came up recently after the coffee crisis of 1998-2002 (Bacon 2005; Daviron and Ponte 2005; Lewin et al. 2004; Utting-Chamorro 2005). Ever since the production, marketing and consumption of certified coffee gained tremendous momentum worldwide, becoming a multi-dimensional and complex tool for development. Against this backdrop, this paper examines the current status of coffee certification on the producers' side, The first part the paper analyzes the price difference and marginal benefits from both conventional and certified markets. In total, four groups of farmers have been considered, namely members of fairtrade certified coops, members of organic certified coops, members of both fairtrade and organic certified coops, and members of non-certified coops. .

The calculation of gross margin and gross revenues is done by using the following procedure. After coffee harvest farmers mostly sale a part of their harvest to private merchants to satisfy their immediate need for cash. The cooperatives, however, buy coffee with some time lag after the harvest. Therefore, the gross revenue is a combination of revenues earned from coffee sale in the spot market and revenues from coffee sold to the cooperative.

$$R_i = p^s q^s + p^c q^c \qquad (1)$$

where, R is the gross revenue; p^s is the average price in spot market and q^s is the quantity sold in spot market. Farmers sale their coffee to different intermediaries in the local market with varying quantities and prices. The price considered here however is the

average price a farmer has received in the local market. p^c and q^c are the price paid by cooperative and quantity sold to the cooperative respectively.

The gross margin (GM) is then calculated by subtracting the operating cost (OC) from the gross revenue. The operating costs involve fertilization costs, input costs, and labour costs.

$$GM_i = R_i - OC_i \quad (2)$$

4.2 Income effects of certification

In the second part, an econometric analysis has been undertaken to examine the income effects of different certification schemes. The theoretical underpinning of this analysis is the following: in standard microeconomic theory, individual welfare *W* depends on a bundle of goods, an array *c*, which also includes services and material and immaterial goods:

$$W_i = W_i(c_i) \quad (3)$$

This welfare function differs among individuals. The same bundle of goods can produce different levels of welfare. The welfare function therefore depends not only on the bundle of goods *c*, but also on factors as age, health, or employment status. If these characteristics are designated as x_i, then (1) can be formalized more precisely as:

$$W_i = W_i(c_i; x_i) \quad (4)$$

In (2) it is assumed that a socially-defined welfare function *W* exists which gives each individual *i* a value of individual welfare W_i for every bundle of goods c_i, under consideration of additional factors x_i.

Suppose that the relevant bundle of goods as well as the characteristics *x* can be assessed, and that the individual welfare *Wi* can be calculated. Even in this hypothetical case, drawing conclusions from these calculations this with respect to poverty would be still problematic. The leading opinion in poverty research is that the question of whether someone is poor is measured not by the observable living standard but by the possibilities and resources an individual has. If a lower standard of living (measured in terms of the socially-defined welfare function) is due (only) to preferences and not based on the restrictions an individual faces, then the individual generally is not considered to be poor. Accordingly, (2) can be rewritten as:

$$W_i = W\left(c_i^*(r_i); x_i\right) = W(r_i; x_i) \quad (5)$$

where the resources of individual *i* are called r_i. Welfare then is directly dependent on a bundle of goods c_i*, which is dependent on resources r_i. The bundles of goods c_i* may not necessarily be identical to the observable bundle of goods c_i, as preferences of the individual may differ from those preferences implied by the welfare function *W* defined by society. c_i* is the result of maximizing the socially-defined function W_i subject to the available resources r_i. Relevant for poverty definitions is this value of W_i which depends

on an optimization process theoretically restricted by available resources. This goes in line with the resource definition of poverty by Hagenaars (1986) and Strengmann-Kuhn (2000). Following this definition, we construct a regression model where certification serves as a resource-augmenting instrument. So, per capita income Y is a function of household characteristics, certification status, and other resources.

$$Y_i = \alpha_0 + \alpha_1 Cert + \alpha_2 R_i + \alpha_3 H_i + \varepsilon_i \quad (6)$$

The reduced-form regression equation is the following –

$$Y_i = \alpha_0 + \alpha_1 Age_i + \alpha_2 Edu_i + \alpha_3 Cert_i + \alpha_4 Exp_i + \alpha_5 Yield_i + \alpha_6 land_i + \alpha_7 labour_i + \alpha_8 Dis\tan ce_i + \alpha_9 Training_i + \alpha_{10}\gamma_i + \varepsilon_i \quad (7)$$

The variables used in the regression eqn (5) are described in Table 2. There are three forms of resources: 1) certification as an institutional resource; 2) household characteristics such as age, education and experience; and 3) land and labour as a physical resource. Furthermore, there are some other control variables such as yield, training, and distance from homestead to the selling market. We have used the cooperative dummies to control for any unobservable fixed effects.

Table 2: Description of variables

Variables	Description
Y	Log per capita coffee income
Age	Age of the household head
Education	Years of education of the household head
Cert	Dummy variable – Fairtrade, Organic, Organic and fair-trade, and non-certified
Exp	Years involved in coffee cultivation
Yield	Coffee yield in parchment form, per ha of land
Land	Land under coffee cultivation, in ha
Labor	Household members involved in coffee cultivation
Distance	Distance from homestead to the selling market, in km
Training	Dummy variable indicating whether the farmer attended extension training
γ_i	Fixed effects – cooperative dummies

4.3 Impacts of certification to reduce farmers' poverty

The third part of the paper deals with poverty scenarios. The income effects of certification analyzed above are based on income from coffee. However, since farmers' overall livelihoods depend on a portfolio of livelihood assets and strategies, it is also necessary to examine other sources of income beyond coffee. In this section, we analyze the impact of coffee certification on the poverty status of the farmers. For this purpose, national poverty lines in Nicaragua have been identified. The World Bank Poverty

Assessment in Nicaragua (2008) has defined the national poverty line of the country as 442.6 US-$ per capita per year. The extreme poverty line is fixed at 246.8 US-$ per capita per year. With a view to convert these poverty lines into Nicaraguan Cordoba, we have used the official exchange rate in 2009 which was 20.34 Cordoba per US-$. It is to be noted that we do know about the likely asymmetries that official exchange rate may bring about in comparisons since official exchange rate does not fully represent the living standards in a country and a purchasing power parity (PPP) exchange rate is more appropriate. However, the ratio between GDP in current prices (in US-$) and GDP in PPP (in US-$) in Nicaragua is 2.70 for 2009. This translates into the fact that 1 US-$ with the official exchange rate of 20.34 Cordoba in 2009 is 54.9 Cordoba in PPP terms. This is unlike many other countries where the PPP exchange rate is lower than the official exchange rate. We therefore decided to use the official exchange rate. Based on this background we worked with a national poverty line of 9002.4 Nicaraguan Cordoba per capita per year and an extreme poverty line of 5019.9 Nicaraguan Cordoba per capita per year.

In this section, we constructed a poverty index for each respondent by calculating the income gap. More precisely the poverty index is –

$$P_i = Y_i^p - P^* \tag{8}$$

where, P_i is the poverty index for an average person in household i, Y_i^p is the per capita income of an average person in household i, and P^* is the extreme poverty line in Nicaragua i.e. 5019.9 Cordoba.

The poverty status of the respondents that are calculated following the eqn (6) are shown in Table 6. The table suggests that a sizable number of respondents in our sample falls below the poverty line. From the total respondents of 234 (excluding the 4 Rainforest certified farmers), 158 respondents live below the national poverty line of 9002.4 Cordoba per year and 110 respondents live below the extreme poverty line of 5019.9 Cordoba per year.

Table 3: Poverty status of the respondents by group

Groups	**Size**	**Poor**		**Very poor**	
Total sample	234	158	67.5 %	110	47.0 %
Non-certified	93	64	68.8 %	50	53.8 %
Fairtrade	57	44	77.2 %	30	52.3 %
Organic	38	24	63,2 %	16	42.1 %
Organic and fair-trade	46	26	56.5 %	14	30.4 %

Source: Own calculations.

Having constructed the poverty index, we followed the welfare analysis theory in section 4.2 to construct a model to examine the impact of coffee certification on the poverty status of the respondents. We acknowledge that this is a static statistical approach to poverty but a more dynamic approach would have required panel data, which is beyond the scope of our study. The regression eqn. is specified as –

$$P_i = \beta_0 + \beta_1 Age + \beta_2 Edu + \beta_3 Land + \beta_4 HS + \beta_5 Cert + \beta_6 Exp + \beta_7 Livestock + \beta_8 \lambda_i \quad (9)$$

The variable *Livestock* is the current monetary value of the livestock of the respondents and *HS* is the household size of the respondents. All other variables are as described in Eqn (6) and in Table 2.

V. Findings

5.1 Gross Margin Analysis

The mean values of coffee yield, prices from both cooperative and the local market and the gross margins per unit of land of coffee cultivation is shown in Table 4 for each household category (organic certified, organic and fairtrade certified, fairtrade certified and non-certified) .

The figures in Table 4 show that fairtrade certified coffee farmers have significantly higher yields than both the conventional and organic coffee farmers. While the mean harvest of fairtrade farmers is 1643 kilograms of parchment coffee per ha, conventional farmers harvest 1283 kg. Farmers who are both, organic and fair-trade certified, produce a mean harvest of 1210 kg per ha and organic certified farmers only 1165 kg per ha. The relatively low yields of organic farmers is, however, not surprising. Organic farmers complained during our open interviews that the lack of organic pesticides and fertilizers dramatically reduces their yields.[1] But it is interesting to note that fairtrade certified farmers have significantly higher yields than all other farmers' groups. This can be partly attributed to the fairtrade cooperatives' extension training programs and provision of equipments such as pulping machines and drying beds.

Farmers from all the groups sold their coffee both to their cooperative and to private merchants on the local markets. Organic and organic-fairtrade farmers predominantly sold their coffee to the cooperative as shown in Table 4. This illustrates that organic coffee production is more detached from the conventional markets than e.g. fairtrade production, and organic farmers are more dependent on their cooperatives trying to compensate their relatively lower yields. The prices paid by cooperatives and on local

[1] Coffee production highly depends on fertilization. Many smallholders in Jinotea Municipality, however, do not produce enough organic fertilization materials on their own farms. They do not have much livestock, for example, to produce manure for organic coffee farming..

private markets support this hypothesis. The cooperative price is normally higher than the price obtained from private merchants. Data shows that organic and organic-fairtrade farmers obtained significantly higher prices than the other two groups of farmers. The non-certified farmers have received by far the lowest prices. The price differences between them and the fairtrade farmers are, however, not too big.

The gross margins calculated as the total net income from coffee per unit of land (i.e. revenues net of cost of cultivation per ha) per ha finally reveal that fairtrade farmers have earned the highest gross margins i.e. 17547 Cordoba per year. The organic and organic-fairtrade farmers have earned 15400 and 15622 Cordoba respectively. The organic gross margins are lower than the fairtrade margins due to the relatively lower yields and higher production costs of organic farming. The non-certified farmers have earned the lowest margins i.e. 14100 Cordoba. We can hence summarize that all the certified farmers' groups have earned higher average gross margins than the non-certified ones.

Table 4: Gross margins in certified and conventional channels

Variables	Organic certified	Organic and Fairtrade certified	Fairtrade certified	Non certified
Households	38	46	59	93
area under coffee (ha)	1.9 (58%)	1.88	2 (57%)	1.78 (62.5%)
Parchment coffee yield (kg)	1165	1210	1643	1283
Coffee price from cooperative (Cordoba)	1400	1428	1130.21	1095
Coffee price in local market (Cordoba)	942 (6)	941 (11)	984 (39)	979 (63)
Income from coffee per ha	15400	15622	17547	14100

Source: Own calculations.

5.2 Certification's impact on coffee income

The total cash income of the respondents are comprised of a) income from coffee, b) income from other crops such as grains, fruits, and vegetables, c) sale of animal products such as milk or eggs, d) sale of livestock, and d) non-farm activities such as carpentry, shops, wage-labor, employed work, pensions, and remittances. The income proportions among these categories show that coffee is by far the major source of income contributing 61 percent of the total cash income. The living standard of the farmers hence greatly depends on the production and marketing of coffee.

Table 5 summarizes the estimated results from regression eqn (5). The dependent variable is log per capita income from coffee. In order to compare the different certification schemes and to check the robustness of the model, 4 specifications are made.

Specification 1 considers all certified farmers' groups and compares them with the conventional group. Specification 2 drops the fairtrade group from the regression and compares only organic, organic-fairtrade and non-certified farmers' groups. Specification 3 drops the double certified group. The cooperative dummy coefficients are not reported in the Table. The usual heteroscedasticity test and model specification tests have been undertaken and the final results reported in Table 5 are robust to those inconsistencies.

The estimated coefficients from Spec. 1 to 3 show that both organic and organic-fairtrade certification have a statistically significant impact on the log per capita coffee income. The coefficients vary in the range of 0.33 to 0.42 for organic certified farmers and from 0.32 to 0.36 for organic-fairtrade certified farmers. The coefficient of the fairtrade dummy is significant only at 7 percent level in the 3rd specification where organic-fairtrade is dropped. In Spec. 4, where the comparison benchmark is fairtrade certification, the coefficients of organic and organic-fairtrade variables are statistically insignificant.

Among the control variables, both land under coffee and yield have positive and significant contributions to the per capita coffee income. This could be due to the fact that household labor is proxied by number of family members involved in coffee cultivation in the regression and the endogenous variable is per capita coffee income; hence higher involvement of family members reduces the per capita income. The variables such as extension training, distance to the selling market, education level, experience, and age have no statistically significant impact on coffee income.

Table 5: Regression Results (Dependent variable = log per capita income from coffee)

Exp. Variable	**Spec. 1**	**Spec.2**	**Spec.3**	**Spec. 4**
Intercept	4.95 (0.37)*	4.71 (0.36)*	5.09 (0.45)	5.04 (0.70)*
Age	0.004 (0.004)	0.005 (0.003)	0.005 (0.004)	0.002 (0.005)
Education	-0.005 (0.01)	0.00 (0.01)	-0.02 (0.02)	-0.004 (0.02)
Land under coffee	0.19 (0.05)*	0.25 (0.08)*	0.17 (0.05)*	0.22 (0.06)*
Experience	0.006 (0.006)	0.004 (0.006)	0.005 (0.007)	0.009 (0.007)
Fairtrade	0.20 (0.14)		0.23 (0.14)***	
Organic	0.33 (0.16)**	0.42 (0.17)*	0.33 (0.16)**	0.08 (0.22)
Organic-fairtrade	0.32 (0.17) **	0.36 (0.19)**		0.12 (0.21)
Training	0.02 (0.17)	-0.09 (0.17)	-0.06 (0.18)	0.47 (0.37)
Distance	-0.004 (0.003)	-0.004 (0.003)	-0.005 (0.005)	-0.002 (0.004)

Yield	0.82 (0.07)*	0.94 (0.07)*	0.78 (0.07)*	0.70 (0.10)*
Household labor	-0.09 (0.02)*	-0.13 (0.02)*	-0.09 (0.03)*	-0.08 (0.03)*
No. of observations	203	150	161	
R^2	0.59	0.65	0.59	

Source: Own calculations.

5.3 The impact of certification on poverty alleviation

One of the most highlighted aspects of certification in developing countries is its role in alleviating smallholdes' poverty and vulnerability. As illustrated in section 2.1. and 2.2. of this paper, Nicaraguan coffee farmers are amongst the poorest in Latin America. At the same time, Nicaragua is a definite hotspot of coffee certification. This justifies the research question if and how far the different coffee certification approaches effectively provide the coffee farmers with a better income which can sustain their livelihood above the poverty line? The following section attempts to provide some answers to this question.

The poverty regression in Table 6 summarizes the estimated results from regression eqn (7). Similar to the per capita coffee income regression of Table 5, Table 6 also designates 4 specifications each varying by the choice of certification groups being considered. It is interesting to note that unlike per capita coffee income, the coefficients of certification dummies are not statistically significant in their effect on reducing income gap. This result is partly also corroborated by the figures of respondents falling below poverty line from each certification category described in Table 3. It is to be borne in mind that the study region is one of the most productive coffee cultivating regions of Nicaragua. Despite of that none of the certification dummies have come up with a statistically significant coefficient against income gap.

Among the control variables, land ownership and education status of the household heads have positive and statistically significant coefficients. On the other hand, household size and age have negative and significant coefficients. A larger household increases the income gap if the members are not contributing significantly to the total household income. The reason for age to positively contribute to the income gap can be explained by assuming that younger household heads have higher physical capabilities and often better formal education than older household heads offering the former higher income prospects.

Both the gross margin analysis and the income regressions show that certification programs positively correlate to the cash income of the coffee farmers participating in these programs. The net income of certified farmers is higher than those of non-certified ones. Organic and fair-trade-organic certified farmers get significantly higher prices for their coffee than non-certified ones. channels. But what is worrying is that the monetary benefit of certification for the farmers is not as high as often argued. A large proportion of the certified farmers are still hovering around or falling below the extreme poverty line of 5019.9 Nicaraguan Cordoba per capita per year. As seen in Table 3, 52.3% of the

fairtrade certified farmers live below the extreme poverty line, compared with 53.8% of the non-certified ones. Even when taking into consideration that respondents in a survey tend to underestimate their income and overestimate their cost, the percentage of certified farmers below poverty line is still alarming. The poverty regression of Table 6 shows that certification has no impact in reducing the income gap between per capita income and poverty line.

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Table 6: Poverty regression (Dependent variable = income gap)

Exp. Variables	**Spec. 1**	**Spec. 2**	**Spec. 3**	**Spec. 4**
Intercept	7.29 (1.93)*	7.14 (2.17)*	7.74 (2.17)*	6.38 (2.15)*
Age	-0.05 (0.02)	-0.05 (0.03)***	-0.07 (0.02)*	-0.05 (0.02)***
Education	0.20 (0.10)***	0.24 (0.12)**	0.20 (0.11)***	0.20 (0.10)***
Total Land	0.24 (0.11)**	0.30 (0.13)*	0.25 (0.12)**	0.16 (0.12)
Household size	-0.79 (0.13)*	-0.70 (0.15)*	-0.77 (0.14)*	-0.83 (0.16)*
Fairtrade	-0.16 (0.82)		-0.20 (0.84)	
Organic	0.23 (1.24)	0.02 (1.35)		1.06 (1.15)
Organic-fairtrade	0.34 (1.34)	-0.07 (1.48)	0.23 (1.40)	1.67 (0.97)***
Experience in coffee cultivation	0.03 (0.03)	-0.00 (0.03)	0.02 (0.04)	0.07 (0.04)***
Livestock	0.00 (0.00)	0.00 (0.00)	0.000 (0.000)**	0.000 (0.000)
Observation	191	141	160	118
R^2	0.33	0.35	0.35	0.41

Source: Own calculations.

VI. Concluding remarks

This paper statistically examines the impact of coffee certification on the income levels of coffee farmers in Jinotega Municipality of North-central Nicaragua. The data collection has been undertaken in a well-designed stratified random sampling procedure in which the certification status of farmers was considered in the first stage of stratum selection followed by a complete randomness in the later stage of the sample selection.

The first part of the analysis shows that farmers have received higher prices in certified channels established through the cooperative sector. Local markets do not distinguish between certified and conventional coffee. Organic-fairtrade double certification yields the highest prices in absolute terms, however, the price difference between organic-fairtrade and organic certified is slim. The gross margins earned are also higher in certified markets compared to those in non-certified markets. The gross margins of fairtrade certified farmers are higher than those of organic certified ones. This is mainly reasoned by the much lower yields of organic coffee cultivation. The higher prices that organic certified farmers obtain from their cooperatives do not adequately compensate for the lower yields. This poses a major concern for organic certification programs.

The answer to the first research question is that the income effects of certification are positive. The second part of our analysis shows that the concerned certification program does not eradicate severe poverty among the certified coffee farmers.

The improvement of producers' income is crucial. However, making certification effectively work in the long term implies more than paying higher producer prices, especially when applied to smallholder production in rural areas of developing countries. In the long term, additional challenges have to be tackled to make certification a success, The first and probably the most difficult one is the availability of sustainable organizational and infrastructural capacities. The success of certification is hence often interlinked with a success of the agricultural cooperative sector. Second, certification needs proper controlling. The effective and regular verification of the certification requirements by accredited inspectors is, however, challenging, not only in developing countries. Thirdly certification needs the 'right' concepts and standards to be applied, especially when aiming simultaneously at socio-economic and environmental concerns. In our case study, this problem is visible for organic certification. Unlike fairtrade certification, organic coffee certification requires a drastic and long term change of the whole production system. Organic farming requires specific knowledge and much more labor input than conventional farming. To add to this, organic fertilizers and pesticides are scantly available for many organic certified farmers. On the other hand, organic farming allows produces much lower yields. This creates a serious dilemma as the lower yields are not sufficiently compensated by the price premiums paid by the cooperatives for the organic certified farmers.

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