Do farmers benefit from participating in specialty markets and cooperatives? The case of coffee marketing in Costa Rica

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Abstract

Historically low prices in the conventional coffee market have caused financial and social hardship among coffee farmers. In the face of this crisis, specialty markets have attracted the attention of the international donor community. These market segments have shown consistent growth over the last decade and exhibit price premiums in international markets. Therefore, if higher prices are passed on to farmers, access to specialty markets could help to alleviate the crisis brought on by low prices in the conventional sector. The present study attempts to identify the factors that determine farmers' participation in specialized markets and whether participation in these markets leads to higher prices for farmers. A two-stage model is used to analyze farmers' marketing decisions and their effect on the prices received. This procedure allows us to control for the endogeneity bias introduced by the marketing choice. Our results indicate that farmers participating in the specialty coffee segment do in fact receive higher prices than those participating in conventional channels. Additionally, we find that participation in cooperatives has a positive impact on the probability that a farmer chooses to grow specialty coffee and analogously the prices that they receive. Based on these results it seems that efforts to increase participation in the specialty coffee segment and in cooperatives would help to lessen some of the hardships brought on by low prices in the conventional coffee sector.

Keywords: Central America, Costa Rica, coffee, specialty markets, cooperatives

Introduction

Changing patterns in global coffee markets led to a plunge in coffee prices that marked the coffee crisis at the turn of the millennium. Market liberalization and, to a larger extent, the

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abolition of the international coffee agreement in 1989 increased the volatility of world market coffee prices and boosted an unequal distribution of income along the global coffee commodity chain (Talbot 1997). Expanding production, contrasted with almost stagnant consumption, resulted in a worldwide oversupply, causing prices to decline to their lowest levels in a century (Ponte 2002). The low price of coffee has in turn caused widespread financial and social hardships among coffee producers (Varangis, Siegel et al. 2003).

In an attempt to identify ways out of the crisis, specialty coffee market niches are often considered as a promising alternative to conventional coffee channels (Flores, Bratescu et al. 2002; Bacon 2005). While sales in the conventional coffee sector have been stagnant, the specialty coffee segment has been growing at an annual rate of 5-10% (Lewin, Giovannucci et al. 2004). Specialty coffees are distinguished by those that emphasize quality aspects (such as gourmet and estate coffees) and those that stand out for a specific production technology (such as organic, shade-grown and fair trade coffees) (Lewin, Giovannucci et al. 2004). In these market segments consumers pay price premiums, which lie considerably above prices paid for conventional coffee. The question remains, however, whether these higher prices are actually passed on to farmers. In this context, the importance of marketing cooperatives has often been highlighted as a link between consumers and producers that allows farmers to participate in new market developments (Varangis, Siegel et al 2003; Bacon 2005).

The present study seeks to explore farmers' marketing performance in the Costa Rican coffee market. The primary objective is to determine the factors that influence participation in specialized markets and whether participation in these markets as well as in cooperatives leads to higher prices for coffee farmers.

Coffee marketing in Costa Rica

In Costa Rica coffee is produced by about 33,000 farmers and their families (De Graaff 1986) on around 113,000 ha of land (ICAFE 2002). The Costa Rican Institute of Coffee regulates

coffee marketing and the pricing system. Farmers must deliver their coffee within 24 hours of harvest to a processing plant to avoid post-harvest decay. On delivery, farmers receive only an initial advance for their coffee. The final price is calculated as an average price from each processing firm and is paid in November, almost one year after harvest. This pricing system should ensure that farmers receive an appropriate share of the final market price, but it also implies that price risk is entirely borne by the farmer (Hazell 2000).

The final price that farmers get for their coffee is subject to their marketing performance. A farmer's marketing performance is primarily a function of their choice of a marketing channel, since the timing of the transaction is not subject to farmers' decision making. In addition, the price a farmer receives should depend on product quality and, given imperfect markets, access to price and market information as well as the market environment.

Looking specifically at the marketing decision, farmers can choose between private and cooperatively owned processors. Costa Rican cooperatives are farmer-owned and process about 40% of the national coffee production. They pursue an open membership policy, which does not restrict new entries and farmers can market their coffee through the cooperative without being a member. Vertical integration of farmers in the processing stage aims at obtaining higher prices for farmers by circumventing middlemen. Furthermore, many cooperatives offer services to their members such as credit, technical assistance and information about market developments.

Another marketing decision refers to participation in specialty or conventional channels. As a response to the crisis, an increasing number of processors have established direct trade relationships with smaller international roasters enabling them to enter specialty coffee market niches. These new marketing channels seek to transmit the consumers' willingness to pay price premiums for certain types of coffee to the producer level, thereby generating greater incentives for farmers to adapt their production. Cooperatives and farmer associations have

been found to play a vital role in providing support to farmers for converting their production and adopting quality standards (Varangis, Siegel et al. 2003; Bacon 2005). Verhaegen and van Huylenbroeck (2001) point out that institutions such as cooperatives can substantially reduce the cost of information gathering. In this regard cooperatives can play an important role in enabling farmers to access specialized markets (Blackman, Albers et al. 2005).

Data and estimation procedure

Data for this study were collected in March and April 2003 in two major coffee regions in Costa Rica: Valle Central Occidental (Central Valley) and Coto Brus (South). Selection of households was done based on multi-stage cluster sampling. Cantons and districts within these two regions were weighted according to the number of coffee farmers in each cluster. Finally, a random sample of 216 households was selected in 26 villages.

The marketing performance of farmers is modeled in two stages. In the first stage, a binary choice model is used to analyze farmers' participation in cooperative and specialty channels. We assume that the decision to participate is based on the maximization of an underlying utility function. Since the actual utility level of each individual farmer, U_i, is unknown, the portion of the farmer's utility function that is observable can be expressed as a function of a vector of exogenous variables X_i and a vector of parameters to be estimated, β:

$V_i(\beta' X_i)$, where $U_i = V_i(\beta' X_i) + u_i$.

Within this framework, it is assumed that the observable portion of the expected utility function is equal to the mean of the random variable U_i. The unobservable portion of the farmer's utility is represented by an error term u_i, which is assumed to be independently and identically distributed with mean zero. The household will choose to market the coffee through a specialty channel if the utility gained from participation (U_i^P) is greater than the utility of not participating (U_i^N). Following a random utility framework, it can be shown that the probability of a farmer participating in a specialty channel is given by prob($u_i < \beta' X_i$). The

error term in this model is assumed to have a standard normal distribution, thus motivating the use of a probit model. Formally, the model to be estimated is:

$$\text{Prob}(SPEC_i = 1) = \text{prob}(u_i < \beta' X_i) = \beta' X_i + u_i \text{ , for } i = 1,\ldots N$$

where $SPEC_i = 1$ if $U_i^P > U_i^N$, and

$SPEC_i = 0$ if $U_i^P \leq U_i^N$.

Similarly, the probability of participation in cooperative marketing channels is estimated by the function:

$$\text{Prob}(COOP_i = 1) = \text{prob}(v_i < \alpha' Y_i) = \alpha' Y_i + v_i \text{ , for } i = 1,\ldots N$$

where $COOP_i = 1$ if $U_i^P > U_i^N$, and

$COOP_i = 0$ if $U_i^P \leq U_i^N$

The observed variables in the models above include attributes of the marketing channels as well as household characteristics. Attributes of the marketing channel refer to the expected price, services offered, such as credit and technical assistance, and product requirements. Controlling for household specific factors we expect these channel attributes to be constant among farmers. Household characteristics include socioeconomic factors, such as education, age, farm size, labor availability, access to institutions and other income sources, as well as the quality of the coffee the farmer produces. The hypothesized effect of each of the variables is derived from the literature reviewed below.

Participation in specialty markets involves the adoption of quality standards and specific production techniques. To identify indicators for inclusion in the model and their respective hypothesis we draw on the literature on adoption of innovations and program participation. Several studies have found education (De Souza Filho, Cyphers et al. 1993; Henning 1994), land size (Chambers and Foster 1983; Zbinden and Lee 2005), membership in farmers' organizations (De Souza Filho, Yound et al. 1999), access to extension services (Nowak

1987) and household labor availability (Neupane, Sharma et al. 2002; Zbinden and Lee 2005) to influence the adoption of innovative agricultural practices. We expect education to increase farmers' ability to process information and to implement new production standards (Zbinden and Lee 2005) and thus to increase the probability of participation in specialty markets. Similarly, we expect experience in coffee cultivation to be positively associated with participation in specialty channels. Farmers with large-scale operations are assumed to be more flexible in crop use (Chambers and Foster 1983) and have a greater capacity to bear the risk involved in adoption of innovations (Nowak 1987). Thus, we expect the size of the coffee plantation to have a positive impact on participation. Furthermore, the adoption of labor-intensive quality standards and sustainable production techniques may be constrained by limited availability of family labor. In particular, careful harvesting is time-intensive but necessary to achieve a high-quality product. It is important to collect only ripe cherries, as green coffee is not yet fully developed affecting grain size and giving the brewed coffee a bitter taste. On the othe hand, overripe coffee begins a fermenting process which produces a fruity, winy or sour taste and thus an inferior quality (Cleves 1995). We therefore expect a positive relationship between the number of household members and participation in specialty channels. Access to non-agricultural income generating activities can have opposing effects. On one hand, farmers have a greater risk-bearing capacity, which should have a positive effect on participation. On the other hand, the opportunity cost of family labor is increased, making investments in coffee cultivation less profitable. We include a variable for membership in coffee cooperatives, as evidence has shown that cooperatives constitute an important link between smallholders and specialized markets (IDB, USAID et al. 2002). As specialty markets demand higher quality, the probability of participation is expected to increase with the quality of the coffee produced by the farmer. We use the altitude in which the coffee is grown as a proxy for quality, as a positive correlation has been found in several studies (Cleves 1995; Figueroa, Jimenez et al. 2000). Similarly, access to extension services

that help farmers to increase the quality of their coffee is expected to have a positive influence on participation.

With respect to participation in cooperative channels, previous research suggests that age is positively related to participation due to intergenerational differences in cooperative values (Hakelius 1996). In Costa Rica most of the cooperatives were founded by farmers during the 1960's and 1970's. Founding members are likely to have a stronger commitment to their cooperative. Similarly, education is expected to have a positive effect on cooperative values. Depending on the size of their coffee plantation and quality of their produce, farmers may perceive differing benefits from delivering coffee to a cooperative as opposed to a private buyer. Larger farmers and farmers who have high-quality coffee may have a better bargaining position when dealing with private buyers (Mosheim 2002). Personal preferences in regard to working in groups is reflected by the number of economic groups other than the coffee cooperative a farmer is member of. We expect a positive influence on the decision to market through a cooperative. Although farmers can market their coffee through a cooperative even if they are not members and members can choose to market part or all of their produce to private processors, it is expected that members are more likely to use the cooperative as an outlet for their coffee than nonmembers. Finally, the number of cooperative coffee collection stations in the village improves the farmers' access to cooperative channels and is therefore likely to have a positive influence on participation in cooperative marketing channels.

In the second stage, the marketing performance of farmers is analyzed. Marketing performance is measured in terms of the average coffee price obtained by the farmer at the end of the season (November 2003) in US$/100 lbs[2]. Marketing performance is assumed to be a function of the chosen marketing channel and a set of exogenous variables. Yet the choice of a marketing channel is influenced by the expected price, thus resulting in endogeneity bias.

[2] Coffee delivered to processors is measured in fanegas. One fanega is equal to 4 hectolitres, which results in approximately 100 lbs of green coffee after processing (before roasting) (González 1998).

To deal with this problem, we obtain predictions for COOP and SPEC from the probit models and insert them in the price equation:

$P_i = \delta_0 W_i + \delta_1 PC_i + \delta_2 PS_i + w_i$, for i = 1,…N

Where Z is a vector of exogenous variables, PC and PS are the predictions for participation in cooperatives and in specialty channels, respectively, the deltas are vectors of unknown parameters, and w is a normally distributed random error term. The model is estimated by OLS and standard errors are corrected using the Murphy-Topel estimate of variance to account for the inclusion of estimated regressors in the second stage (Maddala 1983; Murphy and Topel 1985).

We expect that participation in cooperatives as well as in specialty markets have a positive effect on the price obtained by farmers. Other factors that influence marketing performance can be divided into three categories: the farmer's access to price information and marketing assistance, the quality of the produce, and the market environment. Farmers' access to relevant information and marketing assistance is expected to have a positive influence on marketing performance (Poole 2000). Irrespective of whether farmers participate in a specialty coffee marketing channel, high-quality coffee is likely to receive a higher price. With respect to the market environment, the density of markets and the resulting level of competition between buyers is expected to be positively related to the prices received by farmers (van Bruggen and van Tilburg 1999). Additionally, we include three regional dummy variables to account for differences in transportation costs. It is expected that transportation costs incurred by processors are higher in the marginalized regions in the South resulting in lower prices for farmers. Summary statistics for the variables included in all three models are given in Table one.

Results and discussion

Results of the three regression models are presented in Tables two, three and four. Table two

shows the results of the model on participation in specialty coffee marketing channels. The model confirms the link between cooperatives and participation in specialized markets: all other factors held constant, membership in cooperatives increases the probability that a household participates in specialty markets by 24%. Similarly, if farmers received training in quality enhancing practices during the last two years, their probability of participation increases by 33%. This provides some evidence that extension programs are successful, although this variable has to be interpreted with caution. In the case that extension agents select those farmers, whom they consider more likely to adopt the recommended practices, a potential source of bias is introduced (Zbinden et al. 2005). In that case the effect of the variable would be overestimated, but lacking further information about the selection process we cannot control for this here. As expected, the altitude in which coffee is grown, a proxy for the quality of coffee, is positively related to participation in specialty markets. Likewise education and experience have a significant and positive effect on participation. The size of the coffee business and number of male household members are also significant determinants. Land size has a positive influence on participation, as expected, while the number of men in the household has adverse effects. The latter seems inconsistent with theoretical considerations, but could be explained by taking into account off-farm employment, which, especially in times of low coffee prices, is more profitable than coffee cultivation. This is supported by the finding that the number of non-agricultural income-generating activities has a negative sign, although it is not significant. Moreover, especially with respect to harvesting, availability of family labor is not a binding constraint in Costa Rica, as most farm households contract temporal workers, mainly migrant workers from Nicaragua, during the harvest season.

Table three presents results for the analysis of participation in cooperative channels. As expected, membership increases the probability that the farmer uses the cooperative as outlet. Similarly, farmers who participate in other economic groups, such as agricultural cooperatives

or labor unions, are more likely to prefer cooperative marketing channels as opposed to private channels for their produce. Small-scale farmers are more likely to market their coffee through cooperative channels. Finally, the probability that farmers market their coffee through a cooperative increases with greater presence of cooperatively owned collection stations in the village.

Table four presents results regarding the determinants of marketing performance. Regression results reveal that marketing performance, measured by the average price farmers received for their coffee, is considerably improved by participation in both specialty and cooperative marketing channels. Marketing through cooperatives increases the average price obtained by 0.05 US$/lb, while participation in specialty channels by 0.09 US$/lb. When controlling for the effect of participation in specialty coffee marketing channels, differences in quality (proxied by altitude) are not reflected in the price obtained by farmers. This indicates that in the conventional coffee channels quality attributes are not rewarded by a higher price. Furthermore, prices are significantly higher among households that have access to reliable price information. Access to information about world market prices leads to an increase of 0.03 US$/lb in producer prices on average. Moreover, the regional dummies are significant, indicating that farmers in the Central Valley receive higher prices. This is consistent with the higher transportation costs incurred by processors in the southern region.

Conclusion

The findings of this study show that participation in specialty coffee marketing channels and participation in cooperatives both serve to increase prices received by producers. Furthermore, access to specific market information is associated with better marketing performance. Market regulations by the Institute of Coffee have aimed at guaranteeing a fair distribution of coffee incomes among all actors involved, but also have been limiting the development of new market segments and the remuneration of higher quality coffee (Deugd 2003).

Implementation of new marketing channels in the segment of specialty coffees should be fostered to give farmers the opportunity to participate in these new market developments and increase the value of their produce. Cooperatives can play an important role in facilitating these changes and helping farmers to adjust to the new requirements of the market.

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Appendix

Table 1: Summary statistics

Variable	Description	Mean	Std. Dev.
P	Average price received by farmer in US$/100 lb.	68.085	12.060
SPEC	Participation in specialty coffee marketing channel (0/1)	0.491	0.501
COOP	Participation in cooperative marketing channels (0/1)	0.693	0.462
AGE	Age of the household head	55.421	13.377
ALT	Altitude of the village in which farmer lives (in meters)	1042.329	134.976
CHILD	Number of children in the household (< 14)	0.773	1.061
COMEM	Member in coffee cooperative (0/1)	0.843	0.365
COMP	Level of competition (number of buyers within 4 km of village center)	3.148	2.674
DENS	Number of cooperatively owned coffee collection stations in the village	1.498	1.962
EDUC	Education level of the household head	3.028	1.189
EXPER	Experience in coffee cultivation (in years)	36.470	15.137
GROUP	Whether household members participate in economic groups (except from coffee cooperatives) (0/1)	0.242	0.429
LAND	Land cultivated with coffee (in hectares)	5.381	6.866
M_EXT	Number of institutions that provided assistance in coffee marketing to farmer during last two years	0.449	0.535
MEN	Number of male adults in the household (>= 14 years)	1.694	0.930
NONAG	Number of non-agricultural income-generating activities household members are engaged in	0.667	0.868
P_LAST	Farmer has information about final prices paid by processors last year (0/1)	0.398	0.491
QUAL	Whether household received training in quality enhancing practices (0/1)	0.093	0.291
WOMEN	Number of female adults in the household (>= 14 years)	1.611	0.850
WORLD	Farmer has information about world market coffee prices (0/1)	0.269	0.269

Table 2: Determinants of participation in specialty coffee channels (probit model)

Variables[a]	Coefficients	Standard errors	dF/dx[b]
EXPER	0.029***	0.009	0.011
EDUC	0.232**	0.107	0.092
LAND	0.112***	0.032	0.044
COMEM	0.596*	0.341	0.238
ALT	0.006***	0.001	0.003
QUAL	0.838**	0.394	0.334
NONAG	-0.224	0.138	-0.089
MEN	-0.236*	0.130	-0.094
WOMEN	-0.017	0.135	-0.007
CHILD	-0.128	0.123	-0.051
_cons	-8.998***	1.347	
N	215		
Log likelihood	-88.491		
LR $chi^2(10)$	120.96***		
Mc Fadden's R^2	0.4060		

[a] Definitions for variables in table one.
[b] Marginal change in probabilities evaluated at the sample means (for dummy variables discrete change from 0 to 1)
* significant at p = 0.10
** significant at p = 0.05
*** significant at p = 0.01

Table 3: Determinants of participation in cooperative channels (probit model)

Variables[a]	Coefficients	Standard errors	dF/dx[b]
AGE	0.007	0.009	0.002
EDUC	-0.009	0.099	-0.003
LAND	-0.066***	0.016	-0.022
GROUP	0.537**	0.216	0.176
COMEM	1.628***	0.292	0.534
ALT	-0.001	0.001	-0.000
DENS	0.211***	0.069	0.069
_cons	-0.090	0.990	
N	215		
Log likelihood	-99.640		
LR chi²(8)	65.88***		
Mc Fadden's R²	0.2485		

[a] Definitions for variables in table one.
[b] Marginal change in probabilities evaluated at the sample means (for dummy variables discrete change from 0 to 1)
* significant at p = 0.10
** significant at p = 0.05
*** significant at p = 0.01

Table 4: Determinants of marketing performance (linear regression model)

Variables[a]	Coefficients	Corrected standard errors
I_SPEC	9.137***	2.499
I_COOP	4.866**	2.519
ALT	0.002	0.007
M_EXT	1.154	0.934
WORLD	2.639***	0.989
P_LAST	1.110	0.897
COMP	0.144	0.273
CVN	19.331***	2.025
CVP	18.072***	2.352
CBA	2.494	2.022
_cons	42.859***	6.490
N	215	
F (10, 204)	61.91***	
Adjusted R^2	0.7400	

[a] Definitions for variables in table one.
* significant at p = 0.10
** significant at p = 0.05
*** significant at p = 0.01