Josef G. Knoll-Europäischer Wissenschaftspreisträger 2008

Josef G. Knoll-European-Science Award Winner 2008

Meike Wollni "Coping with the Coffee Crisis. An Analysis of the Production and Marketing Performance of Coffee Farmers in Costa Rica", University of Goettingen, 2007

Summary

Problem setting

Changing patterns in global coffee markets led to a plunge in coffee prices that marked the coffee crisis at the turn of the millennium. As a result of considerable oversupply of green coffee on the international market, world coffee prices dropped to their lowest levels in 30 years giving rise to one of the most severe crises experienced by the coffee sector to date. From a macroeconomic perspective, the crisis had detrimental effects on export revenues and employment in coffee producing countries. Negative consequences were especially felt in rural areas, where the coffee sector is one of the most important employers and income alternatives are often scarce. In many cases, coffee prices fell below the cost of production causing widespread financial and social hardships among producers. All over the world, coffee producing families were adversely affected by the depressed coffee prices resulting in negative consequences for income and food security, children's school enrolment, and fanners' ability to repay production loans. Economic losses and the lack of viable alternatives forced many farmers to abandon their coffee plantations and migrate to urban areas in search of employment. Overall, the effects of the crisis pose serious threats to the prospects for sustainable rural development.

Many experts claim that even if prices recover in the short term, the current crisis is likely to recur unless a structural transformation of the sector addresses the imbalance of supply and demand. In this context, the potential role of differentiated markets in restoring the economic viability of coffee cultivation has been highlighted. While coffee marketing has historically been organized through a commodity-based system, in which the lowest cost production of a standardized product is typically rewarded, a growing number of specialty marketing channels have emerged in recent years satisfying increasingly diverse consumer demand patterns. As opposed to conventional coffee, specialty coffee commands considerable price premiums in international markets, potentially offering farmers a sustainable livelihood strategy and a way to cope with the crisis. Compared to other coffee producing countries, Costa Rica's competitive advantage is in the production of high-quality coffee, given its excellent growing conditions. In light of the crisis, the country has put emphasis on exploring this competitive advantage trying to motivate farmers to adjust their production to the requirements of specialty markets. However, whether farmers can meet the standards required in these segments, and whether higher prices are actually passed on to them, still remains an open empirical question. In this context, the importance of marketing cooperatives has been highlighted as a link between consumers and producers, which can potentially allow farmers to gain access to specialty markets.

Objectives

The main objective of this study is to analyze the effects of the coffee crisis on the Costa Rican coffee sector, particularly on producers, and to identify the factors that influence production and marketing performance of coffee farmers. Based on the analysis, policy recommendations are derived that should help farmers to improve their competitiveness and their ability to cope with the crisis. The overall aim can be broken down into several specific objectives addressed by this research:

- To analyze the organization, coordination and performance of the Costa Rican coffee sector with special regard to the changes that have been induced by the coffee crisis;
- To describe the coffee production and marketing activity of farmers in Costa Rica, as well as their adaptation to the changing situation in world coffee markets;
- To analyze the factors that influence farmers' participation in specialty markets and marketing cooperatives and the effect of participation on producer prices;
- To identify the factors that explain farm-level technical efficiency of coffee farmers producing in the conventional and in the specialty segment, respectively; and
- To derive policy recommendations on how to improve fanners' performance in coffee production and marketing in order to help them cope with the crisis.

Methodology

Conceptual framework

Given the adverse economic conditions caused by the coffee crisis, the economic performance of coffee fanners is the key to improving the competitiveness of the sector and enabling farmers to make a decent living. In general, economic growth can be achieved through (1) cost reductions in the production of commodities, (2) technological innovations, and (3) the introduction of new products and quality improvements. The scope of technological innovations in coffee production is limited, especially as they cannot be achieved in the short run and are not directly under the control of farmers. Therefore, this study concentrates mainly on points (1) and (3) and their potential for offering fanners opportunities to enhance their competitiveness and cope with the crisis. A conceptual framework is developed to guide the analysis of farmers' production and marketing performance. Production performance is measured in terms of the technical efficiency achieved in coffee production. Technical efficiency reflects the farmer's ability to produce maximum output with a given level of inputs and given the available technologies. As inefficiency in production results in a failure to maximize profits at the farm level, increases in productive efficiency are expected to enhance farmers' competitiveness and ability to confront the adverse economic conditions. Although technical efficiency is critical for maximizing farm profits, it is not likely to provide high-cost producers, such as fanners in Costa Rica, with a competitive advantage in international

markets. Due to favorable natural conditions for the production of high-quality coffee, their competitive position is more likely to be related to product differentiation, which is more difficult to match by low-cost producers. Product differentiation is based on the consumers' willingness to pay price premiums for the added value of specialty coffee. Specialty coffees are distinguished by those that emphasize quality aspects (such as gourmet and estate coffees) and those that are produced under a specific production technology (such as organic, shade-grown and fair trade coffees). Coffee marketed through specialty channels is subject to various grades and standards aiming to ensure different aspects of sustainability and product quality. If farmers wish to access specialty markets, they have to comply with these standards often requiring the adoption of sustainable and quality-enhancing production technologies. While considerable price premiums are paid by consumers for the quality and process attributes of specialty coffee, it is not clear to what extent prices are passed on to producers. Marketing performance is thus defined as the average price received by farmers, which is in part determined by the farmer's choice of a marketing channel. Furthermore, the conceptual framework explicitly discusses the potential role of cooperatives to enhance farmers' access to specialty markets and productive resources potentially improving their marketing and production performance.

Econometric estimation

Marketing performance of Costa Rican coffee farmers is modeled by means of an econometric two-step model. The first stage of the model reflects the marketing decision of farmers. Two separate binary choice models are estimated to identify the determinants of participation in specialty and cooperative channels. In the second step, the average coffee prices received by farmers are regressed on the marketing decisions and a range of other exogenous variables. The fact that fanners are likely to select the marketing channel based on the expected price in the available channels introduces a potential endogeneity bias. To control for this potential bias, predictions for participation in specialty and cooperative channels are obtained from the first-stage probit models and are inserted on the right-hand-side of the price model instead of the original variables. Results of the two-step model are compared to coefficient estimates obtained from a three-stage least square model. In this approach, the marketing decisions and their effect on prices are estimated simultaneously. Results obtained from the two different models are very similar. The first method is, however, preferred as it explicitly accounts for the binary structure of the marketing choices.

In order to analyze farmers' production performance, a stochastic frontier model is estimated and the effects of a range of farm-specific variables on technical efficiency are determined simultaneously. When estimating a production frontier, the underlying assumption is that all farmers in the sample use the same production technology. In this study, some of the farmers produce for specialty markets, which require the adoption of quality-enhancing production techniques. To account for technological heterogeneity between sub-samples of farmers, separate production frontiers are estimated for farmers cultivating conventional and specialty coffee, respectively. However, the two sub-samples are unlikely to constitute unbiased representations of the population. If farmers choose to participate in one group or the other based on their expected performance under the chosen technology, the two sub-samples will systematically differ with respect to certain farm and household characteristics. If self-selection is ignored in the estimation of separate production frontiers, coefficient estimates will be inconsistent. This study adds to the existent literature on farm-level efficiency analysis by combining stochastic frontier methods with sample selection modelling techniques.

Following Heckman (1979) and Lee (1978), an inverse Mill's ratio is included in the frontier models to control for self-selection bias.

Empirical data

The study was carried out in the Western Valley and in the Brunca region representing two major coffee regions in Costa Rica. A multi-stage cluster sampling was used to randomly select 216 households in 26 villages for the survey. A standardized questionnaire was administered to households to collect data on coffee production, marketing, and prices as well as on the socio-economic characteristics of households covering the two-year period 2002 and 2003.

Results

Sub-sector study

The sub-sector study of the Costa Rican coffee sector reveals that besides having favorable natural conditions for the production of high-quality coffee, Costa Rica also benefits from a strong organizational structure throughout the production and marketing stages of the coffee sector. The sector is regulated by the Institute of Coffee (ICAFE), which coordinates the interactions between coffee producers, processors, roasters and exporters. While there are large numbers of coffee farmers, the downstream segments of the sector are more concentrated. However, 40% of the coffee production is processed and in part exported by farmer-owned coffee cooperatives offering producers the opportunity to vertically integrate and receive some of the value added at the downstream stages of the value chain. As a response to the crisis, the Institute of Coffee has launched various initiatives to give farmers incentives to adjust their production to the requirements of specialty markets and thus to increase the quality of coffee produced in the country. During recent years, the efforts to increase quality started to become evident in increased amounts of specialty coffee exported and relatively constant price differentials obtained for specialty coffee at the export level. However, there is some evidence that greater differentiation in final coffee markets has led to increased price differentials in international markets but is not reflected in producer prices. The performance of the sector depends critically on the degree to which these price differentials are actually passed on to the producers of high-quality coffee.

Descriptive analysis

The descriptive analysis indicates that coffee cultivation is of major importance for most households in the sample, even though the majority of households have a diversified income portfolio. As a response to the crisis, households reduced the amount of land, hired labor, and purchased inputs used in coffee cultivation. As a consequence, total output as well as average yields declined. As a result of lower coffee incomes, household expenditures were negatively affected. The analysis shows that households significantly reduced their expenditures in all categories including food, education, clothing, and housing. Expenditures related to social events were most drastically reduced by the households in the sample as a response to the

crisis. In addition, the descriptive analysis reveals that coffee cooperatives play an important role in the organization of coffee production and marketing. With respect to production performance, average yields arc slightly higher for cooperative members as compared to non-members, but the difference is not significant. In regard to marketing performance, the analysis confirms the hypothesized link between cooperatives and participation in specialty markets. The descriptive analysis further suggests that prices obtained by farmers producing in the specialty segment are higher compared to farmers selling their coffee in conventional markets. Moreover, farmers participating in cooperatives receive higher prices compared to farmers that market their coffee mainly through private marketing channels. Over the course of the crisis, price differentials between specialty and conventional channels as well as between cooperative and private outlets further increased.

Marketing performance

The econometric analysis of farmers' marketing performance shows that both participation in specialty coffee channels and in cooperatives improve the price received by farmers. Marketing through cooperatives increases the average price received by 5 cents/lb, and participation in specialty markets by 9 cents/lb. Furthermore, access to information about world market prices leads to an increase of 3 cents/lb in producer prices. Moreover, the first-stage probit analysis on participation in specialty markets confirms the link between cooperatives and access to differentiated markets. Membership in cooperatives increases the probability that a farmer chooses to grow specialty coffee by 24%. In addition, if farmers have received extension with respect to quality-enhancing production practices, their probability of participation in the specialty segment increases by 33%. Similarly, farmer education and experience in coffee cultivation are found to have significant and positive effects on participation. Finally, another policy-relevant finding is that large-scale farmers are more likely to participate in specialty markets indicating that small-scale farmers may face barriers that hinder their participation in differentiated markets.

Production performance

With respect to the analysis of production performance, the inverse Mill's ratio is found to be significant in both production frontier models indicating that selection bias is present. Average output of specialty coffee farmers is larger than it would be if all fanners were cultivating specialty coffee. In contrast, average output of conventional farmers is smaller than it would be if all farmers were using that technology. The fact that the inverse Mill's ratio is significant in both models emphasizes the importance of controlling for selection bias when estimating separate production functions. The differences in the determinants of technical inefficiency among conventional and specialty coffee fanners are influenced by both identical and divergent factors. Among the former, the size of the family increases inefficiency, while additional non-agricultural income activities decrease inefficiency for both types of farms. The efficiency-enhancing effect of other income-generating activities is often associated with better access to information and liquidity of farmers working off-farm. Among the divergent factors, farm size, experience and bookkeeping are found to have a significant impact in the specialty coffee model. While experience and bookkeeping decrease farm-level inefficiency, the positive sign of farm size indicates that small-scale farmers are more efficient in the production of specialty coffee. In the case of conventional coffee farmers, membership in cooperatives leads to higher farm-level efficiency.

Conclusions and policy implications

In Costa Rica, market regulations have aimed at guaranteeing a fair distribution of coffee incomes among all actors involved, but have also limited the development of new market segments and the remuneration of higher quality coffee. However, this is likely to change under the quality improvement program defined by the coffee sector. The results of this study suggest that implementation of new marketing channels in the segment of specialty coffees should be fostered to give fanners the opportunity to participate in these new market developments and increase the value of their produce. In some cases, price incentives may suffice to motivate farmers to increase the quality of their coffee and participate in differentiated markets. In many cases, farmers will need more support to adopt quality standards and to acquire the necessary information.

When fostering the expansion of production for specialty segments, two issues need to be taken into consideration by decision-makers. First, as the analysis has shown, smallholders are easily excluded. The lack of access to information and liquidity are only two of the factors that may prevent small-scale farmers from participation. However, product differentiation is an important tool to stay competitive in international markets and to increase the value of the coffee. Product differentiation has traditionally been in the realm of small-scale farming and the present study has shown that higher efficiency levels are achieved on smaller farms that produce in the specialty segments. This underscores the fact that small-scale farmers can successfully participate in differentiated markets once they are able to overcome the constraints that prevent their participation in the first place. The second issue that decision-makers need to consider is the degree to which supply is meeting current demand. If the production in specialty segments is expanded beyond the levels of effective demand, oversupply will lead to falling prices and a replication of the crisis currently experienced in the conventional market.

Based on the empirical analysis, three promising fields of policy action are identified including the provision of extension and information, the support of coffee cooperatives, and the diversification of the rural economy. Coffee cooperatives can help farmers to improve their production and marketing performance, as shown in this study. As small-scale farmers are more likely to choose a cooperative as an outlet for their coffee, cooperatives can be an effective means to target services specifically to this group of farmers. Furthermore, the creation of alternative income opportunities in rural areas is important to ameliorate at least some of the devastating effects of the crisis and bring coffee production back in line with demand. As viable alternatives are often scarce in rural areas, market research and enterprise development programs are needed to support farmers in then-efforts to diversify into other agricultural and non-agricultural activities.

Lit.:

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Meike Wollni: Coping with the Coffee Crisis. An Analysis of the Production and Marketing Performance of Coffee Farmers in Costa Rica, Peter Lang Frankfurt, 2007, ISBN: 978-3-631-56431-8