

# Institutions in the Mexican coffee sector – changes and responses



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This research was conducted under the auspices of the Wageningen School of Social Sciences

**Institutions in the Mexican coffee  
sector – changes and responses**

**Benigno Rodríguez Padrón**

**Thesis**

submitted in fulfilment of the requirements for the degree of doctor  
at Wageningen University  
by the authority of the Rector Magnificus  
Prof. dr. M.J. Kropff,  
in the presence of the  
Thesis Committee appointed by the Academic Board  
to be defended in public  
on Tuesday 20 November 2012  
at 4 p.m. in the Aula.

Benigno Rodríguez Padrón

Institutions in the Mexican coffee sector – changes and responses, 201 pages.

PhD thesis, Wageningen University, Wageningen, NL (2012)

With references, with summaries in English, Dutch and Spanish

ISBN: 978-94-6173-418-1

Dedicated to my wife Roselia and my daughters Rocío and Berenice

## **Abstract**

The main aim of this thesis is to investigate the institutional environment prevailing in the Mexican coffee sector and its effect on the producers, traders and households. Specific topics we examine are the contract arrangements and trade performance, the factors influencing the growers' willingness to join a cooperative, the effects of cooperation on price variability, the influence of cooperation on the growers' welfare, and coffee producers' response to the falling coffee price through their engagement in diversification activities. To accomplish the main objectives we have used primary and secondary data. We applied ordinary least squares, logistic, probit and multivariate probit regressions in the analysis. The main findings indicate that farmers were better off under the quota system than they are under the free market. Results also indicate that being a roaster and selling cherry coffee negatively affects traders' use of contracts, whereas being vertically integrated has a positive effect on contracting. On the other hand, selling cherry coffee, participating in a competitive environment and having contracts positively influence intermediaries' performance. Other results show that some individual, family and farm factors, as well as variability of the coffee price at the municipal level favour cooperative affiliation; whereas housing conditions, the proportion of farmers in the municipality and the level of producers selling to intermediaries at the municipal level negatively affect prospects for cooperative membership. We discovered overall positive effects of cooperative participation on household welfare through an increase in the price and total coffee income; results also indicate that households responded to the low coffee price periods with an increase in diversification.

*Keywords:* Cooperation, contract arrangements, traders' performance, market uncertainty, diversification, coffee, Mexico.



## **Acknowledgements**

The work that I present in this thesis is a product of the many people who supported me with their company, comments, advice, information and discussions. It is also a product of my family and relatives; their involvement started two years before my PhD programmes, with the preparation and almost six years to finish this thesis.

First of all, I would like to thank my supervisors, Kees Burger, Erwin Bulte and Ruerd Ruben for providing many thoughts for this thesis. Kees, you helped me from the start to the finish of this research. You willingly dealt with all my difficulties in understanding how good research should be done and taught me to think more scientifically rather than in the empirical way. Thank you so much for your time and valuable contribution to all my empirical chapters. I do not have enough words to express my gratitude towards my co-promoter Ruerd Ruben, who showed a lot of interest in my work and whose contribution added value to my thesis. Your confidence in my research was the source of strength at the beginning of my writing. My special thanks go to Erwin Bulte for his kindness, support and invaluable comments and suggestions during my PhD study and research.

Many thanks to Arie Kuyvenhoven for accepting me as a PhD student at the Development Economics Group. I want to extend my gratitude to Aad van Tilburg and Liesbeth Dries, who reviewed and provided comment on some chapters of my thesis. Special thanks to Fernando Saenz for his friendship and help in developing my thesis. I want to give many thanks and recognition to André R. Cortés, who joined my PhD research with his master thesis.

I also want to thank the entire staff of the Development Economics Group for the time we shared in academic events, coffee breaks and outside of the University. That was really a great opportunity to express our ideas and to understand the way of thinking of well-prepared Dutch people. I extend my thanks to Rob Schipper, Nico Heerink, Henk Moll, Rein Haagsma, Marrit van den Berg, Marijke D'Haese, Lei Pan and Robert Lensink. Thanks to all of you for the comments and worries about my progress during the research. I appreciate all the support and friendship that I received from the secretaries and administrators of DEC, especially Henny Hendriks, Ingrid Lefeber, Marian Jonker and Dineke Wemmenhove. Your work helped me a lot to overcome many difficulties within the shortest time, which would otherwise have taken hours. Special thanks go to Roelfina Mihalj-Ijken, whose help in some administrative procedures made our lives easier here.

I would like to recognize the support from some colleagues in the Development Economics Group. It was possible to work in a pleasant environment, not only academically but also with regard to social issues. I would like to thank especially my colleagues Maren Radeny, Aifa Ndoeye, Fred Owegi, Mesharch Katusiimeh, Rabindra Thapa, Maarten Voors, Lonneke Nillesen, Ezra Berkhout, Fédes van Rijn and Gonne Beekman. Thank you all for your company during part of my stay in the DEC group and for the help I received whenever I requested it. Alvaro Reyes and family, thank you so much for your great friendship and company during the time you were in the Netherlands. To Jaime Arana and family, for all the time we spent together talking and discussing many academic

and Mexican issues. I remember how, whenever you were in the office, not one week passed without me visiting you or you visiting me in my office to share at least one thing.

To John and Esperanza and family, you always were my family contact in the Netherlands and we had a wonderful time together; we shared many times of happiness and sadness during my five years in the Netherlands. Enid Tomkinson, our guide in English and family friend forever; we learned so many things from you. Agnes Akwero, Sharon Harris and Mariette van Staveren for helping in correcting the writing and editing of this thesis. Also thanks to Teo and Mari Carmen and family, for your friendship in this country. We appreciated so much all your support and the time we shared. I want to say special thanks to Martha, Frank and their daughter for their kindness from the beginning to the end of our stay in the Netherlands. We will not forget the parties we had together. Many thanks to Francisco Guevara and his family, for the friendship and companionship we received from them when living in the Netherlands. Thank to José Potting and Olga Lyashevskaya for their company and kindness. My thanks also go to many other friends that I cannot list for space reasons, but I would like to mention my special thanks to Juana, Karla, Eira, Caucasela and Xochitl for their friendship and their being close to my family during my PhD studies.

I cannot miss the opportunity to thank all my colleagues at the Regional Centre of Chapingo Autonomous University, especially Alejandro, Bernardo, Víctor, Laura, Carlos, Francisco, Fabian, Gervasio, Emiliano, Susana, Salvador, Esteban, Tinoco, Ernesto, Romeo, Domingo, Antonio, Dámaso, Zárate and Atenógenes. My special gratitude goes to Gerónimo, for all his help in the organization of the Coffee Census and 2005 survey databases. Your work really helped me to resolve a number of difficulties in my research. Special thanks go to Guillermo for all his help in the procedures we carried out before and during my PhD programme and for the push I always received from him with regard to my study.

I would like to take this opportunity to thank all the heads of governmental and non-governmental institutions in México who provided information during my fieldwork. Also thanks to the farmers' organization leaders and CEOs of the many coffee companies I talked to during the study in México, as well as to the staff members of the International Coffee Organization for the valuable information and the help I received during my visit to England. I would like to thank all the intermediaries and coffee processors who provided information I needed for my thesis. Special thanks also go to the Mexican Coffee Association for providing some of the records and databases that were especially useful in my analysis.

My PhD programme could not start without the financial support from the Alban foundation (Santander Group) that provided the scholarship and tuition fees for three years. In the same vein, I thank the Ministry of Education and the Ministry of Science and Technology of México for the financial support during part of my PhD studies. Special thanks go to Chapingo Autonomous University for the financial support they provided to me during my stay in the Netherlands. All this support allowed me to concentrate on my studies and follow a complete programme in a foreign country.

To my father and mother (r.i.p.), many thanks for the love and all the support they gave during my studies; to my brothers and sisters Ernesto, Pablo, Juana, Efrén, Elena and Antonio, thank you for all the support and companionship during the time I was preparing and developing my PhD study. Special thanks to Magdaleno and Deisy and their family for all the help I received from them before and during the development of my PhD programme.

Special thanks to my wife Roselia and daughters Rocío and Berenice; without them my life in the Netherlands would have been very difficult. I am indebted to them for their understanding when I devoted my time to my study and research. Roselia, thank you for all your support, not only in my personal life but also with regard to the academic issues, and for being with me wherever I am.

Benigno Rodríguez Padrón

Wageningen, the Netherlands, November 2012

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## Chapter 1. Introduction

### 1.1. Introduction

This thesis intends to make a contribution to the existing coffee sector literature, by providing theoretical and empirical evidence on the institutional environment and policy changes and their effect on the coffee traders' and households' behaviour. Its main findings show that the institutional environment creates differential opportunities among partners in the coffee sector, making their ways of doing business in coffee substantially different. The cooperative involvement does not always help growers to increase their welfare, and neither does it help to reduce the instability of the coffee price. Households' response with an increase in diversification during the low coffee price periods was evident.

Coffee is the second-largest global commodity after oil, employing more than 25 million people on more than 5 million farms. It fills approximately 400 billion cups a year and is estimated to be regularly consumed by more than 40% of the world's population (Robert and Raphael, 2001). During the 1962-1989 period, the international coffee market was regulated by the economic clauses of the International Coffee Agreement (ICA). During this period, quotas were distributed to members of the International Coffee Organization (ICO) in order to keep the coffee prices stable. As a consequence of the disappearance of the economic clauses of the ICA in 1989, a dismantling of coffee boards and other governmental bodies operating in producer countries was started. According to some scholars (Milford, 2004, Ponte, 2001), the emergence of other national bodies, such as producer and intermediary organizations, has not been able to substitute the demised ones. They also argue that local exporters found it difficult to mobilize funds to compete with international traders. As a result, international companies have been taking control of the domestic market in producing countries.

Just before the Mexican presidency period of 1988-1994, Mexico started a profound transformation of its economy. The country joined the General Agreement on Tariffs and Trade (GATT) in 1986 and signed the North American Free Trade Agreement (NAFTA) with Canada and the United States of America in 1992. By doing so, the Mexican government broke radically with previous import substitution policies and embarked on trade liberalization.<sup>1</sup> These processes forced the Mexican state to avoid market intervention, abolish the minimum prices for basic products, and open the border to the import of any product and input (Bussolo *et al.*, 2007); this policy included the coffee sector. During the same period, a modification took place in the system of land ownership with regard to the ejidal and communal properties. This entailed an adaptation of article 27 of the Mexican Constitution in 1992, which formally ended the process of land reform in Mexico. This change established a legal process through which land titles were given to the land rights within the ejido and to operators as well. As a result, individual parcels could be sold or used as collateral. This latter modification affected more than half of the Mexican territory. As part of the same

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<sup>1</sup> Trade liberalization or globalisation has been defined as the process of lowering barriers on importing and exporting goods and capital; it has been implemented to a degree by the signing of multinational and regional free trade agreements (Wehbe *et al.*, 2005).

economic changes, a huge reduction in the participation of the State in credit, marketing and other agricultural services started at the beginning of the nineteen nineties (Davis, 1999).

To reduce the effect on the coffee sector of the quick decrease in direct intervention by the Mexican state, the federal government set up a number of subsidies and compensation programmes. Those programmes helped to support agricultural and livestock producers. The largest programme was the income support programme (Procampo), its main aim being to compensate basic grain and oilseed growers. The second-largest programme was the *Alianza para el Campo* (Countryside Alliance) programme, the main aim of which was to enhance agricultural and livestock productivity through small investment projects, financed jointly by the government and producers. The majority of the smallholders participated in the first one (80%), whereas in the second one only a small portion (12%) took part (Davis, 1999).

To accomplish the main objective of this thesis, we will apply the New Institutional Economics theory. We will define institutions as the formal and informal rules of the game in society. Formal rules include constitutions, laws, property rights and other regulations (North, 1994; Williamson, 1987; Williamson, 1998). They are also often enforced by some external authority. By contrast, informal institutions have unwritten codes of social conduct like shared values, norms, customs, ethics, and ideology: they generally operate outside of formal legislation. Such institutions evolve spontaneously but not deliberately through human interactions (North, 1990). Many of the rules refer to the transfer and protection of property rights and sanctions, which are imposed in the absence of agreements. Thus, both formal and informal institutions create a behavioural framework within which economic activities occur.

Institutions constitute the "rules of the game" by which any economy operates. It is not the agencies or organizations that implement policies, but the agencies are influenced by the effects of the policies. The ultimate objective of these rules is to create an institutional environment which will give investors and citizens confidence; they will rely on it, which will ultimately result in increased wealth (North, 1994). The rules of the game in any sector are important to build a setting based on confidence and certainty for investors and for the general public that interacts in any sector (OECD, 2007). In general, institutions serve to reduce uncertainties in people's daily lives (North, 1990).

The Industry Representational Organization (IRO) represents all economic agents included in the supply chain. In the case of coffee, this includes producers and their organizations (grassroots and cooperatives), individual or organized intermediaries, processors who can also be included in some kind of organization, exporters, governmental instances and other indirect partners such as universities, input suppliers, credit providers and machinery producers (Gilbert *et al.*, 1999).

The existence of the IRO benefits all the actors participating in the coffee sector. The government can benefit because the IRO has become a means of transmitting information to farmers, firms, and several other agents. For coffee farmers, an industry representative is very important as it allows them access to services and information from the government or firms. Additionally, all the

other partners in the supply chain can benefit by providing national and international statistics and by representing the country at international debates (Gilbert *et al.*, 1999). In the Mexican coffee sector, after the demise of the Mexican Coffee Institute (INMECAFE), the industry representation was covered first by the Mexican Coffee Council (MCC) and then by the Coffee Product System (CPS).

The rest of this introduction is organized as follows: in Section 1.1, we will provide a background to the research; in Section 1.2, we will describe some major characteristics of the Mexican coffee sector; Section 1.3 will provide an overview of the problem statements of the thesis; in Section 1.4, we will describe the research objectives and questions under investigation in this research; Section 1.5 will comprise information concerning the data collection and methods used in this investigation; and in Section 1.6, we will provide an outline of the thesis.

## **1.2. The Mexican coffee sector**

Coffee was first introduced into Mexico in the late nineteenth century, and by 1970 this crop had been cultivated on 356,253 hectares. After that time, the growth increased enormously, partly as a result of the institutional environment established. In 1992, the total land occupied by this crop was 761,899 hectares. This represents an increase of over 114% in almost twenty years. During this period, a relatively high and stable coffee price was registered. A total of 97,716 coffee producers were registered in 1970. This means that coffee producers had an average of 3.55 hectares in that year. In 1992, there were 282,593 coffee farmers with an average of 2.69 hectares per farmer. This represented a reduction of 24.2% on the size of coffee growers from 1970 to 1992. In Mexico, coffee orchards were located in 52 coffee-producing regions and almost 80% of total production was exported to the United States at the beginning of the nineteen eighties.

According to data from the last National Coffee Census (SIAP, 2008), a total of 493,497 coffee growers was registered in 2008, owning 764,132 hectares. This represented an average of 1.37 hectares with coffee orchard per coffee grower. Yet, a decline of 49.2% in the average coffee farm size per farmer was registered from 1992 to 2008. Thus, 62.2% of the farmers had land equal to or less than one hectare cultivated with coffee, according to the Census updated in 2008. According to this Coffee Census, around 27% of the coffee growers speak an indigenous language; this can be compared with the national share of indigenous peoples of around 12% (Nolasco, 1985; SIAP, 2008). The poor public services available and the indigenism present in the Mexican coffee-producing regions give the coffee production special characteristics in terms of technology and culture.

Coffee helps to preserve the ecological conditions. The coffee orchard has been considered as one of the major environmental conditions maintained for more than two hundred years. Around 98% of the coffee orchards in Mexico are farmed under shade trees. This provides a very important wood mass that favours aspects such as the protection of native fauna, with an important influence on the water cycle (Marban-Mendoza, 2009). Thus, the coffee production has been considered as

one of the most important crops to preserve the landscape ecology and sociology of 52 coffee-producing regions in this country.

As a rule, at the upstream of the coffee chain there is a large number of small-scale coffee farmers, followed by several small-scale processors who usually live in remote areas in developing countries, as is the case in Mexico (see Figure 1.1). Nowadays, they face a complicated international trading system of which they have only very limited knowledge. Moreover, as a result of the free coffee market, the variability of the international coffee prices has increased. Nowadays, coffee prices go up and down in cycles, making it very difficult for farmers to make a decision about the future of their business in coffee (Milford, 2004).

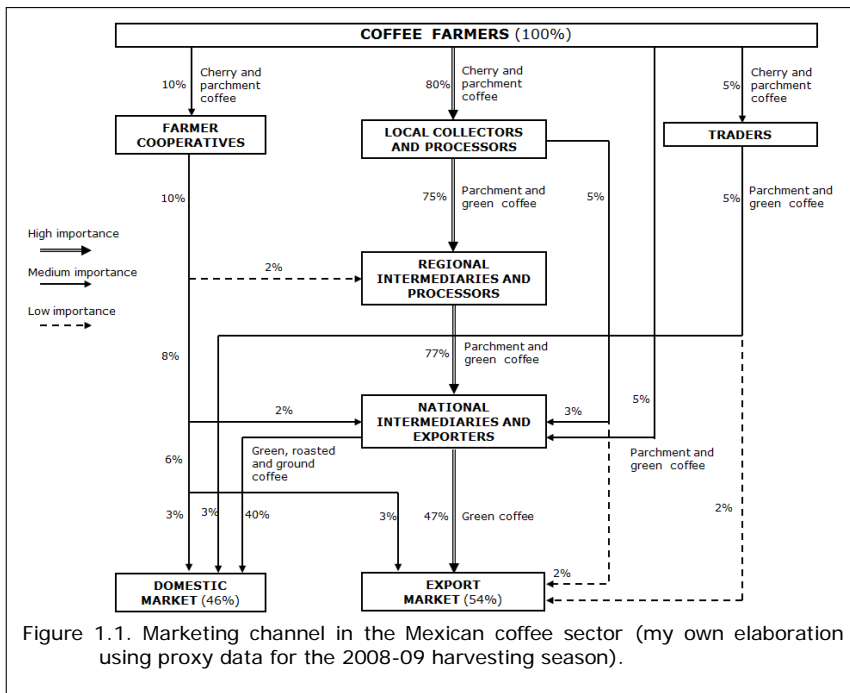


Figure 1.1. Marketing channel in the Mexican coffee sector (my own elaboration using proxy data for the 2008-09 harvesting season).

The production area is located mainly in the southern region of the Mexican territory (see Appendix 1). National bureaus list 12 coffee-producing states, but in other states very little land is actually cultivated with coffee (SIAP, 2008). In the 2008-09 harvesting season, the total coffee production in Mexico was 5,774,159 quintals.<sup>2</sup> The amount of land planted with coffee per farmer decreased by almost 50% in all producing states from 1989 to 2008. In some states such as Veracruz, Puebla, and Colima the reduction was lower than 50%, while in other states such as Oaxaca, Hidalgo, and Guerrero the reduction was greater than 50%. This reduction happened in part because some farmers divided their land farmed with coffee among several members of their household.

<sup>2</sup> A quintal is 245 kg of cherry coffee, 57.5 kg of parchment coffee, 80 kg of natural dry or 46 kg of green coffee.

Coffee has been one of Mexico's major agricultural exports in the last three decades; it was the third major source of foreign revenue, only surpassed by petroleum and automobiles, and represented 3% of total exports, and 25% of the total agricultural exports in the nineteen nineties (Villaseñor, 2004). Coffee brought 413 million dollars of foreign exchange annually in the nineties and 230 million dollars of foreign exchange annually from 2000 to 2009 (Banco de México, 2010). It was estimated that coffee was the fifth in terms of shared value of total agricultural exports in 2008.

The coffee sector is still important in Mexico, even though coffee exports account for less than 4% of the agricultural export revenues in 2008. It provides employment and income to almost half a million households, while around one million workers are hired each year to harvest coffee. Mexico is the world's leading producer of certified organic coffee, and together with Peru, it is one of the leaders of fair trade coffee production (Calo and Wise, 2005). Thus, coffee is very important in this country because of its economic, social and ecological aspects.

### **1.3. Problem statement**

Coffee is grown in twelve states of Mexico, but the organization of the coffee sector in each of them differs in terms of institutional setting, government support and farm household responses to policy changes (Giovannucci and Juárez, 2006). The regional organizations evolved from a major change in the national organization that occurred after the demise of the International Coffee Agreement in 1989, which led to the abolishment of the INMECAFE in 1993. Since then, new organizations have emerged and federal and state support for the sector has been made available in various forms, at varying times and in differing amounts.<sup>3</sup>

As a result of a relatively high coffee price during the regulated era of the coffee market, many Mexican coffee growers devoted almost all their land to coffee orchards. This process was considered necessary at that stage because the Mexican government was more interested in getting as much revenue as possible by exporting any raw material. This process, complemented with the prevailing agro-climatic and ecological conditions, led to a specialization and consequently to the economic dependence of many households on this crop.

The freedom of the international coffee market was established at the same time that the Mexican economy turned to the free market. Like many other developing countries, Mexico made a change from a largely controlled economy before the nineteen eighties, to a largely free market at present. As a result, over the past decades, many new economic agents entered the coffee sector as input producers and output processors, multinational corporations, and non-governmental organizations; some of which have become the most important players in the national coffee supply chain (Wehbe *et al.*, 2005).

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<sup>3</sup> Organization refers to the established structures that deal with the coffee sector as an entire supply chain. Normally, organization is taken as being synonymous to the IRO.

Other additional changes carried out as a result of the breakdown of the ICA were the complete withdrawal of the state from processing and marketing coffee, the abolishment of minimum prices, and the removal of the export tax. As expected, a closer synchronization between domestic and international coffee prices was suddenly presented. This means that after the liberalization, there has been a closer relationship between the rural coffee prices and the Mexican export price. The difference between those prices was around 30 dollars per quintal during the nineteen eighties and around 10 dollars per quintal during the last two decades. The average grower price in Mexico was 34, 11, and 26% lower than the composite price of the ICO in February 1989, 1999 and 2007, respectively. This recent figure shows that Mexican farmers receive much lower shares (by nine per cent points) of the world market than their colleagues in Guatemala or Costa Rica receive.

The government plays a much smaller role now in the coffee sector than it had in the past. The highest government participation was through the INMECAFE, which was in operation until 1993, which took control of the coffee sector in research and the financing, processing and marketing of coffee. As part of the move toward a free market policy, this institute and other government organizations supporting the agricultural sector (including coffee) stopped at the same time.<sup>4</sup> Continuous changes in institutions took place, such as the establishment of the CMC in 1993 and its substitution by the CPS in 2004; the latter is a representative council of all the stakeholders participating in the coffee supply chain (Giovannucci and Juárez, 2006). Thus, under the liberalized scenario, the public sector is redefining its role in the coffee sector. It has shifted from a very active role to that of a service provider and regulatory body. A clear picture is that the state is now a kind of mediator between the private processor and exporter companies, and the social sector of coffee growers and small-scale processors.

In the regulated coffee sector, farmers delivered their raw coffee either to cooperatives or directly to government factories. Once coffee was milled and cleaned, it was delivered to the Mexican Coffee Marketing Board. Only then were private parties allowed to purchase the coffee through auction. By contrast, under the free regime, the government's participation was mostly replaced by large-scale companies (Winter-Nelson and Temu, 2002).<sup>5</sup> They bought raw coffee from wholesalers and small-scale companies rather than directly from smallholder farmers.

Currently, the Mexican government has been implementing several subsidy programmes to encourage crop diversification, to support the lowering of production costs, to compensate for the low coffee prices, to increase the processing capacity, to expand the domestic market and to control coffee diseases. Thus, during the last eight years, it spent almost 110 million dollars annually on supporting the coffee sector (SAGARPA, 2009). In addition to the national support, some states are supporting coffee programmes with a specific focus, such as the coffee

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<sup>4</sup> Livestock and Agriculture National Insurance (ANAGSA), which participated by offering insurance against natural disasters, and the National Rural Credit Bank (BANRURAL), which participated by offering cheap credit to productive project proposals.

<sup>5</sup> The major companies (e.g. Kraft Jacobs-Suchard, Nestlé, Douwe Egberts Group, and Folgers Coffee) in Mexico have had an oligopolistic control of the coffee market in almost all coffee-producing areas since the start of the nineteen nineties (Renard, 1999).

denomination of origin (Chiapas, Veracruz, and Oaxaca), income diversification (Veracruz and Puebla), input facilitation and consumption promotion (Veracruz).

The last decades have seen a reduction in the number of farmers' organizations, and in the number of traders and processors. At the start of the nineteen nineties, there were 2,671 local cooperatives that brought together two-thirds of all coffee growers. In addition, there were thirteen grassroots farmer organizations, uniting 67.5% of all coffee growers. Nowadays, there are five large grassroots farmer organizations, in which almost 30% of all coffee farmers took part. In addition, there were 1,962 agro industries to process cherry coffee and 426 to process parchment coffee in 2001. According to the latest report of CPS, there are 867 intermediaries; only 304 of them are exporters and only 73 of them are also coffee producers. The majority of those intermediaries is located in Chiapas (300), Oaxaca (84), Puebla (113), and Veracruz (205) (AMECAFE, 2009). Thus, there has been a reduction in the number of intermediaries and an increase in the number of agents in the upstream part of the supply chain, whilst the degree of organization of the producers has declined.

There are a number of earlier studies on the Mexican coffee sector that are related to our topic of interest. Avalos-Sartorio (2006b) has concluded that the liberalization reform applied in Mexico has not been giving the expected result in terms of efficiency. Eakin *et al.* (2006) found that the Mexican IRO is not working well to facilitate the adaptation that the coffee sector needs under the free market. Calo and Wise (2005) have suggested that any solution to the coffee crisis, beside the coffee subsidies to growers, should include a diversification of households' livelihood. Avalos-Sartorio (2006a) has found that not all coffee producers are able to participate in market niches, in particular in the fair trade, because they do not meet the requirement established in the rules. Perez and Echanove (2006) have concluded that coffee growers have lost part of their income as a result of the implementation of the free market. Renard (1999) has found that entering into market niches, such as the fair trade, help producers to escape from the competition. The same author (2010) has concluded that the survival of the coffee cooperatives depends of their entry into the market niches. Ponette-González (2007) has determined that coffee is not profitable for small coffee producers. Finally, Lewis (2005) has concluded that the migration of coffee households' members helps in investing in coffee production.

Additionally, several researchers have studied the producers' and traders' response to institutional changes. Milagrosa (2007) analysed the industry of vegetables in the Philippines and found that including the social capital and culture in the institutional analysis produces better results in explaining market participants' behaviour. Orr and Mwale (2001) have analysed the households' strategies that link them with market liberalization in Malawi; they concluded that analysing this phenomenon required a variety of methods. Baffes (2003) has analysed the Tanzanian coffee sector under the globalized economy; he concluded that the liberalization allows producers to have a bigger share of the export price. Mwihia (2002) studied the liberalization process and the effect on smallholders; considering the case of coffee in Kenya, he found that the reform has caused an increase in the price volatility and that the reform has led to higher transaction costs for smallholders when they buy input and contract agricultural services. All these studies have produced valuable elements for a better understanding of the dynamics of the Mexican coffee supply chain and the growers' response to a

changing institutional environment. However, not one of these authors focused on the organization and structure of one particular sector and the actions undertaken by the major actors included in the supply chain.

Consequently, this study aims at evaluating the effect of institutional changes on the structure of the coffee sector, coffee growers' organizations, and the coffee households' production and marketing decisions. Our study aims at assessing the contractual arrangements and traders' performance under the currently liberalized coffee sector; the factors determining the coffee growers' willingness to cooperate and its effect on the households' welfare; the coffee producers' response to market uncertainty with regard to cooperation and the effect of cooperation on the market instability; and the coffee growers' response to the low coffee price through diversification.

#### **1.4. Research objectives and questions**

The main objective of this research was to analyse the institutional environment of the coffee sector in Mexico and the effects of its changes on coffee traders' and households' behaviour. To achieve these main goals, the following specific objectives were addressed:

1. To identify the factors explaining the contractual choices of traders engaged in the Mexican coffee chain, and to assess the performance of coffee traders in four coffee-producing regions.
2. To identify the variables that contribute to joining an organization, and to examine the significance, relative importance and direction of some of the most important variables influencing the per capita coffee income.
3. To evaluate farmer cooperation as a response to market uncertainty and the effect of such cooperation on coffee market instability.
4. To analyse the coffee households' response to the low coffee price through diversification and its effect on their annual coffee income.

With the aim to assess the changes in the institutional environment resulting from the modification in the Mexican economy and the deregulation of the coffee market, in this thesis we studied the following main research questions:

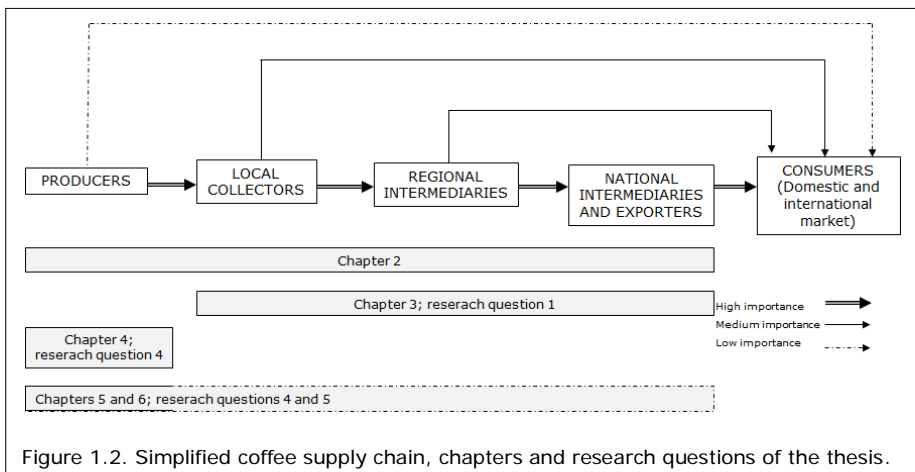
1. What are the socio-economic characteristics of coffee traders in the states of Oaxaca and Veracruz, Mexico? What are the main factors that affect traders' decisions to have or not to have a contract with their buyers? And what are the factors that influence the performance of coffee traders in Oaxaca and Veracruz, Mexico?
2. What are the characteristics of farmers who are members of the coffee cooperatives? What are the main factors that determine growers' participation in coffee organizations? Do



coffee cooperatives that are active in the Mexican coffee sector assist farmers to find a better market outlet and receive better coffee prices? What are the factors that influence the level of the per capita coffee income, and to which extent do those factors differ between members and non-members of cooperatives?

3. What is the effect of coffee price variability on the coffee households' willingness to cooperate? To what extent does the level of organization help in reducing the coffee market instability? Which factors determine the individual coffee prices? What role do market variables play to influence the level of the individual yearly coffee income?
4. Do coffee growers respond to a low coffee price by increasing a particular kind of diversification? To what extent does a more diversified livelihood imply a higher individual coffee income? What are the main capitals that induce more vertical integration of coffee growers? What role does the institutional environment play in adopting the coffee-extra activities?

Figure 1.2 shows the location in the supply chain of the chapters and research questions of this thesis. In Chapter 2, we present a general overview of the Mexican coffee sector. This information is useful in understanding the liberalization process experienced by the Mexican economy and the changes in the institutional setting and organization of the coffee supply chain. This chapter will take into account the whole supply chain at the national level. Here, we will include information about the coffee growers, how they were organized in the past and how they are organized under the current conditions. We will follow the way in which main agents intervene in the supply chain from the producers' side to the exporters' side; we have also included some information related to the international coffee market in this chapter.



Chapter 3 will focus on the intermediaries' side. This chapter will include information on traders, from the local collectors to the national intermediaries and exporters. We did not include

information on producers and consumers. In this chapter, we will try to answer question 1. Figure 1.2 also shows the location of Chapter 4, in which we will try to answer question 2. To this end, we will mainly focus on the growers' side, also including some information related to the other part of the supply chain at the domestic level. Chapters 5 and 6 will be placed mainly on the coffee households' side, but here we will also thoroughly discuss variables that were obtained on the coffee market (at both the national and international level). Chapter 5 will answer question 3, while Chapter 6 will answer question 4 by constructing a database with variables at the households', regional, national and international level.

### **1.5. Data collection and methods**

Several sources of primary and secondary data were used in this thesis. We carried out field work in two periods. The first of these fieldwork periods took place from May to July 2008 to get information relating to the functioning and nature of the coffee supply chain. During this period, we interviewed people involved in the coffee supply chain such as policymakers, representatives of grassroots farmer organizations, coffee experts, researchers, and government institution representatives.

Another period of fieldwork took place from November 2009 to February 2010, when we conducted interviews with coffee traders in four producing regions in Mexico. During this period, a coffee intermediaries' survey was conducted as well in four coffee-producing regions, which differ by state and within states according to their market accessibility and altitude. First, we interviewed intermediaries located in the selected producing regions and then some intermediaries working steps downstream in the supply chain. During this fieldwork, we held meetings with local authorities and people involved in the National Coffee System Committees (NCSC).<sup>6</sup>

We collected secondary data from research institutes and other organizations participating in the agricultural and coffee sectors, such as the CPS and the Mexican Coffee Association (AMECAFE, by its initials in Spanish), academics and statistical offices, among others. This information was used to provide a background on the Mexican coffee sector and to identify the major structural characteristics in this industry.

We approached a number of national service institutions at the national level to obtain statistical databases relating to the coffee sector at the state and national levels (SIAP, INEGI, INCA-RURAL and ASERCA).<sup>7</sup> This effort resulted in the Mexican National Coffee Census of 2002–2008 database, which contains technical, economic, and social data on 493,497 coffee growers (see Figure 1.3). Additional information was obtained from representatives of most stakeholders in Mexico City where the most important decisions regarding the coffee sector are made.

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<sup>6</sup> The NCSC is the coffee IRO, constituted to serve as a platform for permanent planning, communication and consultation between all different actors in the coffee chain.

<sup>7</sup> The Service of Agricultural and Livestock Information (SIAP), the National Institute of Statistics, Geography, and Informatics (INEGI), the National Institute of Rural Training (INCA-RURAL), Support and Services for the Marketing of Agricultural Livestock (ASERCA).

The ICO, which has its offices in England, as well as several Mexican institutional libraries, supplied theoretical and empirical literature concerning the organization of the Mexican coffee sector; this information relates to the market setting before and after the liberalization of the Mexican economy.<sup>8</sup> Governmental and non-governmental institutions in Mexico also provided data with reference to the history of the institutional environment, coffee policies, and coffee farmers' household characteristics under both the quota system and the free coffee market.

As benchmark information we used two coffee grower surveys: the 2004 survey which included 1,396 coffee producers and the 2005 survey which included 2,294 coffee producers from the eight and five major coffee-producing states, respectively (see Figure 1.3). Those surveys were carried out by Mexican academic institutions evaluating coffee programmes applied by the federal government. In both surveys, similar questionnaires were administered to interview coffee growers. The information included in those databases relates to the organization of the coffee sector, coffee growers' response to the low coffee price scenario, government policies, and individual, household and regional characteristics.

The databases constructed with the two surveys were complemented with information included in the National Coffee Census. Individual, family and households characteristics of each of the coffee growers included in the surveys were retrieved from the Census. We also complemented the 2004 and 2005 survey databases with information of market characteristics prevailing in each of the municipalities. Data from the SIAP, ICO and INEGI were included as well in those databases. By doing so, we were not only able to have a more complete database. We could also build a panel database by including the coffee prices over eight years at the municipal level and individual and household characteristics in 2001 (Census time) with information obtained in 2004, 2005, and other dates.

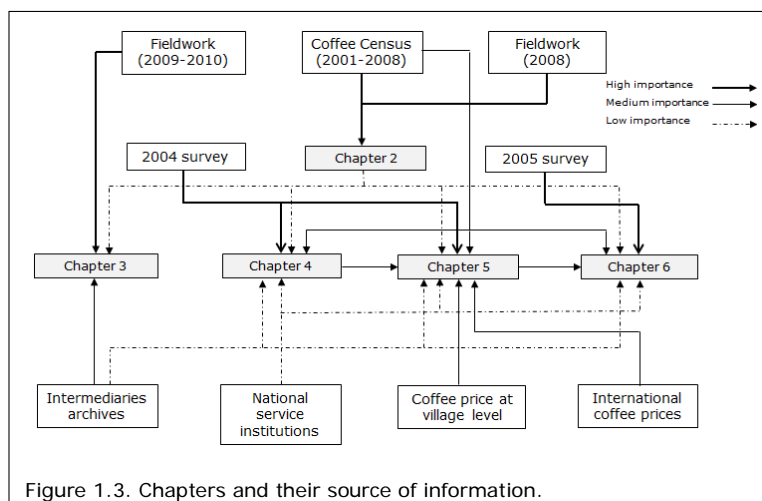


Figure 1.3. Chapters and their source of information.

<sup>8</sup> The ICO was created in 1962 under the auspices of the United Nations to administer the International Coffee Agreements (Santoyo *et al.* 1994).

In summary, data were collected in three ways: 1) by direct information: interviews with many participants in the coffee supply chain, including key informants of governmental and non-governmental institutions, grassroots farmer organizations and research centres, and a survey of coffee intermediaries; 2) from secondary sources: two surveys among the coffee farmers; 3) from statistics: archival records, databases and related studies at the state, national and international level. The main and complementary sources for each of the chapters are included in Figure 1.3. In this figure, we can also see the relationships between the chapters included in this thesis. Chapter 2 is related with the other core chapters (3 to 6), in that the former provides a general overview of the whole coffee sector now and in the past. Chapter 4 is related with Chapter 5 because both of them are taking cooperation and its effect on the coffee growers' welfare as a very important component; those chapters were done using the 2004 survey as a benchmark. Chapters 5 and 7 are related because the latter includes some variables that were calculated in the former's database. In general, Chapters 4 to 6 share a number of variables, most of them expressing the institutional setting at the national and international level.

To answer the research questions listed above, we applied several econometric techniques and statistical procedures. In Chapter 3, we used a logit regression in the analysis to figure out the specific variables that explain the intermediary's decision to set up contractual arrangements. In the same chapter, we used the gross marketing margins (the difference between selling and buying prices) as an indicator of traders' performance; an ordinary least squared regression was done to regress price margins on a set of variables depicting trader's socio-economic, marketing and institutional characteristics, so as to evaluate that performance.

In Chapter 4, we used a large-scale coffee field survey, conducted in 2004, complemented with information from the Coffee Census database. We relied on three different procedures. First, a Probit model analysis was performed that identified the individual, family, farm and regional factors influencing the likelihood of cooperative participation. Secondly, a statistical analysis of means differences was performed regarding the price levels obtained for coffee marketing between different types of coffee delivered by farmers. This was followed by a multinomial logistic regression, to identify the variables that play a role in defining the type of coffee delivered by producers. Thirdly, we performed three ordinary least square regressions – using pooled and non-pooled samples of organized and non-organized coffee growers, to identify the factors influencing the per capita coffee income and the possible differences between cooperative and individual coffee farmers.

In Chapter 5, we used the data included in the 2004 survey. This information was complemented with information included in the National Coffee Census database. In addition, to measure price uncertainty and calculate the mean and the variance price in the 2001-2004 period, we used municipal data on prices for eight years, constructing a panel with data coming from the SIAP database (SIAP, 2010). Using these panel data, we tested for the effect of farmers' organization on the price variability by applying an ordinary least square regression. This procedure contemplated

data for the 432 municipalities listed in the Census, which included the 66 municipalities considered in the 2004 survey and whose prices were available in most of the eight-year period.

In Chapter 6, we relied on data from the 2005 survey. We took additional village-level data from the National Coffee Census database retrieved from 2001 to 2008 and other databases reported by SIAP (2010), CMC (2005), and INEGI (2011) as another source of information. The wealth of data permitted the inclusion of lag variables as dynamic factors, such as past diversification, in the analysis of households' decisions regarding particular types of diversification. Thus, the database built related to household size, assets, agricultural production, family labour, migration, market participation, education, organization, and programmes financed by the federal government were included as well. To find out which variables are involved in the decision of coffee-producing households to engage in coffee-extra, agricultural and non-agricultural activities, we applied the multivariate probit model; to relate diversification and other factors to the level of the annual coffee income, we executed OLS regressions.

### 1.6. Outline of the thesis

This thesis is organized in seven chapters (see Figure 1.4). Chapter 1, which is the present one, includes the general introduction outlining the background of the topic, the coffee context in which this research took place, the problem statement of the whole thesis, the research questions of this research and objectives followed during the investigation, the data used and methodological approaches applied in each chapter. It finishes with the current outline section.

After this introductory chapter, in Chapter 2 we will describe the relevance of coffee in Mexico, headlining the value coffee generates in the whole economy. We will introduce the topic of the liberalization of the Mexican economy and the relationship with the agricultural sector (including coffee). We will also include a section with the institutional organization of the Mexican coffee sector and its changes, starting from the point of the liberalization of the coffee market and the liberalization of the Mexican economy. In one of the sections, we will briefly describe the structure prevailing in this industry.

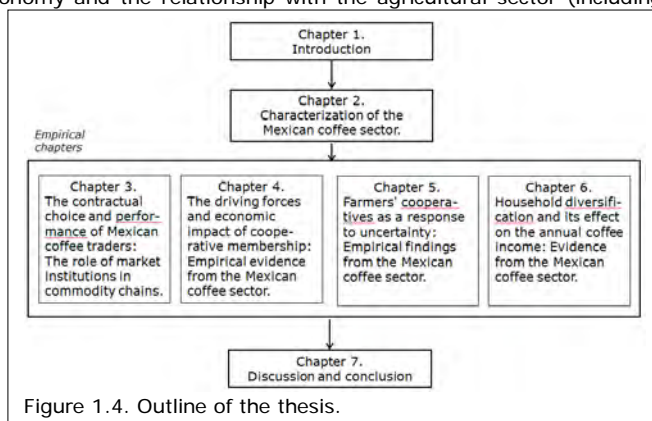


Figure 1.4. Outline of the thesis.

Chapter 3 will shed light on the contractual choices and performance of the coffee traders in the Mexican coffee sector. The traders' decision to have a contractual arrangement with their buyer will be analysed by applying the New Institutional Economic theory. The performance of the intermediaries will be analysed by using the gross margin of the coffee price. This chapter will provide information about the factors determining the traders' decision-making process about

whether to have a formal arrangement, and about the main variables that play a role in the performance of the intermediaries in four coffee-producing regions of the states of Veracruz and Oaxaca.

Chapter 4 will focus on the factors driving the coffee growers' decision making on their participation in a cooperative; the rationality behind the willingness to cooperate will be analysed in this chapter. The effect of the cooperative participation on the coffee farmers' endowment was revised. We performed a differentiation on the main individual, family and geographic characteristics between organized and non-organized farmers by using a probit model. As part of the analysis in this chapter, we will evaluate the effect of the cooperation on the coffee households' welfare by applying OLS regressions.

Chapter 5 will examine the coffee farmers' response to uncertainty in the coffee market with respect to their willingness to cooperate. The effect of the local price in the long run was tested as a possible main force to cooperate. The variance and the mean coffee prices at the municipal level were considered as a potential explanation for cooperative formation. We then tested the relationship between the level of organization and the stabilization of the coffee market by using the panel data. To end with the analysis in this chapter, we did an evaluation of the individual, households', regional and market factors influencing the individual yearly coffee income.

In Chapter 6, we will investigate the effect of the low coffee price scenario on the coffee growers/households' decision making about diversification. In this chapter, we will evaluate the farmers' willingness to diversify into coffee-extra, agricultural and non-agricultural activities as a response to a low coffee price or to structural differences at the village level. Four dependent variables were included in a multivariate probit to determine the main factors (natural, human, physical and social capital, plus regional and lagged variables of diversification) influencing the households' decision to diversify into a particular group of activities. The same group of variables, plus the predicted probability obtained from the prior step, were tested for their influence on the annual coffee income.

In Chapter 7, we will present a discussion and the conclusions. This chapter will contain a general conclusion of the research to summarize the main findings we presented in the previous chapters. In this part of the thesis, we will also present a number of policy recommendations that may be helpful in trying to improve the Mexican coffee sector through a better understanding of the institutional environment. Following this, we will underline some limitations we faced in doing this research. The chapter finishes with some thoughts about a research agenda for the future.

## **Chapter 2. Characterization of the Mexican coffee sector**

### **2.1. Introduction**

The structures that have been in place in the Mexican coffee sector in the last two decades account for the participation of government representatives, firms, farmers, and other agents directly involved in this industry. Among them, most influential in the decision making have been the government and firms. Now, the question is whether the institutional arrangements that have been in place since the end of the nineteen eighties have been able to fill the gaps caused by the decreasing government participation in the coffee supply chain.

The structural changes in the organization of the Mexican coffee sector took place within a broader national context of reform due to the liberalization of the economy. The process of liberalization started with the accession to the General Agreement on Tariffs and Trade (GATT) in the middle of the nineteen eighties.<sup>9</sup> As part of this procedure, the agricultural sector was unprotected subsequent to the closure of several governmental instances. Another influential step in liberalizing the Mexican economy was when the Mexican state signed the North American Free Trade Agreement (NAFTA) in 1992 (Thorvald, 2004).<sup>10</sup>

In addition, there was a flight of capital out of Mexico and the country experienced a very steep devaluation of the Mexican peso devaluation during the first three months of 1994, as a result of the reduced trust in the government economy. This ended with a tremendous financial crisis in the economy. Because of this crisis, the interest rates rose to 90% in that year. Those things together led to the closure of many small- and middle-sized enterprises; the Mexican government also had to expend a lot of money to rescue the banks from the bankruptcy. After some years of instability in the economy during the nineteen nineties, Mexico has experienced a stable inflation and exchange rates in the last sixteen years (Avalos-Sartorio, 2006a; OECD, 2011).

This chapter is organized as follows: in Section 2.1, we will present an introduction to the Mexican coffee sector; Section 2.2 describes the relevance of the Mexican coffee sector; Section 2.3 presents a description of the liberalization process of the Mexican economy; Section 2.4 presents a picture of the structure and organization of the coffee sector; Section 2.5 describes the institutional arrangement that was in operation under the quota system; in Section 2.6, we will describe the structure of the Mexican coffee sector from 1993 to 2004; Section 2.7 focuses on the actual organization of the Mexican coffee industry; and section 2.8 contains some concluding remarks.

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<sup>9</sup> The objective of the multilateral system for trade in goods created by GATT provided industries and business enterprises from different countries with a secure, stable and predictable environment in which they could trade with one another under fair and equitable competitive conditions (GATT, 1994).

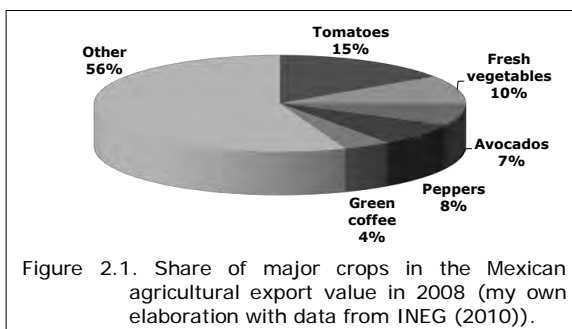
<sup>10</sup> The NAFTA was signed within Mexico, Canada and the United State of America in 1992; it was done with the hope to build one of the biggest markets in the world. The NAFTA has brought several changes in the kind of crops and type of partners' participation in the Mexican agricultural sector. Some of the most important changes were related to production inputs, technological innovations, pest control, farmer organizations and the administration of farms. Also, this agreement was intended to break down any barrier within the three countries within fifteen years (Thorvald, 2004).

## 2.2. Relevance of coffee in Mexico

Coffee is the main export product for many developing nations, and at the international level, coffee represents the second most tradable commodity after petroleum. The production of coffee worldwide was 116.7 million quintals in 1989-90 and 167.98 million quintals in the 2008-09 harvesting season.<sup>11</sup> This represents a 44% increase in 20 years (ICO, 2009); twice more than the demand for the same period (IDEA, 2006). It is estimated that over 125 million people worldwide depend on coffee for their livelihood; coffee produces an income for millions of small growers and their families. The economies of some countries are highly dependent on coffee as a source of national income and export earnings (Fuzhi, 2007).

Coffee has been farmed in Mexico for more than two centuries. This crop was originally introduced to Mexico in the late eighteenth century and was initially grown in large plantations. However, at the start of the nineteenth century, it gradually became a crop of smaller farms. Currently coffee is farmed in 12 of the 32 states of Mexico, five of which are major coffee producers (Chiapas, Oaxaca, Veracruz, Puebla and Guerrero). According to the Coffee Census database, updated in 2008, coffee is produced in a total of 541 municipalities. Considering the geographic and environmental characteristics of the locations where this crop is being farmed in Mexico, the total land cultivated can be grouped into two coffee-producing areas: the Pacific Ocean region and the Gulf of Mexico region (see the map in Appendix 1). The former accounts for 75% and the latter for 25% of the total coffee production in this country (Pérez *et al.*, 2001).

This commodity has been Mexico's most important source of agricultural export revenue for many decades. It is fifth in terms of geographic area cultivated (after corn, beans, wheat and sorghum). Coffee was one of Mexico's major agricultural exports in the middle of the nineteen eighties; it accounted for 35% of the total agricultural output at that time (Wehbe *et al.*, 2005). This crop was also the third major source of foreign revenue, surpassed only by petroleum and automobiles, and represented 3% of the total exports and 25% of the total agricultural exports in the nineteen nineties (Villaseñor, 2004). It brought in \$413 million of foreign exchange annually in the nineteen nineties and \$230 million annually during the past decade (Banco de México, 2010). It is estimated that coffee was fifth in terms of the shared value of the total agricultural exports after tomatoes, fresh vegetables, avocados and peppers in 2008 (see Figure 2.1).



The government intervention in the coffee sector was formally institutionalized in the nineteen forties. Yet, the strongest government participation started with the establishment of the Mexican

<sup>11</sup> A quintal is 245 kg of cherry coffee, 57.5 kg of parchment coffee, 80 kg of natural dry or 46 kg of green coffee.



Coffee Institute (INMECAFE) in 1958. Through this institute's efforts with regard to distributing coffee technology and credit provision and extension, coffee became an economically viable activity for smaller landowning farmers in Mexico in the nineteen eighties (Eakin *et al.*, 2006).

The economic relevance of the agricultural sector and coffee production in Mexico has decreased in the last decades. Its agricultural sector's contribution to the GDP was 4.97% in 1989, after which it fell to 3.67% in 1997 and to 3.40% in 2007 (INEGI, 2010). Similarly, the share of coffee value in the Mexican GDP was 0.25% in 1989, after which it fell to 0.20% in 1997 and to 0.08% in 2006 (Banco de México, 2010). In particular, it was reported that the percentage of coffee's contribution to agricultural exports was 3.64% in 2008 (see Table 2.1) (Banco de México, 2010, Pieterse and Silvis, 1988). Although coffee's relative economic importance has declined, it still remains the country's largest single export crop and a significant source of foreign income (Calo and Wise, 2005; Pérez *et al.*, 2001).

Table 2.1. Value of exported coffee within Mexico's total and agricultural exports.

Year	Total export	Agriculture export	Coffee export	% coffee in total export	% coffee in the agricultural export
2001	158,779	4,446	243.91	0.15	5.49
2002	161,046	4,214	186.44	0.12	4.42
2003	164,766	5,035	182.70	0.11	3.63
2004	187,998	5,683	205.75	0.11	3.62
2005	214,233	6,008	235.98	0.11	3.93
2006	249,925	6,853	264.60	0.11	3.86
2007	271,875	7,435	305.60	0.11	4.11
2008	291,342	7,916	288.20	0.10	3.64

Nota: Value in million dollars.

Source: My own elaboration with data from Banco de México (2010).

Even when Mexico's position as one of the major producer countries has decreased in recent years, it continues to be an important supplier in the world market. Mexico was the fourth-highest producing country in the 1988-89 harvesting season; however, in the 1998-99 harvesting season, it fell to the position of sixth-highest coffee producer. According to information included in Table 2.2, these changes have occurred not only because Mexico has reduced its total production, but also because other countries such as Vietnam, Ethiopia and Indonesia have increased their production.

Table 2.2. Coffee production by major producing countries (in thousands of quintals).

Country	1988-89		1998-99		2008-09	
	Quantity	%	Quantity	%	Quantity	%
Brazil	29,919	26	47,949	34	59,990	36
Vietnam	1,357	1	9,091	6	20,870	12
Colombia	13,752	12	14,393	10	13,696	8
Indonesia	8,830	8	9,633	7	11,267	7
Ethiopia	3,522	3	3,580	3	8,000	5
Mexico	7,827	7	6,262	4	6,065	4
Total	116,684	100	141,056	100	167,987	100

Source: My own elaboration with information from ICO (2009).

Some of the main indicators of coffee production have changed in the last twenty years. The land planted with coffee orchard was reduced by 9.3% from 1989 to 2008. The production was reduced as well with 23% between during

those years (see Table 2.3). These changes are presented as a result of the reduced maintenance of the coffee plantations and the low incentive to invest in coffee orchards. In fact, 93.7% of the coffee farmers owned less than five hectares of coffee orchard in 1989, while 1.9% of the coffee

Table 2.3. Shifts of some indicators of the Mexican coffee sector from 1989 to 2008.

Indicator	1989	2008	% shift
Number of farmers	276,655	493,497	78.38
Land with coffee (ha)	743,482	674,132	-9.33
Total production (Qq)	7,509,110	5,774,159	-23.10
Average hectares per farmer	2.69	1.37	-49.17
Average yield (Qq/ha)	10.10	8.57	-15.19

Source: My own elaboration with data from INMECAFE (1990) and SIAP (2010).

farmers owned 10 or more hectares of coffee orchard in the same year. This means there were many small-scale and few large-scale coffee growers.

Coffee growers farm their orchards in two basic ways: under the shade of trees and out in the open. Of the total of 776,870 coffee plots in Mexico, 99.8% are under the shade of trees and 0.2% are in the open (SIAP, 2008). Shaded crops such as coffee are important because they generate wood masses, which protect the native fauna; this type of plantations also has a beneficial influence on the water cycle, in conserving environmental conditions, and on the landscape (Marban-Mendoza, 2009). Beside the economic importance, environmental conservation is one of the most important benefits of coffee production in Mexico.

According to the Coffee Census database updated in July 2008, there were around 500,000 Mexican coffee growers, which means that the same number of families depends to a certain degree on coffee cultivation for their sustenance. Together, growers and their relatives (1,053,713 people) who were reported as working in coffee production activities, came to a total of 1,547,210 people directly involved in this crop. Considering the additional people employed in harvesting, processing, and marketing coffee, in Mexico at least three million people depend on coffee for their living. In the largest major coffee-producing states, coffee provides employment to about 50% of the working population of the rural areas (Pérez *et al.*, 2001).

Coffee also has importance in Mexico for its relation to the type of population that works within this sector. Many coffee growers' mother tongue is not Spanish; this means that many coffee growers are indigenous people. Indeed, according to the most recent Coffee Census, 39.7% of the total of Mexican coffee growers speaks an indigenous tongue as their primary language.

Coffee is concentrated in some of Mexico's poorest regions. The major coffee-producing areas are mountainous, have poor communication and limited public services. Around 84% of the communities in which coffee is a primary agricultural activity have high or very high poverty rates. Furthermore, 60% of the Mexican coffee growers lives in extreme poverty, and more than half belong to one of Mexico's 52 ethnic groups (Avalos-Sartorio, 2006a; Pérez *et al.*, 2001).

The total coffee production has been diminishing in the last years. Figure 2.2 shows a total production in Mexico of 4.5 million quintals in 1980. The biggest amount produced under the quota system was reached in 1989, which was higher than 7.8 million quintals. Thereafter, production declined until it reached its lowest level of 4.4 million quintals in

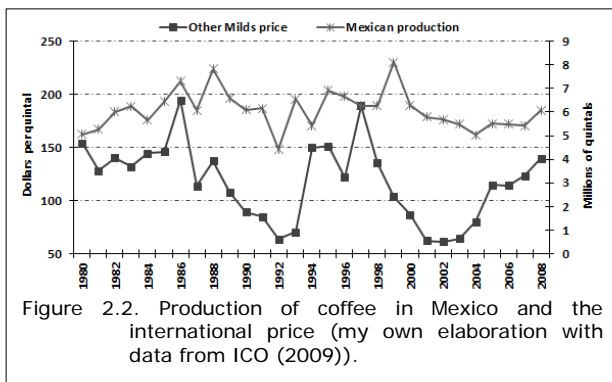


Figure 2.2. Production of coffee in Mexico and the international price (my own elaboration with data from ICO (2009)).

1992. After that, a recovery in the total production was registered, reaching 8.1 million quintals in 1999 and 6 million quintals in 2008. In part, these changes have been positively associated with the development of the international price (Other Milds price).

Coffee prices have been recovering since 2004. The Other Milds price was \$80.47 per quintal in 2004 and \$139.78 per quintal in 2008 (see Figure 2.2). Similarly, the rural coffee price has shown a tendency to rise in recent years; it was \$35.82 per quintal in 2004 and \$89.41 per quintal in 2008. Thus, the differences in those prices were \$44.65 per quintal in 2004 and \$50.37 per quintal in 2008.

Mexican coffee's final destination has changed during the last thirty years. During the nineteen eighties and nineties, most of the coffee was exported while a smaller quantity was reserved for the internal market. The domestic market share of coffee was of 38.8% of the total production in 1980 and 47.3% of the total production in 2008. The lowest domestic market share was registered in 1999, at 18.5% of the total production, while the biggest share was registered in 2008, at 47.3% of the total production.

The export markets for Mexican coffee have also shifted in recent years. For several years, the United States of America has been the primary export destination. This country received approximately 80% of the Mexican coffee exports during the nineteen nineties, but 67% of the exports in 2008. The next largest markets in that year were Belgium and Germany (see Figure 2.3). However, in recent years, increasing

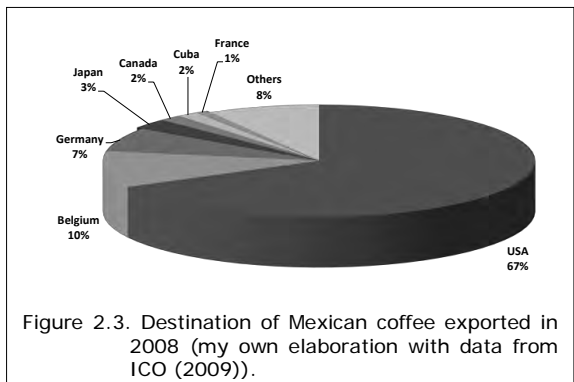


Figure 2.3. Destination of Mexican coffee exported in 2008 (my own elaboration with data from ICO (2009)).

quantities were also sent to Japan, Canada, Cuba and France. Approximately 75% of the coffee exported from Mexico is green coffee, and 25% is soluble and extracted; roasted and ground coffee do not figure in the export statistics (see Figure 2.4).

During the last decade, the world's coffee economy has undergone deep structural changes resulting from an amendment in the international agreement to commercialize coffee. This process put an end to domestic control in several producing and exporting countries. Some of these changes are the shift in stock control from producer

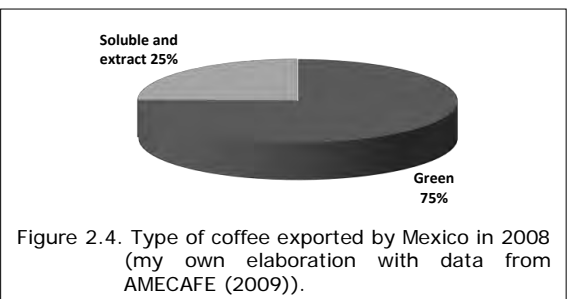


Figure 2.4. Type of coffee exported by Mexico in 2008 (my own elaboration with data from AMECAFE (2009)).

to consumer countries, the increasing concentration of processing and exporting activities in the hands of a few transnational companies, and the creation of new producing regions with a higher

potential and lower production costs (FAO, 2007). Moreover, according to a recent ICO estimation, the total supply of and demand for coffee in the world has been placed around 125 million quintals and the price is about \$125 per quintal of green washed Arabic coffee (ICO, 2009).

### **2.3. Liberalization of the Mexican economy**

At the beginning of the second half of the last century, the agro-alimentary sector in Mexico was subjected to strong protection, which ended in the nineteen eighties. Thus, agriculture, allied services, production, processing, and marketing inputs and outputs were subjected to government regulations. At that time, certain crops which were part of the basic Mexican diet were regulated and maintained by the state institutions, which provided a system of government subsidies on which they depended. This kind of policy also removed the actors' incentive for long-term investing and to look for ways and means of improving their competitiveness and sustainability. At the end of the nineteen eighties, the Mexican government began to withdraw from the agricultural sector and moved toward liberalizing the economy.<sup>12</sup> This was done by providing fewer services to the sector and by allowing the private sector to fill this gap.

In the latter half of the nineteen eighties, the Mexican government began to liberalize the economy. The decision to change from a rigidly controlled economy to a more flexible one was made to comply with recommendations coming from international institutions such as the International Monetary Fund (IMF) and the World Bank (WB). Consequently, governmental organizations linked to the agricultural sector were closed down, although a number of them have been restructured during the last two decades. In summary, the Mexican shift from a more controlled to a free market economy was in line with the overall tendency in world policy; by doing so, the Mexican government reduced their role not only in the rural sector but also in the economy as a whole, making room for private actors (Burger, 2011).

Two major processes were key in the liberalization of the Mexican economy. The first was becoming a signatory of the General Agreement on Tariffs and Trade (GATT) in 1986 and the second was the arrangement of the North American Free Trade Agreement (NAFTA) in 1994. After becoming a member of the GATT, Mexico abolished its import pricing policies in 1987. These liberalization measures also had an influence on many other policies. Thus, privatization and a restoration of several governmental instances took place at the beginning of the nineteen nineties; industries such as steel, sugar, banking, and communication were included in this process.

Another step in the market liberalization was the reform of land tenure legislation, which was carried out in 1992. Article 27 of the Mexican Constitution was modified in order to give property rights to the owners of "ejidal" and communal land. This modification brought an end to land distribution in Mexico and started the creation of a land market without restrictions on the type of ownership. One of the goals of this reform was to capitalize agricultural activities by giving

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<sup>12</sup> The concept of liberalization comes from neo-classical economic theory, which states that a market works better if there is perfect competition. Furthermore, it assumes that perfect competition is possible only if an economy is operating without any outside intervention (Godfrey, 2002).

agricultural producers access to private credit. As a result, ejidal and communal tenants are now able to use land ownership as collateral in the official banking system (Díaz, 2005).

Privatizing the most prominent institutions throughout the entire Mexican agricultural sector meant the end of market restrictions. As mentors of the liberalization had been advocating, this process in the coffee sector signified the end of reserve formation and the end of a minimum price for producers (FAO, 2007). The decision to liberalize and the manner in which the liberalization process was implemented were the typical outcome of a mixture of domestic political pressures, financial imperatives and donor conditions (Gilbert *et al.*, 1999).

As a result of the liberalization and privatization of the Mexican economy, several changes have presented themselves in the price definition and marketing of products. In their turn, these changes have modified both the number of times and the way in which partners in supply chains have been intervening. Those modifications have influenced the structural and institutional changes seceded in the Mexican coffee sector.

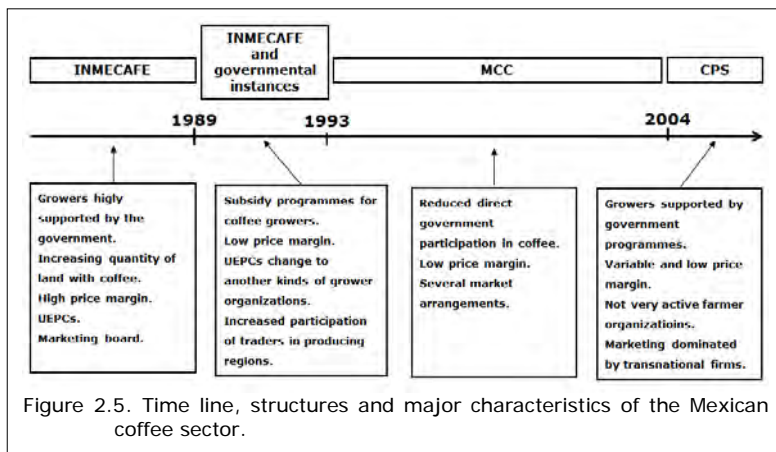
Coffee production generally takes place in isolated areas in undeveloped countries, where the public services are poor and the standards of living and educational levels are low. Under those conditions, coffee farmers only have the option of selling their product to those intermediaries who operate locally. As mentioned before, the liberalization of the market has not always created a competitive environment; under these conditions, a number of processing and exporting companies are normally taking much advantage in comparison to growers and small-scale intermediaries and processors. This in part is a result of the fact that the high costs of processing and exporting creates barriers to entry and difficulties for small-scale processors to remain the owner of their business. In addition to the poor communication in the coffee-producing regions, small- and medium-scale coffee farmers do not have transport facilities to search for better prices in the coffee market further downstream of the chain. As some authors have argued (Milford, 2004; Renard, 1999) an oligopolistic environment has been established in the main producing areas of Mexico.

#### **2.4. Structure and organization of the coffee sector**

The coffee supply chain in particular requires the participation of many economic agents (see Figure 1.1). To better function, these agents need good social and political conditions, which allow them to have optimal market arrangements (Martínez, 1996). Some institutions operating in the Mexican coffee sector are coffee farmer organizations, intermediaries, governments (at the federal, regional and municipal level), the coffee market, the input market, the extension market, the land market, the training market, the technical assistance market, the labour market, the land rental market, universities, research centres, the Coffee Product System (at the federal and regional level), and the formal and informal credit markets. All of these instances and institutions can be grouped into private, public, governmental or rural institutions. As Fafchamps (2004) has said, one important characteristic of the market institutions is that any improvement demands adaptation in the legal environment, to help intermediaries develop better exchange processes.

Following reforms since the nineteen eighties in Mexico, the government's role in agricultural markets (including coffee) has changed substantially. As Avalos-Sartorio (2006a) stated, policymakers expected during the nineteen eighties that the move to a market-based agricultural economy would bring efficiency by better linking domestic and international prices. For this reason, it was expected that the liberalization would benefit producers and consumers by increasing the producer prices and reducing the consumer prices.

The organization of an industry describes the way in which actions undertaken inside the economic system are divided between partners. Some agents engage in many different activities, while others engage in few. Depending on their economic capacity and their interest, some agents are large and others are small; some agents are working in only one area of the supply chain, whereas others are working in many stages of the supply chain. What we expect to understand from studying this kind of organization is how the industry was organized in the past, how it is organized now, what the main differences and benefits are in each kind of organization, which forces caused the changes to happen behind each one, and how these forces have changed over time (Coase, 1988). We will analyse each of the structures (see Figure 2.5) prevailing in recent years in the Mexican coffee sector, by looking at the influence of the institutional environment on the reduction of transaction costs, on the redressing of missing markets, on building social capital, on managing risk and enabling collective action.



Apart from associations of various types and non-profit organizations, which in some cases are firms, there are also a number of governmental instances that assume some economic role, and many of these roles are of great importance. As Coase (1988) has stated, these kinds of agents should be part of the institutions dealing with industrial organizations, so it is very important to describe the economic activities undertaken by any governmental instances and/or associations. Also, an explanation of the type and combination of activities developed by private and public agencies is very important when analysing the structure of the supply chain.

Many agents are involved in the coffee sector. Some of the most important participants in the coffee supply chain are ministries and national government organizations, federal and state councils, private associations, research and extension institutes and centres, non-governmental organizations (NGOs), government instances (at the federal, regional and municipal level), business organizations (processors and exporters), grassroots grower organizations and farmer cooperatives. Other private agents participate indirectly in the coffee sector as well by providing services such as credit, transport and technical assistance.

Between the nineteen fifties and the nineteen eighties, intervention in commodity markets relied on the stabilization of prices and export earnings by implementing multilateral agreements. This type of policy was addressed between 1954 and 1989 in a number of International Commodity Agreements (ICAs). These agreements applied to five products: sugar, cocoa, coffee, rubber and tin (Newman, 2009). As has been mentioned by some authors (Calo and Wise, 2005), in the case of coffee, subsequent attempts by producing countries to control the international market were made in 1993 and 2000, but were unsuccessful. Thus, since 1989, the ICAs have not incorporated economic clauses to regulate the international coffee market.

The coffee sector in Mexico was regulated by the INMECAFE until 1989 (see Figure 2.5). As part of its closeness to the main government institution participating in coffee, the transfer of INMECAFE's assets to farming organizations and its functions to other governmental instances to better service the coffee sector started in 1989. Under the ICAs, the institute coordinated all programmes and activities focused on the coffee sector; the institute also coordinated the agents (producers, producer cooperatives, processors, roasters and exporters) involved in the supply chain. Now the number of participants working in coffee is larger on the upstream side of the supply chain than it was during the quota era; on the other hand, a lower number of partners is observed in the downstream side of the supply chain at the national level than it was in the former structure. According to CMC (2005) and AMECAFE (2009), 440 intermediaries were registered in 2005 and 1,035 in 2009. Indeed, many of them are working in the upstream side and few of them in the downstream side of the coffee supply chain.

One group of participants in the coffee supply chain are the intermediaries. They can either be individuals or a company integrated by several investors. This group of partners includes local collectors, processors, retailers and exporters. Although it is now permissible for anybody to trade in coffee, in the last six years it has become compulsory for everyone to be registered in the national coffee system, run by the Mexican Coffee Association (AMECAFE). This requirement has been set up to operate the Stabilization of Coffee Pricing Fund (SCPF) and to better organize the coffee sector. According to this process, a registration number is allocated to each intermediary, which allows him or her to bill any coffee supplier. This registration also obliges intermediaries to declare to the Mexican Ministry of Finance any profit they make while transacting coffee.

In recent decades, some growers' organizations have emerged. Many of the producer grassroots organizations and farmer cooperatives have been working to create a balance between processing and exporting companies. Furthermore, some producer cooperatives in Mexico have been playing a

crucial role in the development of small farmers and in gaining access to domestic and export markets. The supported cooperatives are more focused on organic and fair-trade coffee. Also, through this participation, these kinds of farmer cooperatives have been granted credit and funding from some international companies and also receive economic support out of the government budget (Varangis *et al.*, 2003). According to data from a recent National Coffee Census, 11% of all coffee producers are member of a cooperative.

The type of coffee sold by producers varies from region to region. Coffee farmers sell either cherry, parchment, or natural dry coffee; although in some cases, depending on the natural conditions and the farmer's wealth, they may sell a combination of these types of products.<sup>13</sup> When farmers sell cherry coffee, delivery to a processing plant must take place within 24 hours of harvesting, to prevent post-harvest damage and maintain the quality. In addition, to ensure quality, processors have to maintain a widespread distribution of local collectors over the coffee-producing areas. Thus, local collectors purchase cherry coffee during the day and deliver it to the processing plants at night. After the coffee reaches the wet processing plants, it is processed into parchment coffee. Following the chain, parchment coffee can either be stored or sold on to the next stage (see Figure 1.1). A number of wet processing plants have their own dry processing plants; in this way, wet processors can get green coffee before it is roasted. Therefore, the type of coffee sold by farmers depends to some degree on the weather conditions, the farmers' endowment, and the level of support farmers have been receiving.

Coffee can be purchased and processed by farmers' cooperatives. Grower organizations can engage either in humid or dry processing, or both. Their characteristics are mainly the result of their environmental conditions and the volume produced at their particular location. The statistics show that 90% of the total Mexican production undergoes humid processing, whereas the remaining 10% undergoes dry processing procedures (ICO, 1999).

## **2.5. The past institutional arrangement**

The International Coffee Agreements (ICAs) have been set up by the International Coffee Organization (ICO), the organization that liaises between producing and consuming countries. Until 1989, it imposed export quotas in order to raise the price at which member exporter countries sold coffee to member importing countries; the latter accepted that consumers pay a higher price to benefit coffee growers in developing nations. Importing countries included in these agreements represented approximately 90% of the total coffee import market. Export countries represented over 99% of the total export in the last agreement, which included the economic clauses (Bohman and Jarvis, 1999). The ICAs, with their economic clauses, became more effective in 1980 when, in addition to the export quotas, the value of stock in producing countries was also included. Thus, importing countries indirectly financed the storage of coffee in producing nations (Calo and Wise, 2005).

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<sup>13</sup> Cherry coffee is the fruit of the coffee trees without any processing; parchment coffee is the green coffee bean contained in the parchment skin; and natural dry is the product obtained by dry processing the fruit (cherry coffee is dried without removing the skin).



The economic clauses of the ICAs established a target price range, which was a weighted average of different types of coffee, and set a global export quota to achieve the desired price. By consensus, each exporting country received a portion of the global export quantity. In the last years of operation of the quota system, the international coffee prices were set from \$1.20–1.40 per pound of green coffee. When prices fell below the target range, the quota were cut in order to reduce the supply at that time and to push the international coffee price up. On the other hand, if prices remained higher than the top price for more than 45 days, exporting countries were allowed to boost the quantity exported until prices went down to the defined level (Bohman and Jarvis, 1999). Even when several problems arose in this system, analysts generally agreed that the system was successful in raising the coffee price for producing countries and stabilizing prices in the world market (Ponte, 2002).

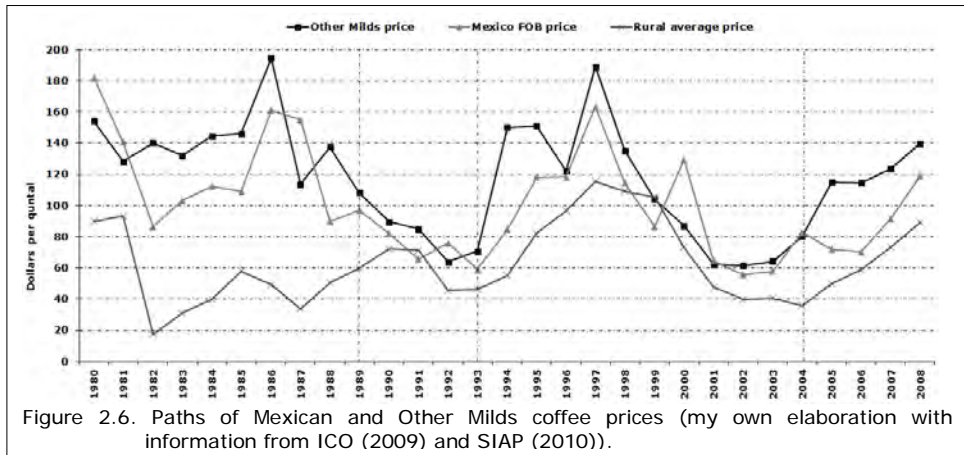
The first ICA was signed in 1962, after which it was renewed at approximately six-year intervals until 1983, when the last one was signed. Negotiations to renew agreements to control the international coffee supply could not take place until July 1989, when the final contract expired. The agreements were not renewed because of competing interests within exporting and importing countries; hence, international control has not been implemented since then (Bohman and Jarvis, 1999).

In the case of Mexico, the INMECAFE was formed in 1958, in preparation for compliance with the economic clauses included in the ICAs. The functions of this institute were researching, planning the coffee development, providing incentives to coffee-producing regions, giving credit to small- and medium-sized coffee growers (those with less than 20 hectares), buying and selling coffee on the domestic and external markets, operating storage facilities, processing coffee, and managing the federal budget allocated to coffee (Martínez, 1996). In addition, in the nineteen eighties, the INMECAFE was given the responsibility to manage the export quotas and other fiscal attributes (FAO, 2007).

Comparing the rural average coffee price with the fob price, in Figure 2.6 we can see that the differences were relatively large during the nineteen eighties. This means that coffee growers did not directly receive the possible benefits of high fob prices. Who actually received the benefits coming from this difference is a question that needs to be answered. Part of the difference in those prices was caused by the storage costs spent to manage all the regulations at the domestic level and to cover the administrative procedures demanded by the regulations. Other elements that may explain the margin were the domestic and export tax payments.

According to Díaz (1996), INMECAFE owned 50 humid processing plants and 27 dry processing plants during the 1986-87 harvesting season, which represented 10% of the total processing capacity at that time. A total of 3,517 small-scale buyers, 597 medium-scale buyers, and 108 exporters were registered at the end of nineteen seventies. Nearly 92% of coffee buyer centres were operated by national investors and the rest by external investors (Nolasco, 1985). Even when it had been reported that the purchasing and processing activities of the institute were of very high

importance, its processing capacity was not high enough to compete against the private sector (Martinez, 1996).



During the nineteen seventies and eighties, the INMECAFE, as the representative of the government position, was the conciliator of the three major actors participating in the coffee sector: producers, processors and exporters (Martinez, 1996). The institute was responsible for applying and supervising all the regulations coming from the international agreements and the national settings aimed at controlling the coffee market. The INMECAFE managed to export 40% of the total amount of coffee exported by Mexico in the 1981-82 harvesting season. Thus, it replaced many traditional intermediaries (Akaki and Huacuja, 2006).

Although the amount of land farmed with coffee increased over the quota system period, the number of Mexican coffee growers did not increase during the final decade under the ICA; the number of producers was 276,655 in 1989. In part as a response to the production philosophy associated with the Green Revolution, the total production reached its highest level of close to eight million quintals in the 1988-89 harvesting season. Accordingly, during the nineteen seventies and early eighties, large quantities of INMECAFE resources were allocated to standardizing and increasing the coffee production; the government did that through the diffusion of new coffee varieties produced in INMECAFE nurseries, the introduction of non-native shade species and the promotion of the frequent use of commercial fertilizers (Santoyo *et al.*, 1994; Wehbe *et al.*, 2005).

A notable increase in private investments occurred as well in the second half of the nineteen seventies. As Martínez (1996) has argued, that increase occurred in response to high international prices and government subsidies granted to the coffee sector. During the controlled period, it was economically acceptable and not restricted to any producer to convert land into coffee orchards. However, later on this led to an overspecialization and economic overdependence on coffee by many producers, producers' families and communities (Marban-Mendoza, 2009). Nevertheless, the highest increases in land cultivated with coffee in the last two decades of the INMECAFE era

happened on land without suitable environmental conditions to produce coffee of a good quality (INMECAFE, 1990).

Under the quota system, coffee had to be in storage until exporter firms received authorization from the institute's inspectors to proceed with the exportation of the product. To define the quota assigned to each exporter, a Marketing Committee was formed by representatives of several government institutions: the Bank of External Commerce, the INMECAFE and the producer organizations in place (CMPC, CNC, CNPP), as well as processor and exporter organizations (ANACAFE, CANACINTRA, AMEC, and BECAMEX) (Martínez, 1996).<sup>14</sup>

According to some authors (Giovannucci and Juárez, 2006, Lewis, 2005), INMECAFE regulated the domestic market by instating a minimum coffee price during all harvesting seasons and by buying and processing coffee. The institute's participation as collector and processor was very important. The INMECAFE had 750 centres for purchasing coffee throughout the coffee-producing regions in 1989 (Martínez, 1996).

The technology of coffee production that was promoted during the quota period encouraged some coffee-producing communities to specialize in coffee. Indeed, INMECAFE was the primary source of coffee research and extension services (Nolasco, 1985). By following the institute's instructions, coffee growers secured credit and other services to produce coffee (Eakin *et al.*, 2006). Hence, this crop was considered one of the best agricultural options for many communities at that time.

The relatively high and stable prices produced a strong expansion in land cultivated with coffee between 1970 and 1989. Additionally, there was a huge domestic promotion of coffee production by the Mexican state (Calo and Wise, 2005); all the services and supports provided by the institute produced enough economic incentive for producers to expand or to start

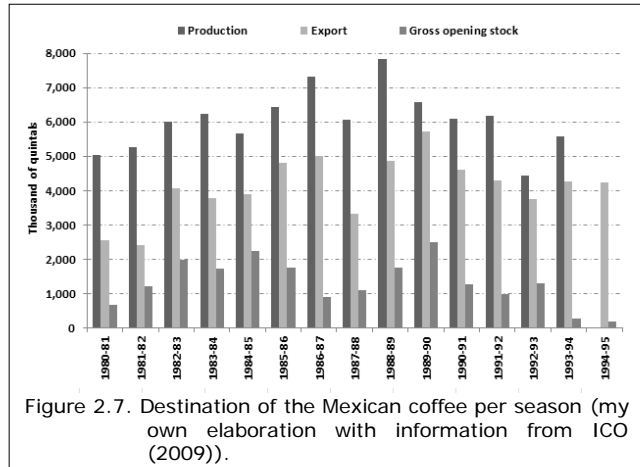


Figure 2.7. Destination of the Mexican coffee per season (my own elaboration with information from ICO (2009)).

the coffee production that increased the total production (see Figure 2.7). As a consequence, the Mexican coffee production grew at a yearly rate of 3.8% from 1970-71 to 1988-89. The same period showed an increase of 2.9% of the total land farmed with coffee (Díaz, 1996). The amount of coffee available in Mexico exceeded the demand in the final years of the quota system; the initial

<sup>14</sup> The Mexican Confederation of Coffee Producers (CMPC), the National Peasants' Confederation (CNC), the National Confederation of Small Producers (CNPP), the National Association of Coffee Industry (ANACAFE), the National Camera of the Transformation Industry (CANACINTRA), the Mexican Coffee Exporters' Association (AMEC), and the Mexican Processing Plants (BECAMEX).

gross stock was 1.7 million quintals in the 1988-89 harvesting season and 2.3 million quintals in the 1989-90 harvesting season.

During the quota period, the government's main effort was devoted to small- and medium-sized coffee growers. It has been reported that over 157,799 producers were technically assisted by INMECAFE during the nineteen eighties; this number represented 85% of the total number of coffee growers existing at that time; these farmers owned 76% of the total land cultivated with coffee in Mexico (Santoyo *et al.*, 1994; Villaseñor, 2004). Therefore, after the institute stopped functioning, the most affected actors were those producers who were suddenly exposed to the intermediaries and private service providers (CNOPC, 2007).

After 1989, rather than directly intervening in the coffee market, the Mexican government developed a diverse array of programmes to support the coffee production and to smooth the effects of the coffee crisis (Eakin *et al.*, 2005; Pérez *et al.*, 2001). The first programme implemented during this period was the Special Programme to Support Coffee Production. This programme was designed to be in operation from 1989 to 1992; it was implemented under the agreement signed between grassroots farmer organizations and the Mexican government. Its main aim was to try to find an immediate solution to the critical situation prevailing in the coffee sector. Through this programme, the government provided credit to those coffee growers who owned more than 10 hectares of coffee orchards and who were able to pay back credit loans. Other support included in this agreement focused on helping farmers with maintenance and harvest costs. Unfortunately, those initiatives were unsuccessful because the production costs exceeded the coffee prices at that time (Avalos-Sartorio, 2006a).

Even through those programmes, the main funding supporting the coffee sector was the National Solidarity Programme (NSP), which started in 1992. Its budget was derived from the National Development Programme (NDP), implemented in Mexico from 1989 to 1994. The NDP's overall aim was to reduce extreme poverty. The NSP targeted indigenous communities and peasants with a low income (Martínez, 1996). Furthermore, at the beginning of the nineteen nineties, the solidarity programmes were the main source of fresh capital for small- and medium-scale coffee growers. This support aimed at providing credit and supporting the harvesting and marketing activities. The total amount used in these initiatives was 6.5 million Mexican pesos in 1990-91, 81.8 million in 1991-92, 140 in 1992-93, and 223 in the 1993-94 harvesting season. Although this programme was designed for refunding, only around 40% of the total amount was given back by producers (Nolasco, 1985).

It is estimated that the total amount the government allocated to support for the coffee sector was \$331.85 million from 1989-90 to 1993-94 – an average of \$66.37 million per season – (Martínez, 1996). This support was given to around 250,000 coffee farmers who had been hit by low coffee prices (Coffee & Cocoa, 1992). Nonetheless, most of the programmes developed from 1989 to 1993 were considered subsidies and not credits (CNOPC, 2007).

With the free domestic coffee market and the Mexican border open, foreign investment in coffee increased. As a result, several companies owned by national investors broke down, and many companies linked to the transnational firms started to work in the upstream of the coffee supply chain. They invested around \$28.9 million in 1989, \$90 million in 1990 and \$209 million in 1994 in processing capacity (UGST, 2006). In consequence, the coffee market started to be dominated by large-scale firms such as AMSA (Atlantic coffee), Becafisa (Volkafe), Far-Man, J. Aron, Rothfos, Mercon, Tardivat, Omnicafe, and Cafés California (Neuman) (Santoyo *et al.*, 1994). However, because of various difficulties in providing support to coffee producers and the high variation of international coffee prices, some international firms that initially invested in several coffee-producing regions withdrew from the coffee sector (Avalos-Sartorio, 2006b; Santoyo *et al.*, 1994).

During the quota system era, some intermediary associations were also operating. The Mexican Association of Coffee Exporters (AMEC, by its initials in Spanish) was established in 1949 and incorporated large-scale producers and exporters. The National Association for the Coffee Industry (ANACAFE, by its initials in Spanish) was founded in 1979. These groups of industries emerged with the aim to represent the Mexican coffee firms collectively. The ANACAFE is an association of large-scale producers whose plantations are vertically integrated. They also are processors integrated with farmers and medium- and large-scale collectors (Martínez, 1996).

The coffee export became very concentrated after the dissolution of INMECAFE. From 1989 to 1992, the modifications in the coffee supply chain shifted the advantage to larger international firms. National investors and processors were hampered by their limited access to funds, while international companies had access to vast amounts of funds. Fifteen large-scale companies exported 40% of the total Mexican export, while 89 small-scale enterprises (some of them owned by small-scale producer organizations) exported 15% of the total exported at the beginning of the nineteen nineties (El Café, 1992). Therefore, the industry transformed into an oligopolistic structure headed by a small number of transnational firms.

At the end of the nineteen eighties and the beginning of the nineteen nineties, commercial banks limited credit to those medium- and large-scale coffee farmers who were well known to the bank and who had proven to have sufficient income to classify as low-risk credit applicants. Other possible sources of credit were informal lenders, initial payments from processors, and some credit unions. Aware of this situation, a number of exporters also gave economic support to some national processors, enabling them to operate their machinery. This was done in exchange for receiving coffee at a low price. Other exporters set up various kinds of associations with national processors to reach the same objective. Thus, collecting, processing and exporting were highly concentrated in the hands of large-scale firms with external funds (Santoyo *et al.*, 1994).

The INMECAFE organized coffee farmers in UEPCs to facilitate its work. These were groups of at least ten small-scale coffee farmers, who began to work jointly to develop various coffee activities; this organization started in 1973. Through these groups, the institute provided input, technical assistance and partial payment in advance for the coffee (Giovannucci and Juárez, 2006). These economic units were basic to the structure. They had access to the market, which enabled them to

reduce transaction costs. At the end of the institute's term there were 3,228 UEPCs, which included 85% of the total number of coffee farmers existing at that time (Renard, 2008).

In addition to the UEPCs, medium- and large-scale coffee growers were integrated in the National Confederation of Rural Producers (CNPR, by its initials in Spanish) and the Mexican Coffee Producers Confederation (CMPC, by its initials in Spanish); the CMPC was constituted in the nineteen fifties. In general, farmers included in the CNPR and CMPC had small businesses. Furthermore, the National Union of Autonomous Regional Peasant Organizations (UNORCA, by its initials in Spanish) was also operating in the nineteen seventies (Martínez, 1996).

During the 1989–1993 period, a transformation of the farmer organizations occurred. Almost all of the UEPCs either disappeared or were transformed into the Solidarity Social Society (SSS, by its initials in Spanish), the Rural Production Society (SPR, by its initials in Spanish) and other kinds of grower cooperatives. These latter kinds of organizations had a legal right to get credit. Some other economic units were reorganized into the Local Solidarity Committee, which was entitled to funding from the solidarity programmes operated by the Ministry of Development. Unluckily, few of those committees did actually function. Many of these groups were participating in one of the main twelve coffee growers' grassroots organizations existing at the start of the nineteen nineties (Santoyo *et al.*, 1994). Indeed, around 190,000 of the total of 280,000 growers were participating in one of the grassroots organizations in 1992 (FAO, 2007).

The closeness of INMECAFE and the coffee crisis, which started in 1989, forced the emergence of many grower organizations. In part, this process was initiated by the National Coordinator of Coffee Organizations (CNOOC, by its initial in Spanish), which represented 54 regional producer organizations with more than 50 producers each in 1990. These cooperatives were marketing around 15% of the national production (Díaz, 1996). CNOOC was a union that included regional autonomous organizations of small coffee producers who cultivated an average of two hectares.; It emerged as an independent organization in 1989 (SAGARPA, 2005). The CNOOC represented the interests of the independent coffee sector in negotiations with the government, providing information and coordinating strategies in processing and marketing the product. This organization represented almost 70,000 small-scale coffee producers (about 35% of the national total number) at the beginning of the nineteen nineties (Giovannucci and Juárez, 2006; Pérez *et al.*, 2001).

The federal government developed a programme to increase the producer cooperatives' participation in the export issue at the end of the nineteen eighties; this programme targeted the advisory leaders, linking producer cooperatives with buyers and promoting contract arrangements (INMECAFE, 1990). One of the difficulties faced in this programme was that small- and medium-scale growers had no information on the global coffee prices and had no knowledge of how domestic prices were set. For this reason, many cooperatives were unsuccessful in this respect.

In response to the end of the economic clauses of the ICAs, the closing of INMECAFE was decided in 1989. During the following three years, public sector intervention in the Mexican coffee sector was limited. Much of the institute's infrastructure was transferred to various UEPCs and other

farmer cooperatives (Avalos-Sartorio, 2006b). Various grower groups received warehouses and processing plants at reduced prices, and the majority of these were payable over ten years (Pérez *et al.*, 2001). It was not easy for small-scale producer organizations to handle the infrastructure they received; the large-scale processing plants required consolidated groups with a high production level besides the necessary capital (SAGARPA, 2005).

The controlling and leading role that INMECAFE had played suddenly ended after 1989. The closure of the institute came as a surprise for many people involved in the coffee industry. The greatest impact this event had was caused by the fact that it occurred during a period of lower coffee prices. Coffee farmers had been accustomed to receiving support from the government through INMECAFE for more than thirty years; thus, they were unprepared to face the new conditions.

The end of the ICAs and the reduction of the institute's activities brought about a number of reactions in the international and domestic coffee markets. As soon as the international agreements to commercialize coffee broke down, an oversupply was presented, and high quantities of coffee were sent onto the international market. This produced a large reduction in coffee prices. Under this condition, the prices also became very volatile (Wehbe *et al.*, 2005). Besides, in a free coffee market, the prices are not only set by the supply and demand but also by an oligopolistic scenery.

## **2.6. The institutional structure of the Mexican coffee sector from 1993 to 2004**

As a representative organization of the coffee sector industry, the Mexican Coffee Council (MCC) was created in June 1993, and it was abolished at the beginning of 2004. The major participants in the coffee sector at the national level were part of this council. Members of the council were drawn from the Ministry of Agriculture, the Ministry of the Economy, the Ministry of Social Development, the Ministry of Finance, representatives from the state government of each of the major coffee-producing states, representatives from industry producer organizations (CNC, CAP, CNPR, CNOC and CMPC) and from associations and trade organizations vested in the coffee industry (ANACAFE, AMEC and CANACINTRA) (Pérez *et al.*, 2001).

The MCC was an autonomous civil association with a legal presence. Additionally, regional councils were created in the main coffee-producing states. Although decentralized from the state governments, governors of producing states took control of those councils through various services and by directly operating programmes. Working with SAGARPA and ASERCA at the state level, these state councils could function in several ways to respond flexibly to the price crisis of 2001–2004, to obtain the needed machinery quickly, and to carry out the coffee market policies (FAO, 2007).<sup>15</sup> Together with the state councils, the MCC formed the primary structure through which all

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<sup>15</sup> The Ministry of Agriculture, Rural Development, Fisheries and Food (SAGARPA, by its initial in Spanish) is a government office devoted to head the agricultural sector. It plays a regulatory role in the general policy of rural development, the formulation and approval of budgetary resources, and in controlling and following up on the results of programmes that comprise the coffee policy. Recently, it has been responsible for convening the string operators to form the CPS. At an operational level, this instance also participates in the distribution of budget in some states, using its territorial structure of Rural Development

the partners involved in the Mexican coffee industry could discuss and negotiate policies and programmes related to this sector. The MCC represented the coffee industry at the national and international levels until 2004. Under this structure, the federal and state governments and the grassroots organizations were key to the definition of public policy in the coffee sector (Giovannucci and Juárez, 2006; Pérez *et al.*, 2001).

The MCC emerged as the body to lead production and policies for the coffee industry in Mexico. The MCC's objectives were to design programmes to increase productivity in the coffee sector; to drive the development of technology, to promote the organization of coffee producers, to better position Mexican coffee in the international market, to represent the interests of Mexico at international forums, and to coordinate all parties involved in the Mexican coffee industry (Martínez, 1996). Consequently, the MCC took a counselling role and thus substantially reduced direct government participation in the coffee sector (Giovannucci and Juárez, 2006).

Some of the activities developed by INMECAFE were also carried out by the MCC. The MCC started to be a technical agent in 1996; it means that this council was responsible for the direct operation of the major programmes supporting coffee (FAO, 2007). Nevertheless, this council did not take on several public services that were previously provided by the institute, such as extension, research, and technology transfer. Therefore, from 1993 on, many gaps left by the former structure had been taken over by other public and private institutions (Giovannucci and Juárez, 2006). The MCC was created not only based on government interest, but also based on the ideas and participation of other partners in the supply chain, including producers and exporters (Coffee & Cocoa, 1993).

The gap in technical assistance for growers left by the INMECAFE was not covered by the public and private sectors. In 1998, the Mexican government contracted 539 technicians specialized in coffee to assist coffee farmers who owned less than 10 hectares. This service benefited 131,472 coffee farmers (nearly 50% of the total at that time), but in 2002, these technicians became the subject of a phased privatization. After that, the rules were that coffee farmers had to gradually cover the technicians' salaries, starting with a payment of 25% of the technicians' salary in the first year, 50% in the second year, and so on. The belief was that the coffee farmers receiving these technical services would be earning enough to cover the remuneration. Unluckily, this plan was unsuccessful because many coffee farmers did not earn enough to pay for the service, due to market uncertainty and a low coffee price.

Various government programmes were developed during the MCC period to smooth the difficulties created by the price crisis. After the emergence of the armed movement in Chiapas (which itself was attributed in part to the low coffee prices), the Mexican government announced two

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Districts (DDRs, by its initial in Spanish) and Rural Development Centres (CADER, by its initial in Spanish). The role of Support and Services for the Marketing of Agricultural and Livestock Products (ASERCA, by its initial in Spanish) in the recent coffee policies has been to design, organize and integrate the National Coffee Census, which nowadays supports not only the operation of the Stabilization of Coffee Pricing Fund, but also the development of systematic planning exercises for the formulation of plans and programmes. In addition, ASERCA has played a decisive role in the introduction of the Price Coverage Programme since 2005.



programmes to support the coffee sector on 1 January 1994. These programmes were in operation during the harvesting seasons of 1993-94, 1994-95 and 1995-96. One programme provided direct financial support to growers with at least four and up to ten hectares cultivated with coffee, by giving them 700 Mexican pesos per hectare.<sup>16</sup> The other programme directly supported farmers with more than ten hectares planted with coffee, by giving them a maximum of 4,500 Mexican pesos per producer (Santoyo *et al.*, 1994).

Other important programmes that were developed from 1994 to 2000 were the Promotion of Coffee Production, Training and Extension, Support for Rural Development, and the Temporary Employment Programme (see Table 2.4). From 2001 to 2003, still more programmes were developed to support the coffee sector. Among the most important were the Productive Retraining and Coffee Development, Productive Projects, the Stabilization of Coffee Pricing Fund, Catalysing Coffee Production and the Special Support Fund for Investing in Coffee (Akaki and Huacuja, 2006).

The Stabilisation of Coffee Pricing Fund programme provided support to producers to a maximum of \$20 per quintal sold (for less than 20 quintals per hectare) when the international coffee prices dropped to less than \$70 per quintal. The total budget of this programme has not been used entirely because several producers did not meet the requirements established for this initiative (Akaki and Huacuja, 2006). Indeed, in an evaluation done by the FAO (2007), 30% of the interviewed coffee growers affirmed that if this programme had not been in place, they would no longer be producing coffee. In recent years, the amount spent by supporting coffee programmes has been greater than a yearly average of \$100 million.

The concentration of power in the hands of transnational actors created a buyer-driven supply chain in which producers, local traders and governments were marginalized in the decision making regarding coffee (Ponte, 2002). According to some scholars (ICO, 1999; Pérez *et al.*, 2001), there were 230 coffee exporters working in Mexico during the 1997-98 harvesting season, but 15 transnational companies shared 67% of the total coffee exported by Mexico at that time.

Table 2.4. The Mexican budget for programmes supporting the coffee sector from 1996 to 2003 (current millions of dollars).

Programme	1996	1997	1998	1999	2000	2001	2002	2003
Promotion of coffee production	10.61	9.91	11.97	10.57	17.97			
Training and extension	0.69	0.60	1.87	3.99	3.70			
Support for rural development	2.42	1.05	2.67	1.95	4.22			
Temporary employment Programme			8.66	12.47	13.03			
Productive retraining and coffee development								27.13
Fund of investment and capitalization (FINCAS)								1.23
Productive projects (wet and dry processing and others)						12.43		
Promotion of coffee consumption						1.93		10.03
Control of coffee bid						0.54	0.58	0.51
Coffee census								3.53
Training						6.82		
Stabilization of coffee pricing fund							111.84	81.62
Withdrawal of lower quality of coffee							2.15	0.04
Catalyzing coffee production						30.32		
Special support fund for investing in coffee							38.29	
<b>Total</b>	<b>13.73</b>	<b>11.56</b>	<b>25.18</b>	<b>28.97</b>	<b>38.93</b>	<b>90.33</b>	<b>118.10</b>	<b>120.55</b>

Source: My own elaboration with data from SAGARPA (2009) and Giovannucci and Juárez (2006).

<sup>16</sup> In 1994, a dollar was equal to 3.50 Mexican pesos.

The market was dominated by a few multinational coffee roasters during the the MCC era. The most influential transnational companies operating in Mexico were Far-Man, J. Aron, Rotphos, Becafisa, Omnicafe, AMSA, Sara Lee, Nestlé, TIASA and Expogranos (Akaki and Huacuja, 2006; Giovannucci and Juárez, 2006; Pérez *et al.*, 2001). Those companies exerted considerable control in collecting and marketing coffee in producing regions. Since the nineteen nineties, the majority of the dry processing plants had been owned by the ten largest companies. They had control of 63% of the total exports during the nineteen nineties, while 197 smaller enterprises, some of them owned by smallholder and producer cooperatives, had control of the remaining 37% of the total export (Pérez *et al.*, 2001; Giovannucci and Juárez, 2006). Thus, the intermediation grew, and the only option that many coffee growers had was to sell their product at the price fixed by the exporters in each producing region (Santoyo *et al.*, 1994).

Even with the various programmes supporting coffee, there is no clear evidence of a recovering yield and production. The average yield dropped from 10.6 quintals per hectare in 2000 to 7.5 quintals per hectare in 2008 (see Figure 2.8) (Akaki and Huacuja, 2006; SIAP, 2010). In accordance with the information of SIAP (2010), during the 1993–2003 period, the total production in Mexico was registered as between 5.4 and 8.1 million quintals. The highest level was registered in 1999 and the lowest in 2003.

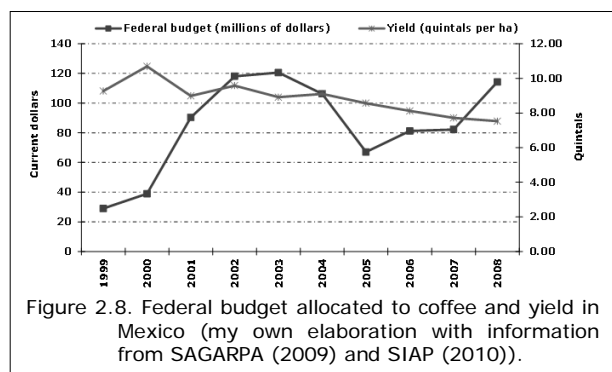


Figure 2.8. Federal budget allocated to coffee and yield in Mexico (my own elaboration with information from SAGARPA (2009) and SIAP (2010)).

The primary exporting borders and how coffee was exported changed over the second half of the nineteen nineties. This was in part as a result that many national investors working in the coffee industry disappeared from the market at the end of the nineteen nineties. After that, the most important brokers went into various producing regions and changed the borders they use to export the product (SAGARPA, 2005; Nolasco, 1985).

Table 2.5. Border from where the Mexican coffee was exported.

Border	1996		2008-09	
	Volume (quintals)	%	Volume (quintals)	%
Veracruz, Veracruz	1,407,620	23.57	2,145,373	59.28
Nuevo Laredo, Tamaulipas	4,207,210	70.44	1,258,562	34.78
Manzanillo, Colima	1,491	0.02	88,098	2.43
Ciudad Hidalgo, Chiapas	8,408	0.14	31,454	0.87
Mexico, D.F.			30,289	0.84
Lázaro Cárdenas, Michoacán			12,070	0.33
Toluca, Estado de México			11,353	0.31
Mazatlán, Sinaloa			10,531	0.29
Mexicali, Baja California Norte	27,034	0.45	10,045	0.28
Tijuana, Baja California Norte	26,546	0.44	6,410	0.18
Subteniente López, Quintana Roo			5,159	0.14
Matamoros, Tamaulipas			3,629	0.10
Salina Cruz, Oaxaca	282,377	4.73	2,663	0.07
Others	11,735	0.20	3,510	0.10
<b>Total</b>	<b>5,972,421</b>	<b>100.00</b>	<b>3,619,148</b>	<b>100.00</b>

Source: My own elaboration with data from SAGARPA (2005) and AMECAFE (2010).

The bulk of the Mexican coffee had been exported through commissioners located on the Nuevo Laredo border. As we can see from Table 2.5, Nuevo Laredo was the most important border from

which coffee was exported in 1996. It accounted for more than 70.4% of the total export in that year. The second most important one was the Veracruz border, from which 23.6% of the total coffee export took place at that time.

## **2.7. The current institutional arrangement**

Currently, the Coffee Product System (CPS) is the organization in charge of this industry at the national and state level. The CPS has been the IRO in place since 2004.<sup>17</sup> It was created as a result of the Sustainable Rural Development Law, which made it mandatory for primary crops to be thus organized. Although the law was passed in 2001, the CPS was not established until years later. The delay in the CPS's creation was because the Mexican Coffee Council and state Coffee Councils were already operating. The CPS's main goals are to synchronize public policy and coffee programmes with the participation of all the partners of the coffee chain. Additionally, one of its functions is to represent the coffee industry at the national and international level.

The Mexican Coffee Association (AMECAFE, by its initials in Spanish) was created with a direct link to the CPS, providing it with the legal capacity to receive and apply the budget assigned to the coffee sector. The AMECAFE is a non-governmental organization; it is financed with its own resources, which mainly come from one share of the programmes it supervises. This institution is a civil association that operates with representatives of the main partners in the coffee industry (AMECAFE, 2010).

The CPS and AMECAFE have been the direct substitute of the MCC since 2004. They are charged with the implementation of all the legislative and governmental regulations related to coffee. They are also responsible for supervising almost all of the federal programmes that support the coffee sector. Both instances are headed by the same person (AMECAFE, 2010).

The integration of the CPS and AMECAFE led to the configuration of the new institutional framework outlined in the Rural Development Law. With this process, several functions were transferred from the MCC to the CPS/AMECAFE, including the responsibility to act as a technical agent (FAO, 2007). The creation of the CPS at the federal level has also been followed by the creation of a similar structure at the state level. In some cases this has been done by abolishing the existing state council and instituting the CPS in its place, and in other cases by creating the CPS as a collateral body of the former state council.

Since the demise of the INMECAFE, the government has reduced its research and technical assistance in the coffee sector. Currently, one of the main research centres for the Mexican

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<sup>17</sup> A product system is the sharing of elements and concurrent agents of productive processes of an agricultural product, including the provision of technical equipment, inputs and services to the primary production, collection, transformation, distribution, and marketing (Article 3, Section XXXI of the Sustainable Rural Development Law).

agricultural sector is the INIFAP, but it has conducted few research projects on coffee.<sup>18</sup> Research on coffee has also been done by the ECOSUR, UACH, CP and UNAM.<sup>19</sup> These institutions have provided technical assistance, advice and skills to technical assistants and coffee farmers, but not to the same degree as the INMECAFE. Other gaps in this respect are being covered by the private sector through individual advisors, groups of advisors, NGOs and coffee firms, but few farmers can afford the cost of these services. Even though technical assistance is very important in coffee production, as it is in other crops, only 9.6% of the total number of coffee farmers included in the recent National Coffee Census reported to be receiving some kind of technical assistance. More than two-thirds of them were receiving it from public institutions, and a small number from private sources or a combination of both.

As we can see in Table 2.6, a large amount of resources was dedicated to the coffee sector at the end of the 2000 decade. Two programmes have been most important in supporting the coffee sector in Mexico in the last few years. One is the Stabilization of

Table 2.6. The Mexican budget for programmes supporting the coffee sector in the last years (current millions of dollars).

Programme	2004	2005	2006	2007	2008	2009
Productive retraining and coffee development	34.39	38.95	47.26	41.50	46.22	48.80
Fund for investment and capitalization (FINCAS)	1.18	1.23	1.22	4.79	23.29	14.79
Productive projects (wet and dry processing and others)		2.35	10.55	14.10	17.70	9.92
Promotion of coffee consumption	0.78	0.92	1.83	3.66	6.52	4.81
Price coverage		4.97	11.92	6.41	5.59	8.14
Coffee plantations renewal					5.36	16.36
Control of coffee bid	2.90	1.46	6.50	7.65	5.26	2.59
Coffee census			0.78	1.78	2.06	1.85
Training		0.46	0.73	1.92	1.76	2.96
Stabilization of coffee pricing fund	66.95	2.91	0.39	0.39	0.47	0.74
Withdrawal of lower quality of coffee	0.02					
Emerging programmes		13.80				
Total	106.23	67.05	81.19	82.21	114.23	110.95

Source: My own elaboration with data from SAGARPA (2009).

Coffee Pricing Fund, started in 2002, and the other is the Productive Retraining and Coffee Development, that started in 2003 (see Table 2.4). The latter provides direct payment to any coffee producer who is registered in the Coffee Census and who proves that he/she sold coffee in the previous season. The Stabilization of Coffee Pricing Fund has been the mechanism with which the money given to coffee growers when the coffee price was very low could be recovered. To regulate this process, the Recovering Coffee Trust (FIRCAFE, by its initials in Spanish) was established in 2004. Its operation has been the responsibility of AMECAFE since 2007 (FAO, 2007).

There was a negative correlation between the federal budget allocated to coffee and the Other Milds coffee price. It seemed that when the international price went up, the Mexican government felt less pressure to support the coffee sector. Figure 2.9 shows that during periods of crisis (from 2001 to 2004), the amount of federal funding allocated to support coffee was high. This is an indication that the Mexican government is responding to the coffee growers' need.

<sup>18</sup> The National Institute for Forestry, Agricultural and Livestock Research (INIFAP, by its initials in Spanish). It is a governmental centre that aims to resolve the major requirement in term of apply research related to agriculture, including coffee.

<sup>19</sup> College of the South Border (ECOSUR, by its initials in Spanish), Chapingo Autonomous University (UACH, by its initials in Spanish), Postgraduate College (CP, by its initials in Spanish), the National Autonomous University of Mexico (UNAM, by its initials in Spanish).

According to the CMC (2005), a total of 867 intermediaries (traders and exporters) were registered in 2005. They were located mainly in the major coffee-producing regions in Mexico. Some of these firms were strategically established in different areas than the producing states. In this way, they could easily reach consumers or buyers in either domestic or external markets. Of those intermediaries, 394 were registered as exporters, and 73 were involved in coffee production as well. Similarly, a total of 1,035 coffee intermediaries were registered in 2009, and 92% of them were located in coffee-producing states (AMECAFE, 2009).

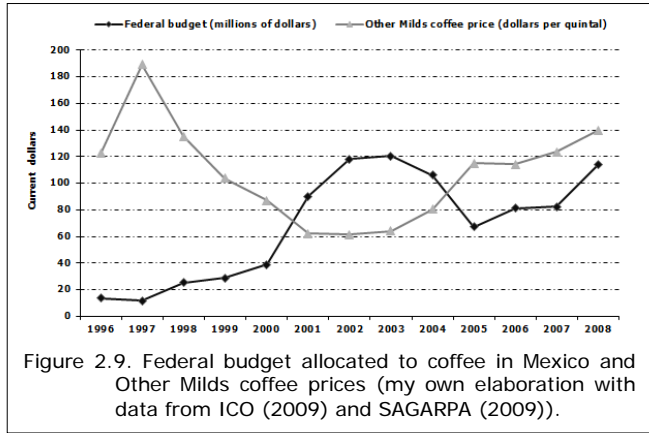


Figure 2.9. Federal budget allocated to coffee in Mexico and Other Milds coffee prices (my own elaboration with data from ICO (2009) and SAGARPA (2009)).

Currently, the National Association of the Coffee Industry (ANACAFE) integrates 32 of the most important companies in the Mexican coffee sector; these firms produce soluble, roasted, ground, and decaffeinated coffee. Some members of this association also do humid and dry processing. The firms included in the ANACAFE generally do business through intermediaries located in several coffee-producing regions. The ANACAFE's firms process an average of 4.17 million quintals of coffee annually. This represents 76.2% of the total Mexican production. These companies are responsible for 100% of the green coffee processed in Mexico to produce soluble coffee, 80% of the roasted and ground coffee, 52% of the total amount of green coffee exported, and 100% of the soluble, roasted, and green decaffeinated coffee exported by Mexico (ANACAFE, 2010). Some of the members of this association are also large-scale, vertically integrated coffee growers, while others are industries integrated with producers and medium- and large-scale collectors placed in various producing regions (Martínez, 1996).

Nowadays, the basic buying price for coffee in every producing area is defined by owners of the large-scale firms who inform commissioners about the rising and lowering of the coffee price. Commissioners are obligated to change their buying price as soon as they receive the information from their buyers or contractors. One important element that is taken into account to set the daily price in producing regions is to be aware of what competitors are doing in the same region. Sometimes, the strategy is to set the price a little higher than the competitors do, to buy a high quantity of coffee or to get other buyers out. But as soon as a buyer is alone in a certain region, he or she can bring down the price indiscriminately (Santoyo *et al.*, 1994). According to the theory, in this case we will observe opportunistic behaviour that allows competitors to reduce buying prices and to increase their profits.

The number of growers who are included in any of the coffee organizations represents 11% of the total included in the Census database updated in 2008; that percentage accounts for around 68,000 growers. The most important kinds of grower organizations are the Society of Social

Solidarity (SSS) and the Working Group. They are mainly interested in improving their production and in adding value to their product. Nevertheless, several organizations have been receiving machinery, equipment and subsidies from the government and NGOs to improve their production, processing and marketing capacities.

Farmer cooperatives and grassroots organizations engage in several activities. These kinds of organizations help producers with negotiating resources from the government budget, connecting and negotiating relations with a number of international agencies, and providing several kinds of services to improve farmers' competitiveness (technical assistance, quality improvement, and building infrastructure to process the product). Hence, in this way producer organizations are filling some gaps caused by the disappearance of the institute.

The processing capacity owned by farmers is limited. As mentioned by Renard (2008), farmer cooperatives owned 12% of the industrial processing capacity in 2007. Through their cooperatives, coffee growers exported 6% of the total amount of coffee exported by Mexico. Several grower enterprises that used to export disappeared from the market and the majority that succeeded in this regard have been related to fair trade and organic schemes. Yet, according to the National Coffee Census, the most important types of coffee that farmers were selling were parchment (50%) and fresh cherry coffee (27%).

## **2.8. Concluding remarks**

Mexico carried out a sudden structural adjustment to the institutions overseeing its coffee sector. The starting point was the collapse of the international coffee agreements to control the coffee supply in 1989. This process caused a break in the services to the coffee industry, the most important of which were financing small-sized and medium-sized coffee growers, providing extension advice, organizing growers, maintaining the infrastructure to process coffee, collecting coffee, marketing coffee, controlling the coffee quality, and keeping a minimum price in every coffee-producing region. The reduction of government participation in the coffee sector led to several gaps, which until now have not been completely covered by other agents already involved in this industry.

As has been mentioned by Avalos-Sartorio (2006a), several services at the community level were and still continue to be inadequate in meeting coffee farmers' needs. Changes in the provision of agricultural extension, research, market information and physical infrastructure (roads) have been taking place since the liberalization of the coffee sector. In recent years, private agencies have provided the majority of services needed in the coffee sector (e.g. firms and informal lenders), non-governmental organizations and some public institutions (e.g. research centres and universities).

Since the beginning of the free market, the financing of small producers first was in the hands of the *Pronasol*, and subsequently has been partially taken up by development and commercial banks as well as by other funding sources such as intermediaries, exporters and informal lenders. The

modifications in these services have brought an increase in the production costs that make farmers ask for higher coffee prices. In contrast, under the quota system, coffee producers were well provided with almost all the services they needed. Even when they received a coffee price relatively lower than current prices, they relied on coffee as the best and most profitable crop, but nowadays many coffee growers keep coffee orchards as a secondary income source.

The current organization of the Mexican coffee sector generates an unbalanced distribution of power among the main actors participating in this industry. On the one hand, there is the growers' sector, which is not well organized and lacks information and capital. On the other hand, there is the industry, mainly represented by ANACAFE, which is a very prominent organization that is well informed and has a high level of capital. Furthermore, it is not clear to what extent the recent programmes supporting coffee are designed to include the voice of all the actors participating in the coffee sector, or only the voices of the most prominent ones. Perhaps the most prominent participants in this supply chain are creating institutional and political conditions to benefit from. Thus, in order of importance, the government, the transnational coffee firms and farmer organizations have become the major players in the supply chain.

Under the current market characteristics, any intermediary is free to set the coffee price according to product quality, market conditions and suppliers' characteristics, among other things. Generally, intermediaries use the international commodity price defined each working day in the New York and London markets as a starting point for setting their daily coffee price. Then, intermediaries subtract from the international price any expenses incurred between the farmers' delivery point and their export point. Maybe as a result of the introduction of a number of programmes supporting coffee, especially the Stabilization of Coffee Pricing Fund, this margin has increased. In order to avoid this kind of reaction, in concordance with the proposal made by the OECD (2007), support to the rural sector is required but does not necessarily have to be directly linked to any crop.

The paths of and differences in the coffee prices have varied from period to period. The average rural, international and fob coffee prices have shown different figures between and within the various institutional settings operating in the Mexican coffee sector during the last decades. After the Stabilization of Coffee Pricing Fund programme began operating, a break occurred in the difference between fob and Other Milds coffee prices as well. This suggests that perhaps processors and exporters have been indirectly discounting part of the government subsidies given through this programme. In this respect, the question is to what extent the money given to growers is generating more economic benefit to large-scale processors and exporters than to growers.

Contrary to what theory tells us, the transaction cost (understood as the difference between the fob and the rural coffee prices) was reduced from what it was in the controlled era since the advent of the free market, and it has been much lower in recent years. Even so, it seems that the coffee producers have not benefited much, as they now receive a relatively higher coffee price but do not receive many of the other services the government used to provide during the regulated period.

The current market arrangements are more diversified than those under the quota system. Under the government marketing board, not many varieties of market arrangements existed. At that time, intermediaries relied on state agencies to buy coffee. By contrast, under the free market, the relationships between transactors are more diverse. Firms have been establishing any type of market arrangement that allows them to have control of producing, processing and exporting the product. In this way, firms have been the most dynamic actor in filling the gaps left by the institute.

Two main reasons to start with the structural changes in the coffee sector were the breakdown of the quota system and the changes in Mexican economic policy. According to our theory, one reason for closing down the main institution governing the coffee sector and creating the successive ones was to align the industry with the liberalization process of the Mexican economy. After more than twenty years since the start of those processes, the coffee sector now has a new structure. This has been established as a response to the government's general organization of the agricultural sector. In this sense, other active partners, such as producers and intermediaries, have been adjusting to what is happening in the primary sector of the Mexican economy.

The liberalization of the Mexican coffee sector and the resulting impact have brought either drawbacks or benefits to all the major players. Large-scale processors and exporters have adapted well to the current institutional environment. Small- and medium-scale farmers, on the other hand, have been losing the ability to compete and participate in the coffee market, as they now face many more constraints than they used to face in the past.

The current government participation in the coffee sector focuses on deregulating the market and allowing agents involved in the supply chain to participate freely. For this reason, it is necessary for the government to work on the provision of public goods and the development of clear rules with which to govern the free market. If a good institutional environment and the most needed public services are provided, the coffee market will be less uncertain. So, as the theory suggests, more impartial government participation and specific economic support aimed at rural areas are desirable to improve the coffee sector.



### **Chapter 3. The contractual choice and performance of Mexican coffee traders: The role of market institutions in commodity chains**

#### **3.1. Introduction**

Middlemen play an important role in a commodity chain. They perform many of the activities required to bring goods from producer to consumer, and their productivity has a strong impact on the performance of the chain as a whole and the welfare of the agents involved (Sexton and Lavoie, 2001). Differences in the behaviour of middlemen can be explained by economic and cultural factors. The way intermediaries interact can then give information about the environment in which they make their transactions and vice versa.

Coffee has been an important agricultural commodity in the last two centuries. Its importance relies on the fact that millions of people around the world are final consumers of this product. In order to meet this demand, several countries are engaged in producing, processing, transporting and marketing this product. Particularly, coffee can attain such relevance for a country or region that it can constitute a substantial part of social and economic policy. Around 25 million people around the world are coffee producers, most of whom are considered smallholder farmers, while this product is pivotal for exports income in some coffee-producing countries (Lewin *et al.*, 2004).

Relationships and the environments in which intermediaries act are not static; they evolve over time. Agricultural commodity markets, for example, have undergone significant changes over the past twenty years, changes that at the same time affect the behaviour of agents within a commodity chain. This is the case for the coffee chain, too. The major change occurred at the end of the nineteen eighties and early nineties, when the coordinated marketing system under the International Coffee Agreement was abandoned. In many countries, including Mexico, this led to a withdrawal of the government from the sector, creating scope for private parties and their organizations. Since then, the degree of state interference has fluctuated; private sector organizations or public-private initiatives have come and gone. In this paper, we look at a particular aspect of the institutional arrangements, namely the use of sales contracts by the agents who buy coffee from the farmers or from other buyers.

Until the end of the nineteen eighties, the world market for coffee was controlled by a quota system resulting from the economic clauses of the International Coffee Agreements (ICAs), signed by the main producing and consuming countries. These ICAs were first put into action in the early nineteen sixties. The agreements stated that producing countries had the responsibility to control their coffee exports in order to affect world prices (Gilbert, 1987). The best way to do this was by means of direct government intervention in the producing, processing and marketing of coffee. This is why, under this controlled regime, most of the producing countries had marketing boards controlled by the state. These public institutions had the monopoly of the coffee trade and some of them were also in charge of technical assistance and financial support to coffee growers (Akiyama, 2001).

In the Mexican case, the government created the Mexican Coffee Institute (Instituto Mexicano del Café, INMECAFE) to control and promote coffee production and sales. The Institute sponsored this crop as a remunerative alternative for peasants via its different support programmes (Santoyo *et al.*, 1994). Given that coffee-producing areas were growing and spreading, the Institute had to make sure these regions remained under the control of the government. Hence, officials were sent and infrastructure was built in several producing regions (Pérez *et al.*, 2001). While the INMECAFE and ICAs were working fully, there was no need for local or regional partner organizations, since every actor in the coffee supply chain relied on the effectiveness of the institutional environment until 1989.

Yet, at the end of the nineteen eighties, the ICAs' economic clauses broke down. This meant that the quota system was out, replaced by the free market. At the same time, liberalization policies were spreading throughout Central and Latin American countries, and Mexico was no exception. New coffee policies focused on reducing the size of the government and its expenditures, prioritizing regulation and macroeconomic stability, and abandoning interventions in commodity markets. For the Mexican coffee sector this meant INMECAFE had to disappear (Snyder, 1999). The Institute was then dismantled between 1989 and 1992, creating a void in the coffee chain; a void that was to be filled by private agencies. In the absence of the state's marketing boards and direct involvement in the coffee market, new local, regional and national traders appeared.

Nowadays, we can have a variety of channels in the Mexican coffee supply chain; within these there is a variety of steps through which coffee transits from producer to consumer. The simplest one is the product sold directly from the producer to the consumer. In this case, the product is sold at the regional, local or national market. Yet, the most common channel is the one starting from the producers who sell to the local collectors; then there are the regional collectors, and after that there are the state buyers; after this, the coffee is transported to the border to be sent to other countries by exporters. From then on, the product is taken over by processors (roasters) of consumer countries. This description implies that there are five steps in the supply chain.

Studies show that the relationships with middlemen can be crucial for the performance of the commodity chain (Gebre-Madhin, 1999). These relationships are closely related to the level and quality of market institutions present in the Mexican context. By knowing Mexican coffee intermediaries' behaviour, we may acquire a better view of the coffee markets of this country, and shed some light for future policies in the sector. Therefore, in this chapter we will investigate the behaviour shown by coffee traders in the free coffee market and the performance of the Mexican coffee agents. We will focus on two important coffee-producing states, Oaxaca and Veracruz. In addition, this study tries to characterize the market conditions facing intermediaries and to indicate how these conditions shape traders' performance and network.

This study centres on the Mexican coffee sector. Mexico is presently the seventh coffee-producing country in the world. There are more than 760 thousand hectares of coffee orchards in the country, distributed over around 500 thousand coffee growers. The sector is responsible for three million direct and indirect jobs (Escamilla *et al.*, 2005). This shows that any action taken that affects

coffee has an impact on many stakeholders. The Mexican coffee value chain is composed of various actors who interact with each other for economic gain. As coffee is a tradable good and nowadays the coffee market in Mexico is almost free, the sector and its members are exposed to national and global changes in the institutional environment of this commodity.

More in particular, the objectives of this work are: to identify and explain the contractual sales arrangements of traders in the Mexican coffee chain and to assess the performance of coffee traders in the states of Oaxaca and Veracruz, Mexico. In order to reach these objectives, the following research questions need to be answered: what are the socio-economic characteristics of coffee traders in the states of Oaxaca and Veracruz, Mexico? What are the main factors that affect whether traders have a contract with their buyers? And what are the factors that influence the performance of coffee traders in Oaxaca and Veracruz, Mexico?

The data used in our analysis were obtained by conducting face-to-face interviews with 53 intermediaries in 4 coffee-producing regions of the states of Oaxaca and Veracruz. Additionally, we held meetings with local authorities and people involved in the National Coffee System. The New Institutional Economics theory was used as a theoretical approach to include the notions of institutions, transaction costs and market performance when analysing the interactions among Mexican coffee middlemen. We used the gross marketing margins (the difference between selling and buying prices) as an indicator of traders' performance. We employed a logit regression in the analysis to identify specific variables that could explain the intermediary's contractual arrangements, and an ordinary least squared regression was done to regress gross margins on a set of variables depicting traders' socio-economic, marketing and institutional characteristics to evaluate the performance.

The results indicate that being a roaster, having wet processing facilities and selling cherry coffee negatively affect traders' use of contracts, whereas having dry processing facilities has a positive effect on their use of contracts. The results also suggest that experience, selling cherry coffee, participating in a competitive environment and having contracts positively influence intermediaries' performance, while being a roaster and being registered in the National Coffee System have a positive effect on the gross margin. The remainder of this chapter is organized as follows: in Section 3.2, we will depict the theoretical approach; in Section 3.3, we will present the data and methods used to analyse the information; in Section 3.4, we will present the model specification; Section 3.5 will include the results; in the Section 3.6, we will present the conclusion.

### **3.2. Theoretical approach**

New Institutional Economics (NIE) provides us with the proper theoretical approach to include the notions of institutions, transaction costs and market performance when analysing the interactions among Mexican coffee middlemen. It also allows us to delimit the study at the levels of social analysis explained by Williamson (1998). According to this structure, levels 2 and 3 are the institutional environment and the governance structures, respectively. Translated to our study, it

means that we need to analyse the rules of the game for the coffee intermediaries, the way these actors relate with each other in terms of contracts and the way they perform as well.

Why are the institutions so important for understanding contractual choices and the performance of traders in chains? According to North (1989), every process in which an exchange is performed has some costs involved. In the case of the Mexican coffee sector, one can think of many costs. The commercialisation of agricultural goods involves transaction costs along the coffee chain. These are related to activities varying from the search for market information, finding farmers who sell coffee, inspecting the quality and transporting the product to arranging contracts between the agents who perform the mentioned activities (Jabbar *et al.*, 2008). Contracts arise as facilitators of these interactions; they provide the possibility of doing business at low costs and thus influence the efficiency along the commodity chain.

As established by Coase (1988), "the most important adaptation to the existence of transaction costs is the emergence of the firm. The fact that it costs something to enter these transactions means that firms will emerge to organise what would otherwise be market transactions whenever their costs are less than the costs of carrying out the transactions through the market." Transaction cost economic theory predicts that under high asset specificity and high uncertainty, the firms will embrace a highly integrated channel in all cases (Shervani *et al.*, 2007).

Transaction Cost Economics (TCE) helps to understand how agents decide to run their business given the environment in which they execute their activities. Some traders may choose to buy and sell coffee without adding much value to the product they market, as costs and uncertainty are high. Others will choose to vertically integrate and sell more downstream in order to tackle these costs. Some agents turn to contractual agreements in order to reduce these costs (Williamson, 1979).

Transaction cost theory can explain the relation that households and sellers have with the market; it shows how the price paid by the buyers increases and how the price effectively received by the farmers decreases. Finally, for some farmers it did make it impossible to buy or to sell – buy inputs and sell outputs – without their earnings turning into losses (Key *et al.*, 2000). If transaction costs are low, economic actors will favour spot markets, but if transaction costs are high, they will favour contracting or vertical integration to lower these costs (Ruben *et al.*, 2007a). Additionally, De Janvry *et al.* (1991) have argued that the existence of transaction costs might explain why households are not entering a certain agricultural market.

Two parts are involved in the transaction costs. One part is the ex-ante cost, which includes searching for potential exchange agents (consumers or wholesalers who offer the best price), the screening of potential agents, and bargaining (Key *et al.*, 2000). The second part consists of the ex-post costs that take into account the transfer of property rights and the monitoring compliance of any transaction (Ruben *et al.*, 2007b). Three principle attributes of transactions has been defined: the frequency with which transactions recur, the specificity of the assets necessary to come to a transaction, and the degree and type of uncertainty of transactions.

Another dimension into which NIE gives important insights is the role of social relationships in economic transactions. When markets are far from representing the ideal situation portrayed in economic textbooks, variables like trust, reputation and informal rules gain in importance (Fafchamps, 2002). As Gabre-Madhin (1999) observes, "in the absence of formalized market institutions that deter dishonest behaviour, such as credit bureaus, trade inspection services, and commercial tribunals, what institutions arise that promote trade among unknown parties?" These social relationships then have an effect on contractual decisions and on trader performance. If there is trust between agents, formal agreements may not be needed (Fafchamps and Minten, 1999). Furthermore, these relationships may serve as substitutes to absent market institutions and may help traders to reduce costs and perform efficiently. For these reasons, we need to take them into account when analysing the factors that affect contractual choices and traders' performance.

The exertion of market power by some firms in the coffee sector may also affect the behaviour of other intermediaries. There is some concern about the level of competition within the Mexican supply chain, given that agricultural markets can show evidence of low levels of concentration of buyers or sellers (Sexton and Lavoie, 2001). Competition is thus an important element in the analysis. Being in a competitive environment is a factor that can increase the probability of contractual agreements between agents as they have to secure the provision of the product and the market in which that product will be sold (Fischer *et al.*, 2009). It may also affect traders' performance, since low competition may lead to higher marketing margins, which decreases the efficiency in the supply chain (Mose, 2007; Schroeter and Azzam, 1991).

An environment in which transaction costs are high may lead to higher margins, and thus, to a less efficient trader and supply chain. The reason for this is that an agent facing high transaction costs will try to buy cheap and sell expensive in order to compensate for the related costs. This would only apply if the setting in which agents make their transactions enables them to do so. Poor physical infrastructure, high costs of processing, poor institutions and high costs of information gathering and monitoring contracts, are some of the costs associated with an inefficient set-up and higher margins (Jabbar *et al.*, 2008; Winter-Nelson and Temu, 2002). On the other hand, it is assumed that in a competitive environment, market power and hence marketing margins are reduced, creating a more efficient industry (Schroeter and Azzam, 1991; Porter, 1998). In this sense, a liberalization process like the one experimented by the Mexican coffee sector should end up in a competitive structure in which marketing margins of traders are low.

What can the presence (or absence) of contracts between coffee traders tell us, both about them and about the Mexican coffee sector? According to Brousseau and Glachant (2002), the analysis of contracts allows us to address a number of important concepts for understanding the economic behaviour of agents. By investigating contractual relationships, we can understand how agents make their decisions and how they have been adapting to the actual institutional environment.

Moreover, studying contractual agreements between Mexican coffee traders can shed light on the close link of these agreements with markets, institutions and the organization of firms (Williamson,

1998). Above, we have mentioned how our analysis is framed by the notions of NIE, and thus by TCE theory. In terms of contracts, TCE portrays contracts as methods to constrain ex-post behaviour, given the fact that there may be opportunistic behaviour, information asymmetries, differences in bargaining power, and possible hold-up situations from asset-specific investments among agents (Williamson, 1979). TCE focuses as well on the determinants and the duration of contracts. It also distinguishes between a contractual and a non-contractual exchange, which has implications in terms of the formality of relationships (Masten and Saussier, 2000).

The Mexican coffee sector went from being ruled by a state-led marketing board to a free market set-up. This meant that part of the role played by the government in the regulated era had to be taken up by private agents. This role included not only buying, processing and marketing the coffee from growers but also providing them with financial and technical assistance. Those changes meant that new arrangements between these agents also had to be established. They may do so in order to reduce the transaction costs and the risk in the coffee market. One of these arrangements is that traders, especially exporters, may be vertically integrated in order to reduce transaction costs (Mehta and Chavas, 2008; Williamson, 2000; Winter-Nelson and Temu, 2002).

Yet, we also observe that there are various actors in the post-liberalization era besides exporters or transnational firms. Small-scale traders still exist because large-scale traders face higher assembly costs compared to local/regional traders. The large-scale firms lack the information the local and regional collectors have about the geographical area where they make their purchases. Small-scale traders know where the growers live and where the best coffee is sold. This means that new contractual arrangements were also created between large- and small-scale traders, depicting an agency relationship. In the first section of our analysis, we will investigate factors that may affect this contractual choice, elements relating to asset-specific investments, trade-credit relationships, and the type of coffee that is marketed by contracting partners.

A prime reason for wanting to secure a trade relationship is having made investments that are specific to these relationships. Traders who invest in machinery or in assets that can only be used in coffee-related activities may want to have contracts with their buyers in order to reduce the risk of being out of the market. In this sense, having a long-term contract may give them higher benefits, since they will not face ex-post opportunistic behaviour from their buyers, who are aware of the traders' sunk costs due to asset-specific investments (Williamson, 1979).

However, traders who face recurrent transactions with their buyers, for example those who sell coffee every day, and who have not made any specific investments besides this, may not need a contractual agreement with their buyers. Repeated interactions between agents can lead to trust-like relationships that do not rely on formal agreements to secure transactions (Fafchamps and Minten, 1999).

Traders may also face asymmetries in information. Some large traders are unaware of the location of coffee growers or local collectors. With this in mind, small- or medium-scale intermediaries who know where to buy coffee can signal large-scale buyers that they have this knowledge and may

want to enter into a contract with them. In order to protect this information, intermediaries may want to negotiate better prices. If the intermediaries who know where to buy coffee provide this information to a buyer without a contract, there is no guarantee that the buyer will buy the coffee from them. A contract may also reduce search costs involved in transactions and in this sense both parties could benefit utility from an agreement.

Traders face an uncertainty that may be due to price volatility in the coffee market. Considering this possibility, intermediaries may want to have a contract with their buyer in which they can negotiate schemes to share the risks of a volatile market before the harvest season starts. This kind of agreements, in which uncertainty is reduced, may give them a higher utility. However, not all coffee traders face such uncertainty. There are traders who do not rely on coffee to make their living because they have another business parallel to marketing coffee. If traders can diversify their sources of income, they have a reason for not having a contract. Moreover, traders who have different lucrative activities usually do not have coffee asset-specific investments, hence another reason for not having a contract.

It is important to clarify that the traders in our sample ranged from small collectors to exporters, which means that the stage in which each agent operated may vary. Some of them buy directly from coffee farmers (or are in fact coffee growers themselves) and perform their activities at a local level. Others buy coffee from these local intermediaries and sell it to traders who operate at a state or national level. We also interviewed roasters who sell their coffee directly to consumers. These characteristics will be taken into account when we analyse the contracting decisions these agents made. Of course, a contract is an agreement between two parties, so the characteristics of one side are just half of the story to explain contractual choices. However, having these different agents in our sample also allows us to depict how the other side of the contract might behave, since we cover different stages in the supply chain. Unfortunately, because of time and money constraints, we did not interview coffee producers who were the providers of the first stage of the coffee supply chain.

Market institutions are a key factor when studying performance. The rules of the game can shape the way in which traders decide to run their business. In this analysis, we will use market institutions as a tool to understand traders' performance. These institutions can determine the way in which traders purchase and sell their coffee, how they pay and receive payment, and also the way in which they interact with other traders (Gabre-Madhin, 2001). The assets and the socio-economic characteristics of each trader, however, can also determine their trading practices. According to Jabbar *et al.* (2008), actors who face the same market institutions can have different trading practices, denoting that there are trader-specific variables affecting trading behaviour, and thus, their performance.

We have argued that new agents entering the sector were also a consequence of liberalization. These changes, as we have explained, should furthermore impact traders' performance. From the fieldwork done for this study we observed that, after the liberalization, former exporters decided to become more involved in upstream steps of the supply chain; some of them acquired infrastructure

that was left by the extinct INMECAFE. However, in the past twenty years, there has been little new investment in processing plants and infrastructure related to the coffee sector. This poses a constraint to the coffee chain, since processing plants are operating with old machinery. The lack of machinery to process coffee and roads in some regions also shapes the behaviour of traders, since they have to take this condition into account in their trading practices. These factors can also affect the performance of traders. With all of the previous in mind, to analyse the marketing margins of the Mexican coffee intermediaries, we will make an OLS model in order to assess which variables can determine the performance of traders, including having a contract.

We use marketing margins as an indicator of traders' performance as in Jabbar *et al.* (2008) and Mose (2007) since they can give an indication of how traders perform given the minimization of their variable costs. These margins are measured as the difference between the purchase and the selling price of a quintal of parchment coffee.<sup>20</sup> It is important to note that in our fieldwork we got information from traders who trade other types of coffee besides parchment coffee. In this logic, we had to make an adjustment in order to make the quantities and prices of coffee traded by each trader comparable. For this reason we transformed prices from other types of coffee into price of parchment coffee. This was done by first applying a weight conversion and secondly adding or subtracting the associated average costs of processing from cherry to parchment and from parchment to green coffee, respectively. After this process, we obtained all prices in terms of quintals of parchment coffee purchased and sold by intermediaries. Then, we calculated the difference between buying and selling prices and we ended up with gross marketing margins.

In the model specification section, we try to translate the theory into an empirical model that we can estimate. The fact that traders decide to have contracts with their buyers is important in understanding the setting in which they interact with each other. Knowing which factors can affect this decision can help us comprehend how the Mexican coffee chain is shaped and how the institutional environment (the rules of the game) relates to trader's decisions to have contracts – the play of the game.

### 3.3. Data and methods

In Mexico, coffee is produced in twelve states. These states comprise 52 regions, which represent 541 municipalities (Escamilla *et al.*, 2005; SIAP, 2008). For the purpose of this work, two states (Oaxaca and Veracruz) were selected to investigate the relationships among coffee traders and the environment in which they interact. Oaxaca is located on the Pacific Ocean slope, whereas Veracruz is located on the Gulf of Mexico slope. The Oaxaca producing regions are characterized by long periods of dry and hot weather, which helps the picking and processing of coffee beans. As a consequence, most of the coffee that is marketed in this state is either parchment or green coffee. The Veracruz producing areas have humid weather and several periods of rain throughout the year. This means that farmers cannot dry their coffee as easily as in Oaxaca, which results in them selling cherry coffee to the intermediaries (FIRA, 2003).

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<sup>20</sup> A quintal is 245 kg of cherry coffee, 57.5 kg of parchment coffee, 80 kg of natural dry or 46 kg of green coffee.



It is important to mention that cherry coffee is highly perishable and preferably must be processed within 24 hours after picking. We argue that these differences may have an impact on the way in which coffee traders interact with each other, on their performance, and on the type of mechanisms they choose to enforce their relationships.

After choosing the states of Oaxaca and Veracruz, the next step was to pick the regions (composed of some neighbouring municipalities) in which the investigation was to be carried out. In this study, four regions were selected, two in each state. For this purpose we established five criteria: the average altitude of the coffee plantations, having electricity in the households (a proxy for remoteness or isolation), having paved road (a proxy for accessibility to urban areas), coffee cooperative participation, and the number of intermediaries registered in the municipality.

Table 3.1. Characteristics of coffee per producing state in Mexico.

State	Land with coffee (ha)	Land harvested (ha)	Production (tons of cherry coffee)	Yield (tons of cherry coffee per ha)	Farmers	Average land per farmer (ha)
Chiapas	253,462	251,951	529,250	2.10	174,571	1.45
Oaxaca	185,187	160,888	165,829	1.03	102,513	1.81
Veracruz	153,435	152,450	332,598	2.18	86,961	1.76
Puebla	88,577	70,066	259,246	3.70	47,124	1.88
Guerrero	54,328	53,917	51,152	0.95	21,326	2.55
Hidalgo	26,335	26,335	40,197	1.53	34,616	0.76
San Luis Potosí	22,539	22,539	18,688	0.83	17,552	1.28
Nayarit	19,473	19,473	29,394	1.51	5,401	3.61
Jalisco	4,497	3,984	4,357	1.09	1,106	4.07
Colima	3,018	2,633	2,566	0.97	820	3.68
Tabasco	1,040	1,040	619	0.60	1,211	0.86
Querétaro	300	300	150	0.50	296	1.01
Total	812,191	765,576	1,434,046	1.87	493,497	1.65

Source: My own elaboration with information from SIAP (2008, 2010).

Note: Land with coffee, farmers, and average land per farmer referred to 2008, while the other data are from the 2008-08 harvesting season.

Considering the altitude where coffee orchards are, municipalities that are located in the range of 600-900 metres above sea level (masl) in general have few market restrictions. Municipalities above 900 masl, on the other hand, are more likely to encounter restrictions in marketing their coffee because of their geography; so, the ones located on a higher altitude are labelled as being faced with high market restrictions.

The criterion of electricity gives an idea of the conditions in which intermediaries can operate. Municipalities in which more than 75% of the coffee growers do not have electricity in their house were considered as encountering high market restrictions. On the other hand, those municipalities with 25% or more of its coffee growers having electricity were labelled as encountering low market restrictions.

The availability of paved road was measured as the percentage of coffee farmers at the municipal level who do not have this service provided to their communities. A low percentage indicates low restrictions for a municipality to market their coffee. With this in mind, if the percentage of not

having paved roads was equal or less than 20, the municipality was considered as having few market restrictions. In the same sense, if the percentage was more than 20, it was considered a municipality facing high coffee market restrictions.

The percentage of coffee growers participating in a cooperative was also taken into account. The idea is that the more organization there is in a municipality, the more easily good marketing conditions for coffee arise. Thus, municipalities with 15% or less coffee growers involved in a cooperative – indicating a low level of organization – are considered as facing high market restrictions. This means that municipalities with more than 15% of their coffee growers participating in a cooperative are considered as encountering few market restrictions.

Regarding the intermediaries in the municipality, their number was calculated using the list of coffee traders who were registered with the Mexican Association of the Coffee Production Chain (AMECAFE, for its initials in Spanish) (AMECAFE, 2009). Municipalities with less than four registered intermediaries were considered as suffering from market restrictions. Therefore, municipalities with less than or equal to three intermediaries registered were considered as being faced with high market restrictions. Those municipalities where there were more than three intermediaries were considered as having few market restrictions to commercialise coffee.

With the above criteria, we then classified municipalities in Oaxaca and Veracruz into two categories, based on the number of restrictions they face. Those with four or more high market restrictions, including a low level of intermediary concentration, were grouped in the first category. Those with less than four restrictions but with a high level of intermediaries registered were included in the second category. In total, there were 19 potential high market restrictions clusters – 11 in Oaxaca and 8 in Veracruz – and 14 potential low market restrictions clusters – 7 in Oaxaca and 7 in Veracruz. A randomized selection was then performed to determine one region per category and state. The four selected regions, two in each state, are shown in Figure 3.1.

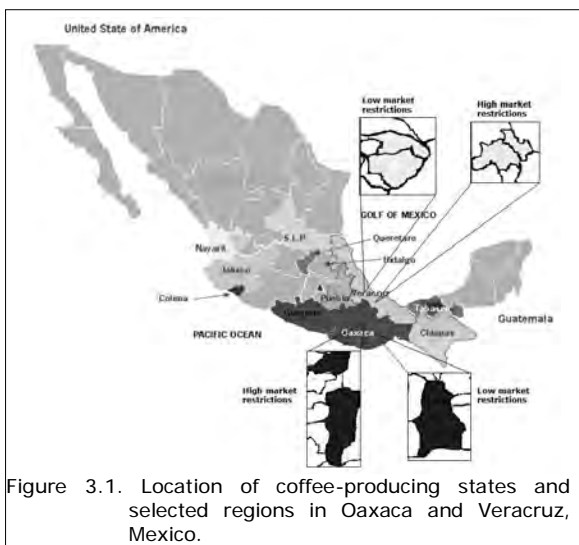


Figure 3.1. Location of coffee-producing states and selected regions in Oaxaca and Veracruz, Mexico.

The selected region in Oaxaca with high market restrictions comprises the municipalities of San Felipe Usila and San Felipe Jalapa de Díaz. For the region with low market restrictions in this state, the municipalities included were Pluma Hidalgo, San Pedro Pochutla and Candelaria Loxicha. In the state of Veracruz, the municipalities included in the high market restrictions region were Chocaman

and Tomatlan. For the low market restrictions region, the municipalities were Teocelo and Cosautlan de Carvajal.

In order to conduct the interviews, we constructed a list with buyers selected in three different steps. The first was to match the list of registered intermediaries in the AMECAFE with the municipalities that were selected for this research. We then had a list of registered coffee traders per municipality.

The second step involved was to ask municipal and local authorities about coffee intermediaries working there. This procedure was undertaken in the field as we visited each of the selected municipalities. We then compared the names given with the ones in the registered list and the ones we found to be non-registered. After having gathered the whole list of intermediaries per municipality, we proceeded to select a random sample from them. Both the registered and the non-registered intermediaries selected added up to a total of 34.

The third step was to include relevant intermediaries that were referred to by the people we interviewed in the field. These relevant traders were described as being one step further in the coffee chain compared to those who referred them. Also, some of the relevant traders operate at a state or even a national level. In total, we surveyed 53 intermediaries. Apart from the surveys with intermediaries, we also held meetings with local authorities and people involved in the National Coffee System Committees (NCSC).<sup>21</sup> For this purpose, we used previously designed semi-structured questionnaires.

Table 3.2 shows the general characteristics of interviewed intermediaries. Traders are on average middle-aged, with considerable experience in the business of trading coffee. Most of them started their businesses after the market liberalization reforms took place in the early nineteen nineties. In spite of this, 68% of the respondents were familiar with coffee practices under the regulated market. This means that even though intermediaries started their businesses on average fourteen years ago, they had previous knowledge of what buying and selling coffee was about.

Table 3.2. General characteristics of the interviewed intermediaries.

Characteristics	Mean	SD
Age (years)	51.38	10.28
Schooling (years)	9.40	4.35
Gender (1 if male)	0.94	0.23
Time in the business (years)	14.12	9.43
Trader has another occupation (1 if yes)	0.43	0.50
Months devoted to coffee trading	6.85	3.15
Employees in the business	4.67	5.01
Sample size	53	

Source: My own elaboration with data from the survey.

Another aspect of traders' characteristics was that 43% (23) of the respondents were working in other activities besides coffee marketing. Among these, eleven respondents worked in local grocery stores. The rest of them diversified their income by producing and/or selling other agricultural products and by trading livestock. Even though these intermediaries do not rely solely on coffee as

<sup>21</sup> The NCSC are non-governmental instances constituted to serve as mechanisms for permanent planning, communication and consultation between different actors in the coffee chain.

an economic activity, sixteen of them agreed that marketing coffee is the activity that promises them the highest economic benefits. It is important to keep in mind that coffee is a seasonal crop; in the case of Mexico, the harvest season runs from October to April. Respondents devote on average seven months to buy/sell coffee. Those who spend more months in the business and who engage in the processing or roasting of coffee are large exporting companies.

Using data from the survey, we classified the intermediaries by the size of the area where they operate, and also by determining whether they add value to the coffee they buy and sell by processing. As can be seen in Table 3.3, almost half of the interviewed people operated as collectors on a local or regional basis. This means that this group of intermediaries did not add any value to the coffee they marketed, apart from transport and selection. Only 13% of the respondents were affiliated with a local or regional cooperative. There were only three cases in the sample in which cooperatives directly exported their coffee. The rest of the cooperatives only collected coffee from its members and then sold it to other intermediaries. In terms of value added, we found that 20% of the respondents could be classified as processors/roasters. Also, if we look at regional differences, given the spatial set-up of our field work, we observed that processing activities often took place in areas where competition was high.

Table 3.3. Classification of interviewed intermediaries.

Category	Number of respondents	Percentage
Local collectors	18	34.0
Regional collectors	7	13.2
Local cooperatives	4	7.5
Regional cooperatives	3	5.7
Traders/processors	8	15.1
Roasters	3	5.7
Exporters	8	15.1
Others	2	3.8
Total	53	100.0

Source: My own elaboration with data from the survey.

Regarding intermediaries who are involved in processing activities, we found that 20% of all respondents were involved in wet processing; all wet processing plants were located in the state of Veracruz, as expected. The average wet processing capacity was 120 quintals per day.<sup>22</sup> Survey data also show that intermediaries in Oaxaca only traded parchment coffee.<sup>23</sup> This proves that our assumptions about differences in the type of coffee that is traded in each state are reflected in the characteristics of our sample. We observed that 30% of the respondents were involved in dry processing activities, with an average capacity of 140 quintals per day.<sup>24</sup> More than half of the intermediaries involved in dry processing were exporting their coffee, and they accounted for all respondents who were classified as exporters. This is understandable, as most of the coffee is exported as green – and therefore processed – coffee.

<sup>22</sup> Coffee processed by the wet method is called wet processed or washed coffee. The wet method requires the use of specific equipment and substantial quantities of water. Following the wet process, the fruit covering the seeds/beans is removed before they are dried.

<sup>23</sup> Parchment coffee is obtained after cherry coffee beans go through wet processing. To obtain green coffee, parchment coffee goes through dry processing.

<sup>24</sup> The dry process is the oldest method of processing coffee. The entire cherry after harvest is first cleaned and then placed in the sun to dry on tables or on patios. The dry process is also known as unwashed or as the natural one.

Roasters accounted for 5.7% of all respondents and operated mainly at a local level. They supplied to local cafeterias or stores, and some even had their own coffee bar. All roasters were located in regions with few market restrictions, which again showed that all value-adding activities were concentrated in areas where it was easier to buy and sell this product.

We also asked traders if they had five or more competitors in the area where they operated. A total of 50% of local collectors and 86% of regional collectors mentioned that they had five or more competitors. Also 50% of both local and regional cooperatives stated that they had five or more competitors in the area where they operated. For processors, roasters and exporters, the percentage of traders who answered that they had five or more competitors was 75%, 67%, and 100%, respectively. We can see that in all stages of the supply chain, traders perceived their operational context as a quite competitive environment in terms of the number of traders they observed. However, it is clear that most of our sample consisted of traders present in the primary collection level of the coffee sector. As one of the interviewed coffee producers' leaders affirmed, high competition is established in areas where coffee farmers sell cherry coffee. This condition allows coffee producers to receive higher prices than those who are located in places with low competition.

In the survey, 94% of the respondents had coffee growers as their suppliers. In addition, some of the interviewees made direct purchases from coffee farmers, even when they worked at the regional or national level. Only 28% of the interviewed intermediaries had a contract with their suppliers. Survey statistics indicate that half of those who had agreements stated that it was a verbal one.

An agreement between intermediaries and coffee growers can be beneficial for both participants. Intermediaries provide financial support to coffee producers to implement the picking, mainly to cover the transport of the coffee pickers and payments during the first days or week of the harvesting season. As was commented by some interviewees, they give money in advance to some coffee farmers in order to engage them for the coming harvesting season. Some respondents said that using this kind of financial agreement allowed them to pay a lower price and still receive a large quantity of coffee. The type of agreement set up with the buyers depends on the type of coffee that growers normally deliver.

To have as much coffee as possible, large firms instruct their commissioners to set up some kind of agreement with coffee producers. Normally these commissioners have good knowledge about the type of coffee that can be bought in the region. They are financed with money from the firms in order to fund some coffee producers who will later become their providers. It was found that some companies also had skilled commissioners to provide technical assistance to coffee growers in producing and processing coffee. They did so to improve the coffee quality.

For many small-scale producers, receiving economic support from the buyers establishes the relationship between the growers and the intermediaries. This kind of financing agreements became more common practice under the actual condition than they had been in the ICAs' era;

nowadays, no formal bank credit is available for small- and medium-scale farmers in the Mexican coffee sector. For some coffee farmers, an option to tackle this difficulty is to become a member of a cooperative that sometimes has access to economic support from governmental or non-governmental organizations.

Another aspect we investigated in the survey was the ownership of assets by intermediaries, which is shown in Table 3.4. Looking at regional differences, we observed that there are more intermediaries with vehicles in the zone with high market restrictions in Oaxaca. We argue that this happens because this area is isolated, since it is located in a mountainous area and has a precarious road infrastructure. Thus, intermediaries should own vehicles to overcome these difficulties. This can also imply that traders located in a region with high market restrictions face higher transaction costs due to the mentioned isolation that may reflect in their performance and contract choices. Only few intermediaries own a coffee-cupping laboratory, and they are exporters. Cupping is important since it is a way of inspecting and ensuring the intrinsic quality of the coffee before it is exported.

Table 3.4. Assets owned by interviewed intermediaries.

Asset	Number of respondents	Percentage
Vehicle	30	56.6
Store	43	81.1
Coffee-cupping laboratory	6	11.3
Processing plant	18	34.0

Source: My own elaboration with data from the survey.

A third of the interviewed intermediaries own a processing plant, and most of them are located in the state of Veracruz. The fact that coffee growers mainly sell cherry coffee in the Veracruz regions creates a need for processing infrastructure, given that the coffee quality decreases if it is not processed within 24 hours after picking. Related to this, 80% of the respondents own a specific depot or place where they buy and sell coffee. The rest buys and stores coffee either in their house or in the processing plants. Despite this, traders stated that they do not store coffee seeking for better prices. They only use these depots to collect the required amount of coffee for transport later on. Local and regional intermediaries in Oaxaca usually take one week to gather the amount of parchment coffee necessary for a load. In Veracruz, those who buy and sell cherry coffee take one day to collect the coffee and they all sell it within the next 24 hours. Exporters are the ones who take more than a week to gather the amount of coffee needed, given the volume they trade.

When asked about the problems they face as coffee traders, 60% of the respondents mentioned that price volatility was the main obstacle to commercialise coffee. Others mentioned a lack of security when transporting both coffee and money, and quality deficiency as problems. In terms of risk coping strategies adopted by intermediaries, we found that 30% of the sample tried to obtain good information about market conditions and prices. The most common way to gather information about prices was by phone, accounting for 95% of the respondents; internet was used by 37% of the sample. Most local and regional intermediaries made daily phone calls to their buyers to know the price for the coffee they were going to sell.

The most common type of the agreement between intermediaries was an oral contract. Only 15 respondents mentioned they used written contracts with their buyers to reduce any risk and uncertainty, and they were mainly exporters who needed a contract to export their coffee. In these

cases, the contract was compulsory to deal with customs authorities. This group of respondents were also the only ones to state that they used the futures market as a price risk management activity. Even though the government is trying to attract small intermediaries and growers into price hedging programmes, requirements are not easy to comply with.

Most local and regional intermediaries said they interact with only one downstream trader each year. This shows that repeated transactions take place between traders along the coffee chain. These repeated interactions may also be important when analysing the (non-)existence of contracts. The fact that traders have known each other for years and that they trust each other may explain the absence of written contracts. Verbal agreements arise in these relationships, as we observed in the survey. However, if there are no written contracts, how can buyers be sure that sellers are going to give them their coffee year after year (or even day after day)? Forty per cent of the sample mentioned that they receive credit from their buyers at zero interest, and all of them stated they use this money to buy coffee.

Another aspect that can be addressed by the data in the survey is to see if these repeated transactions between traders are a sign of an environment in which intermediaries are not free to choose whom to sell to, especially in the areas faced with high market restrictions. To assess this, we asked intermediaries whether they were now selling to a different person than they were five years ago. We observed that in the Oaxaca region with market restrictions, 60% of the intermediaries had changed buyer, because they were either looking for better prices or the last buyer did not respect their previous agreements. This result can be seen as an indication of intermediaries being free to choose the buyer that best fits their needs.

Not all interviewed traders followed regulations established in the coffee sector. Twenty five per cent of the sample was registered in the National Coffee System (NCS). After registration, agents have to fulfil some requirements and pay an annual fee to be part of this system. The requirements are that one has to be legally established as a firm or, in the case of a natural person, one needs to have proper identification, a fiscal address, one has to be up to date with tax payments, and one needs to have a written recommendation from an active member of the coffee sector, among other things. Sixty per cent of the respondents were not registered in the NCS as intermediaries.

Most of the intermediaries who were not registered in the system belonged to the categories of local and regional collectors. When asked about the reasons for not being registered they mentioned that there were many requirements and a lot of paper work in order to be in the system. Since registered traders issue a bill to coffee growers in which the quantity and price of the transaction is stated, and this bill is then used by growers to get government subsidies, most unregistered intermediaries get these bills from buyers working downstream in the coffee chain to satisfy the producers' demand for the bills.

The coffee chain starts with cherry coffee sold by growers; it is then transformed to parchment coffee, which is processed into green coffee, the type that is commonly exported. After that the green coffee can be transformed into roasted and ground coffee. In terms of the conversion from

cherry to parchment coffee, we know that 245 kilogrammes of the former make one quintal of the latter. Also, the average cost for doing wet processing is 146 Mexican pesos per quintal. In this case, with the weight conversion, we multiply the price of one kilogramme of cherry coffee to get a price per quintal of parchment coffee and add the processing cost to make it comparable.

When going from green to parchment coffee, the weight conversion applied is that a quintal of green coffee is equivalent to 0.80 multiplied by the weight of a quintal of parchment, and the costs to be subtracted are 110 Mexican pesos per quintal, indicating dry processing. We subtract the costs, since green coffee is one step further in the processing stage and to get prices in terms of parchment coffee can be seen as going backwards in this stage. To go from the prices of roasted coffee to those of parchment coffee, and knowing that the former is sold per kilogramme, we multiply by 37.5 to get the weight equivalent of a quintal (in kilogrammes). We also have to subtract the associated processing costs, which in this case are 267 Mexican pesos; this is because we subtract both the costs of going from parchment to green coffee (110 Mexican pesos per quintal) plus the costs of going from green to roasted coffee (157 Mexican pesos per quintal).<sup>25</sup>

After this process, we obtained all prices in terms of quintals of parchment coffee purchased and sold by intermediaries. Then, we calculated the difference between buying and selling prices and we ended up with gross marketing margins. From the 53 traders in our sample, 44 observations were affected by this conversion. We could not perform the conversion on the whole sample, since some traders refused to tell us their selling price. Furthermore, a limitation to this conversion is that the average costs we took into account in this process could change for each trader given their infrastructure and technology. However, we also could not get more precise costs because most interviewees did not share this information with us.

With the previous characterization of coffee traders in the states of Oaxaca and Veracruz, Mexico, we constructed a set of variables to answer the research questions. A logit regression was performed to find variables affecting the intermediaries' decision to have a contract (or not) with their buyer. In this procedure, we used several explanatory variables related to individual, regional and market characteristics to predict the probability of a trader having a contract. To assess the performance of traders in the Mexican coffee sector, we calculated their gross margins. Then we investigated which variables affected the intermediaries' performance thus measured. To do so, we performed an ordinary least squares regression.

### **3.4. Model specification**

#### **3.4.1. Contract choices**

The decision to contract with another agent can be expressed by the general and simplified form of a discrete choice model. In this case, an intermediary will choose to enter into a contract with his buyer if the expected benefits of having one are greater than those of arranging the transaction in an alternative way (Masten and Saussier, 2000). In other words, a trader will choose to enter into

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<sup>25</sup> The processing costs per each of the steps in the supply chain were obtained from the interviewed processors.



a contract if the expected utility of having one is greater than the expected utility of not having a contract, otherwise the choice will be not to have a contract.

We constructed a set of variables that represent the socio-economic characteristics of intermediaries, as well as some indicators of their business practices and their relationship both with other traders and the environment in which they perform their activities (Milagrosa, 2007). Table 3.5 lists the variables that were included in the regressions. For a more detailed relationship between variables and contract, see earlier pages of this chapter.

The dependent variable was a dummy that took the value of one if a trader had a contract and zero if not. It also stood for those agents who were part of a vertically integrated organization. The first explanatory variable that we included was the experience in marketing coffee. We expected this variable to negatively affect the probability of having a contract, since experienced traders would know how to deal with uncertainty and market imperfections without having to formalize a contract with their buyer.

The next factor we introduced as an explanatory variable was the fact of having another business besides coffee trading. If traders had other sources of income, they were likely to not have a contract, since this diversification was assumed to reduce their risks. Also, the statement that they had other economic activities shows that they did not depend on a specific investment that could lead them to hold-up situations with their coffee buyer. For these reasons, we argue that engaging in other business has a negative effect on the contracting decision.

Table 3.5. Descriptive statistics of variables included in the analysis (N = 53).

Variable	Units	Mean	SD
Having contract	1 if the intermediary has a contract	0.60	0.49
Margins <sup>1</sup>	Mexican pesos per quintal	410	687
Experience <sup>2</sup>	Years of experience in the coffee business	14.09	9.21
Other business	1 if the intermediary has another business	0.43	0.50
Owens vehicle	1 if the intermediary owns a vehicle	0.57	0.50
Interaction term <sup>3</sup>	1 if the intermediary has another business and owns a vehicle	0.30	0.46
Roaster	1 if the intermediary is a roaster	0.23	0.42
Wet processing plant	1 if the intermediary owns a processing plant	0.25	0.43
Dry mill	1 if the intermediary owns a dry mill	0.30	0.46
Long-term relationship	1 if the intermediary established a long-term relationship	0.34	0.48
Contract	1 if the intermediary has contracts	0.57	0.29
Sells cherry coffee	1 if the intermediary sells cherry coffee	0.19	0.39
Competition	1 if there is competition in the region where the intermediary works	0.68	0.47
Registered in the NCS	1 if the intermediary is registered in the NCS	0.42	0.50
Buyer is registered	1 if the buyer is registered in the NCS	0.60	0.49
Volume of sales <sup>4</sup>	Quintals per season	4,250	7,708
Veracruz	1 if the intermediary resides in the state of Veracruz	0.49	0.54

Source: My own elaboration with data from the survey.

Notes: <sup>1</sup> The minimum is 25 and the maximum is 3,000.

<sup>2</sup> The minimum is 2 and the maximum is 46.

<sup>3</sup> The other business x owns a vehicle.

<sup>4</sup> The minimum is 50 and the maximum is 36,000.

In terms of traders' assets, we included a dummy variable that represents whether traders owned a vehicle or not. Investing in a vehicle can be seen as an asset-specific investment if traders only

used it to market their coffee. In this case, we expected that owning a vehicle positively affects the contractual decision. However, traders could have other businesses besides marketing coffee. In this sense, the effect of vehicle ownership could be more or less twofold. For this reason, we included an interaction term that depicts the fact that traders could own a vehicle and have other lucrative activities at the same time. Subsequently, we expected this interaction to negatively influence the choice of having a contract.

The next variable in the model was a dummy that represents traders who had long-term relationships with their buyer. In this case, the variable had the value of 1 if the relationship dated back more than five years. Since trust and reputation among the traders and their buyer are factors that grow over time, we argue that having a long-term relationship can deter the decision to have a contract, since relational agreements can be chosen instead.

Another variable included in our model was the fact that a trader sold cherry coffee. This characteristic implies that traders had to buy and sell the same product preferably within the following 24 hours after the coffee cherry had been picked from the trees, and thus repetition in transactions was evident. Being in a competitive environment could also affect the interaction among traders and, in this case, the probability of having a contract (see Table 3.6). For this reason, we included a dummy variable that indicates whether intermediaries had five or more competitors in the zone in which they operated. Since higher levels of competition may diminish opportunistic behaviour from intermediaries, given that their buyer could replace them (Bello *et al.*, 1997; Fischer *et al.*, 2009), we expected that competition would make it more likely for traders to have contracts.

Table 3.6. Having or not having a contract per type of coffee intermediaries.

Type of coffee	Having a contract	
	yes	no
Cherry	5	7
Parchment	14	5
Green	4	1
Roasted/ground	1	3

Source: My own elaboration with data from the survey.

The statement of being registered as a trader in the NCS could also influence the contracting decision. Registered traders were more aware of the legal and normative framework of the coffee sector. This could make them rely more on formal agreements than on a spot market relationship. We also included a variable that depicts the information that traders might sell their coffee to registered buyers. The purpose of this was to find out whether dealing with such buyers leads to having a contract with them.

As part of contracting decisions of traders in the Mexican coffee sector, factors like, among other things, asset specificity, bounded rationality, power relationships and opportunistic behaviour have an effect on the traders' contracting decision. At the same time, these factors can also have an effect on the performance of the firm. In this study, by performance we mean the gross margins traders can get for the coffee they market, that is, the difference between purchase and selling prices.

### 3.4.2. Traders' performance

To find out which variables explain the variation of the margin, the gross margins were included in a linear regression model as dependent variable. In this sense, we regressed the margins on a set of variables depicting trader's socio-economic, marketing and institutional characteristics. This linearization allows us to use the concepts drawn from the theory and apply them in an empirical way. The model was written as:

$$Y_i = \alpha_i + x'_i \beta + e_i \tag{1}$$

where  $Y_i$  denotes gross margins for trader  $i$ ;  $x_i$  is a vector which includes the aforementioned variables representing trader characteristics;  $\beta$  represents the parameters to be estimated, which are associated with the explanatory variables; and  $e_i$  represents a stochastic error term.

The variables included in the regression model that estimates equation (1) and their descriptive statistics can be found in Table 3.5. These factors are also taken from the survey data obtained in our fieldwork.

Experience in marketing coffee was the first independent factor included in the model. As we have mentioned, specific experience in marketing coffee is not the same as experience in the coffee sector, which can be given by a trader's age. Most of the traders in our survey have had experience in the coffee sector even though they were not engaged in trading coffee. We expected a positive relation of this factor with the traders' performance.

In terms of the characteristics of the firms, we utilized the variable of whether a trader had another activity to obtain income from. We expected that if traders diversified their livelihood they would have lower margins because they did not rely solely on the profits from trading coffee (Jabbar et al., 2008).

In theory, assets owned by a trader play a role in their performance. This is why we included vehicle ownership as an independent variable. The expectations for this variable were twofold. On the one hand, traders who own a vehicle may have more working capital than those who do not. In this sense, margins for these traders may be low, because they have the ability of having a large volume of business (see Figure 3.2). This means that even

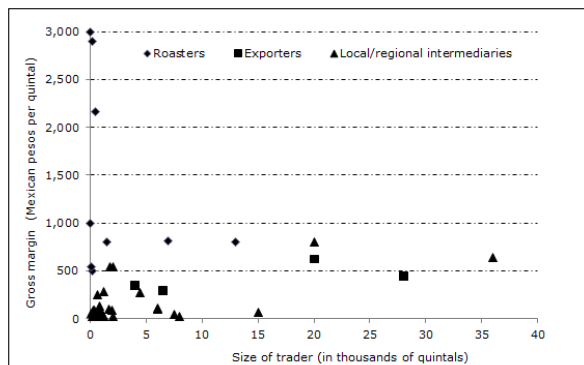


Figure 3.2. Size of intermediaries vs. marketing margin (my own elaboration with data from the survey).

though they have a small margin per quintal sold, they have the capital to buy more coffee and compensate (Jabbar *et al.*, 2008). On the other hand, since a vehicle forms a costly asset, this would require a higher return from their business, thus margins might be high.

The next set of variables show first the degree of integration that a given firm can have and secondly, the stage in the coffee chain in which a trader can be found. In our sample, some coffee agents had large margins but small businesses in terms of the quantity of the coffee they market.

When intermediaries have dry processing facilities, this is often a sign of a vertically integrated firm. This means that traders have decided to integrate as a response to a marketing system in which transaction costs were high; market concentration or asset specificity applies. It also means that these traders adjusted to the new institutional environment and became more efficient by integrating, having increased productivity (Winter-Nelson and Temu, 2002). We argue that this translates into lower margins per quintal although, as mentioned before, they might have a larger business, thus being able to buy and process a greater quantity of coffee.

We also included a variable that indicates whether intermediaries traded cherry coffee. Traders who buy and sell cherry coffee should do the buying and selling transactions within 24 hours. This can be detrimental to their performance, since the urge to sell their coffee can deprive them of the opportunity to find better options in the market. This may also show that, given the environment in which they participate, they decide to sell cherry coffee because this means incurring lower costs. Hence, we expected a negative sign for this variable in the OLS regression.

Operating in a (non-)competitive environment affects the way traders perform. This is why we included a variable that indicates whether a trader operated in a region with more than five traders. We expected that the more competitive the environment was, the smaller the margins would get (Mose, 2007). This means that firms will look to compensate low margins with larger volumes of coffee being marketed.

Being registered in the NCS is another explanatory variable in the OLS model. Traders who had more knowledge about how to develop their business performed better or had lower margins than those who had less knowledge (who were not registered in the NCS). We also included a variable depicting whether traders faced buyers registered in the system. We did so to see whether these buyers took advantage of being registered, since this enabled them to give bills that growers could use to obtain government subsidies. Intermediaries might give lower prices to their providers in exchange for the bills; thus, traders would seek higher margins.

The next variable included in the model concerned the decision made by traders to have a contract with their buyer. This comes from the reasoning that agents facing higher margins should turn to contractual arrangements. This variable tries to link the concepts of contract with the traders' performance. Changes in the institutional framework should lead to contractual arrangements between parties in order to minimize costs (North, 1990). This means that having a contract should lead to lower margins as a consequence of such cost minimization. We should keep in mind that

the margins we consider for our model consist of the difference between buying and selling, and that the contract we analyse is between traders and their buyers. In this sense, if there is in fact a contractual agreement, it could only secure the selling price. We used the estimated probability of having a contract obtained from the logit model to avoid a potential endogeneity problem.

### 3.5. Results

#### 3.5.1. Determinants of contract choices

Table 3.7 presents the results of the logit estimation of the model for the decision made by traders to have a contract with their buyer. Results from the logit model are better interpreted when marginal changes in the probability are addressed. In this case, it is interesting to see how a unit change in one of the explanatory variables affects the likelihood of having a contract, keeping all other variables in the model at their mean value. This effect is measured by marginal probabilities (Greene, 2003; Milagrosa, 2007). The marginal effects for our logit regression are also reported in the same table; these are presented only for those variables that were significant at least at 10%.

Table 3.7. Determinants of contract engagement (logit).

Variables	Coefficient	Marginal effect
Experience	-0.037 (0.530)	
Other business	-0.115 (0.935)	
Owens a vehicle	0.831 (0.485)	
Interaction term	-0.913 (0.592)	
Roaster	-3.738 (0.019)**	-0.73
Wet processing plant	-2.571 (0.083)*	-0.56
Dry mill	2.886 (0.058)*	0.44
Long-term relationship	1.080 (0.332)	
Sells cherry coffee	-3.215 (0.054)*	-0.66
Competition	-0.006 (0.995)	
Registered in the NCS	0.117 (0.926)	
Buyer is registered	1.050 (0.321)	
Veracruz	-0.156 (0.902)	
Intercept	1.486 (0.313)	
Observation numbers	53	
Likelihood Ratio (LR) index	-24.28	
McFadden's R <sup>2</sup>	0.318	

Note: P-values in parenthesis. \* and \*\* refer to significance at 10% and 5%, respectively.

When dealing with continuous variables, we assume a one-unit change in the estimator (i.e. a one-year change in trader experience in the coffee business) for interpreting the effect on the decision to have a contract or not. For discrete variables, the assumed change is from 0 to 1 (from not owning to owning a vehicle).

The first variable found to be significant (at a 5% level) in our model was the one that indicates whether a trader is a roaster. The magnitude of the marginal effect is also significant, since being a roaster decreases the probability of having a contract by 73%. However, the sign of the coefficient is not consistent with our expectations and with what theory tells us. We expected a positive sign (meaning an increase in the probability of having a contract) given the fact that roasters are traders who are vertically integrated and have made specific investments. An explanation we found for this was the reality that in our sample, most roasters do not trade large amounts of coffee and usually sell their coffee to incidental customers. This means that they may choose other types of arrangements with these clients, especially spot market transactions, rather than formal contracts.

The wet processing plant variable negatively affects the decision to have a contract. It confirms the proposition that intermediaries with asset-specific investments are more likely to have a contract.

The opposite result was found for having a dry mill. This magnitude of the associated marginal effect of the variable of owning a dry mill increases the likelihood of having a contract by 44%.

The last variable that was found to affect the contracting decision is the one depicting a trader who sells cherry coffee. The associated marginal effect shows that selling cherry coffee decreases the probability of having a contract by 66%. This finding is in line with our expectations. Traders who sell cherry coffee face repeated transactions with their buyer, and then trust-like relationships can be chosen over formal contractual agreements (Fafchamps and Minten, 1999).

The result related to selling cherry coffee suggests that trading this type of coffee is an option for intermediaries who do not want to (or cannot) make costly and specific investments, which, as observed, would induce them to use a contract. Traders who sell cherry coffee are located specifically in the state of Veracruz, and these geographical characteristics have shaped their behaviour, as can be seen in the above results. They have also somewhat adapted to the constraints their environment poses in terms of selling unprocessed coffee, which does not add much value to their product and can affect their performance in the business.

### **3.5.2. Traders' performance**

In this section the outcome from the regression analysis explaining performance is presented. Initially, we did a linear regression and estimated the parameters via OLS. However, post-estimation tests showed that heteroskedasticity was present. There were also problems with the normality of the residuals and the predicting ability of the model. Nevertheless, no excessive multicollinearity was found in this first regression.

In order to tackle the previous difficulties, we made a log transformation of the gross margins. This was done since the original dependent variable (margin) had influential outliers and its standard deviation was larger than its mean, which could be a reason for the problems obtained in the first regression's post-estimation tests. Then, we ran a robust regression with the log-transformed margins as a dependent variable. This second regression showed the assumption of homoskedasticity and normality of the residuals to be acceptable, as well as a better predicting ability compared to the previous model.

Taking into account the possibility that having a higher gross margin would make it more likely to there would be more money to start another business or to buy a vehicle; and also that having a higher gross margin, traders would be more likely to be registered in the NCS, we suspected that there was an endogeneity problem. We did a Hausman test for those variables to check this and found that the problem was not present.

The results for the second estimation procedure are included in Table 3.8. The first variable listed as significant for our analysis of margins is the intermediaries' experience, which indicates that an increase of one year of experience would reduce the coffee margin by 2.4%. This result suggests that when intermediaries have more experience, they have a bigger coffee business in terms of the

quantity of coffee they trade. According to this line of reasoning, their profit may rely on the quantity of coffee rather than on the amount they earn per unit. It also indicates that they do not exploit their expertise as a monopolist, and that they pass the lower costs on to their customers.

Being a roaster increases the margins by 99.8%. In a way this contradicts the theory, since we mentioned that vertically integrated firms or firms that do processing should have low per quintal margins, given that they are more efficient and productive. However, this result is in line with our expectations, since roasters in our sample are somewhat special. They often do not participate much in competition with other traders, as they sell their coffee in places where there are no other roasters or they at least they differentiate their coffee from the others.

Table 3.8. Factors explaining gross log-transformed margins (OLS).

Variable	Coefficient
Experience	-0.024 (0.096)*
Other business	-0.336 (0.226)
Owens a vehicle	0.129 (0.678)
Roaster	0.998 (0.050)**
Dry mill	0.342 (0.446)
Sells cherry coffee	-2.025 (0.000)***
Competition	-0.590 (0.054)*
Registered in the NCS	1.055 (0.008)***
Buyer is registered in the NCS	-0.000 (0.999)
Having a contract	-1.609 (0.041)**
Intercept	6.705 (0.000)***
Observation numbers	43
R squared	79.99

Note: P-values in parenthesis. \*, \*\* and \*\*\* refer to significance at 10%, 5%, and 1%, respectively.

The model also shows that a trader who sells cherry coffee will have lower margins than one who sells other types of coffee. As we mentioned before, traders dealing with cherry coffee have to buy and sell their product within the next 24 hours to avoid loss of quality. Traders who sell cherry coffee also face lower transaction costs and this is reflected in lower margins. The latter may indicate that there are not enough incentives and market institutions encouraging them to invest in adding processing value to their product.

The results show that an intermediary who operates in a more competitive environment experiences a 59% decrease in the margins. This finding is consistent with the theory. Mose (2007) has stated that higher competition may lead to a lower marketing margin.

The output of our regression indicates that traders who are registered and arguably operate under the rules set by the current structure of the coffee sector get larger margins than those who are not. This finding may be related to the fact that registered buyers are obliged to declare taxes and pay the government a certain amount for the value of the coffee they buy. The latter is in compliment to a government programme named The Stabilization of Coffee Pricing Fund.

The fact that traders decide to engage in contractual agreements with their buyers reduces the gross margins. This shows that, as theory suggested, agents who make the decision to have contracts may face lower costs, since the reason to enter into such contracts was to tackle risks and uncertainty present in the market. In this sense, when dealing with lower costs, traders can settle for smaller per quintal margins. The rest of the variables included in the model made no significant contribution toward explaining coffee traders' performance.

### 3.6. Conclusion

The liberalization of the market should bring about a change in the institutional environment of a commodity market. This has to result in a more competitive framework, in which agents have to find new ways to relate to each other to increase their earnings. In this chapter, we investigated whether that proposition can be proved for the Mexican coffee supply chain. Twenty years have passed since the Mexicans experienced a transition from a state-controlled system into a free market. We provide some evidence on the successes and failures of the new institutional framework for this sector.

The methodology we used to select the intermediaries also allowed us to depict the main actors of the supply chain in each of its stages. In the results section, we have presented information about trading practices, traders' characteristics and the environment in which intermediaries perform their business. By analysing the data we collected in the survey, we were able to understand how traders behave and which decisions they make, for instance with regard to contracting sales.

The objectives of this chapter were to identify and explain the contractual choices of traders in Oaxaca and Veracruz, Mexico, and to examine the performance of these agents. We found several variables that affect traders' contracting decisions (being a roaster, having wet and dry processing facilities, selling cherry coffee) and also factors that influence traders marketing margins (intermediaries' experience, being a roaster, participating in a competitive environment, having a contract, being registered in the NCS, selling cherry coffee). These outcomes allow us to answer our questions. These results are aligned to those found in other studies, like Winter-Nelson and Temu (2002), Mose (2007), Jabbar *et al.* (2008) and Fischer *et al.* (2009). However, there are differences in terms of the commodity that was studied and the context in which the research was done.

One of our results indicates that coffee agents have involved themselves in different activities as a response to the transition from a state-led commodity chain to a liberalized environment. We described how some of them decided to vertically integrate in order to reduce transaction costs and achieve higher efficiency in the market, relying on a larger volume of business to have enhanced profits. Others, on the other hand, invested in assets that allowed them to add value to their product and to attain a better performance in terms of margins per unit of product sold.

We also found that there are risks and uncertainty issues in the coffee sector that lead traders to engage in practices like selling cherry coffee. Even though these practices allow them to mitigate risks, they hinder their possibilities of improving their performance as coffee traders. A lack of supporting market institutions like credit bureaus, proper infrastructure, and clear regulations about the business have resulted in inefficient markets. The latter indicates that there is room for government intervention. In order to have a more efficient supply chain, these costs have to be reduced by giving technical support and increasing the skills of traders (with regard to marketing, branding, managing their own business), by improving access to information and credit, and by providing the proper infrastructure to diminish transaction costs.



Most of the traders are unknown to the government, and thus are unable to participate in any governmental initiative. Data indicate that 60% of the traders are not registered in the National Coffee System. That situation creates unsettling circumstances for small-scale traders. The coffee sector has to have clear rules for traders and informality has to be eliminated.

Taking into account that the information we gathered focuses more on the primary and intermediate collectors, we indicate as an important finding that the portion of the Mexican coffee sector we analysed appears to be somewhat competitive. A challenge for further research related to the issues we tackle in this research is to gather precise data to perform a similar analysis at all stages of the coffee supply chain.

In spite of this, we managed to describe that marketing margins diminish as competition between traders increase. This means that liberalization has indeed brought trader entry into the market. Credit constraints and uncertainty have forced most traders to neglect investments in new technologies and machinery. As we found, they mostly use the same infrastructure present twenty years ago, which has implications in terms of the success of the supply chain. As a result, we can say that there has been liberalization but no modernization in the Mexican coffee sector. Finally, we think that if the Mexican supply chain wants to be competitive, huge investments need to be done and improvements need to be made in both technology and institutions at all stages of the chain.



## **Chapter 4. The driving forces and economic impact of cooperative membership: Empirical evidence from the Mexican coffee sector\***

### **4.1. Introduction**

There are two types of farmer organizations in the Mexican coffee sector: grassroots organizations and cooperatives. These are differentiated according to their abilities to mobilize support for farmers' needs related to coffee production and trade. The former are unions or affiliations of farmers that represent them in the Coffee Product System (CPS) or towards any other regional or national governmental institution. The affiliation includes organizations integrated by small groups of farmers usually labelled as cooperatives. These cooperative are mainly focus on mobilizing economic support by applying for productive projects announced by the national or state government, while some other cooperatives make requests to (inter)national foundations or non-governmental organizations to receive some kind of support.

Under the former controlled coffee market, producers were organized mainly through the governmental organizations named Economic Production and Marketing Units (UEPCs, by its Spanish initials). At the end of the controlled coffee market era, almost 70% of the total Mexican coffee producers were included in these kinds of organizations. They were operating as small solidarity groups in which all members were responsible to compliment the deliveries of any of the group members. However, after the demise of the state-controlled coffee market in 1993, growers had to look for their own initiative to decide whether or not to participate in any kind of farmers' organization.

Considering the importance of the coffee sector for many households and the role that cooperatives play in the current economic situation, this chapter addresses the following key questions: (1) What are the characteristics of farmers who are members of the coffee cooperatives? (2) What are the main factors that determine growers' participation in coffee organizations? (3) Do coffee cooperatives that are active in the Mexican coffee sector assist farmers to find a better market outlet and receive better coffee prices? (4) What are the factors that influence the level of per capita coffee income, and to what extent do those factors differ between member and non-members of cooperatives?

The main objectives are to identify the variables that contribute in defining the membership of an organization, and to examine the significance, relative importance and direction of some of the most important variables influencing the per capita coffee income. We distinguish between four categories of variables: (a) individual factors (like age, gender, education, ethnicity); (b) family characteristics (family size, housing conditions); (c) farm factors (farm size, distance to road, altitude); and (d) regional factors (location and agro-ecological conditions, population density and traders incidence). We will discuss how these variables influence farmers' marketing choices in terms of the type of coffee that is delivered, the price received for the coffee and the derived per capita coffee income effects. We will compare farmers participating in cooperatives with otherwise identical individual farmers to guarantee unbiased results. We rely on information collected in a

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\* A revised version of this chapter will appear in the Journal of Co-operative Studies.

representative field survey, conducted in 2004 throughout the eight major coffee-producing states, and additional village-level data from the coffee census database, retrieved from 2002 to 2008.

The remainder of this chapter is organized as follows. Section 4.2 reviews the most important theories related to farmers' preferences and constraints regarding rural cooperation and present the main characteristics of the Mexican coffee market that may give rise to cooperative membership. Section 4.3 outlines the field survey data used in the study and the statistical methodologies used for data analysis. In Section 4.4, we will proceed with the presentation of results regarding the main variables influencing membership and participation in coffee cooperatives. This is followed in Section 4.5 by a discussion of the effects of cooperative membership on obtained prices and income effects, for which we relied on different specifications of probit, multinomial logistic and ordinary least square estimates. We finally conclude with a discussion on the implications for policy and outreach to strengthen the economic role of cooperatives in the Mexican coffee sector.

#### **4.2. Rationale for cooperative membership in the coffee production and trade**

Coffee is a major export product for many developing countries, and at world level it represents the second most important commodity after petroleum. The production of coffee in the world was 168 million quintals in 2008/09.<sup>26</sup> This represents an increase of 44% during the last 20 years (ICO, 2009). The rise in production is, however, twice as much as the growth in demand for coffee, and therefore downward pressure on prices is increasingly becoming manifest (IDEA, 2006). Coffee produces an income for 125 million smallholder farmers and their families, who are mainly located in tropical zones of developing nations. The national economies in many of these countries is also highly dependent on coffee as a source of export earnings (Fuzhi, 2007).

Particularly in the case of Mexico, the economic dependency on coffee has been reduced during the last decades. Coffee was originally introduced to this country in the late eighteenth century and was initially grown on large plantations, but during the following decades and at the start of the nineteenth century; it gradually became a smallholder crop. Coffee has been the most important source of agricultural revenues from abroad for many decades, generating 413 million dollars of foreign exchange annually in the nineteen nineties and up to 230 million dollars of foreign exchange annually during the last decade (Banco de México, 2010). It is reported that coffee was the fifth agricultural production commodity in terms of value added, just after tomatoes, fresh vegetables, avocados and peppers in 2008. Although coffee's relative economic importance has declined, it still remains the country's largest single export crop and a key source of foreign income (Calo and Wise, 2005; Pérez *et al.*, 2001).

The statistics of the Mexican coffee census data base updated in July, 2008 report a total of 493,497 coffee farmers and a similar number of families depending to a certain degree on coffee production for their sustenance. Growers and their relatives together represent employment in

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<sup>26</sup> A quintal is 245 kg of cherry coffee, 57.5 kg of parchment coffee, 80 kg of natural dry or 46 kg of green coffee.

coffee-related activities for a total number of 1,547,210 people who are directly involved in coffee production.

Coffee-producing farms are located in some of Mexico's poorest provinces. The major coffee-producing areas are mountainous, with poor communication and limited public services. Around 84% of the rural communities where coffee growing represents the primary agricultural activity report high or very high poverty rates. Furthermore, 60% of the coffee producers live in extreme poverty, and more than half belong to one of Mexico's 52 ethnic groups (Pérez *et al.*, 2001; Avalos-Sartorio, 2006a).

Regional and local characteristics determine the prospects for coffee processing. Many farmers process their own coffee in small processing plants owned by individual coffee growers; otherwise, larger processing facilities are owned by farmers or operated by farmer cooperatives. They can limit operations to only humid processing or become engaged in dry processing as well. The feasibility of the latter option depends mainly on the environmental and road conditions and on the volume of production available on the location where they are established. Due to the remote location and heavy rainfall in coffee areas, 86.86% of the Mexican coffee producers relies on wet processing, while 13.14% relies on dry processing (SIAP, 2008).

The wet process is structured into four steps: 1) hulling is done by sending the coffee through a hulling machine operated by hand or by using a motor; 2) during fermenting, coffee seeds are left to ferment in wooden or cement tanks for 20 to 36 hours, depending on local weather conditions; 3) washing is done in a tank, either manually or mechanically; and finally 4) drying the coffee seeds, either by putting them on concrete, fibre or synthetic materials on the ground or by using drying machines (Pérez *et al.*, 2001). The dry process puts the coffee in the sunshine without removing any skin. Hereafter, the coffee is transformed from dry beans to green beans using milling machines.

The governmental participation in the Mexican coffee sector has been gradually replaced by private companies during the past two decades. Under the former controlled coffee market regime, firms could buy raw coffee only directly from governmental warehouses. The current regime permits these firms to buy raw material also from wholesalers and small-scale companies rather than directly from small-scale farmers. In this setting, farmer cooperatives played an important role in collecting coffee from their members (and some non-members), processing it to get a high quantity of produce and selling coffee with more value added, thus negotiating better marketing condition vis-à-vis their trading counterpart for the benefit of their members. Thus, during the past years, there has been increased interest from the government and non-governmental organizations in strengthening cooperative participation as a strategy to address organizational, processing and marketing problems and to improve the economic conditions of many small coffee farmers.

With the increasing interest from development agencies and governments in mechanisms for promoting collective action during the past decades, attention paid to the role of cooperative participation for overcoming smallholder's marketing constraints is receiving new relevance

(Tanguy *et al.*, 2008). Voluntary and cooperative organizations may assist their members to receive better prices and higher net incomes, but these incentives are not always available to ensure that farmers are better off in the commercialization process. Others authors claim that cooperatives in general are receiving renewed attention in terms of structuring development to promote equity (Basu and Chakraborty, 2008).

Defining rural cooperatives as "an association of persons who work together to achieve certain objectives" (LeVay, 1983), we can distinguish cooperatives from other economic organizations in the sense that cooperatives are voluntary associations of people, where decisions are taken based on member participation and representation and not based on capital voting power. Since smallholders tend to face large comparative disadvantages and diseconomies of scale in processing and marketing – due to the high transaction costs related to their usually small production size and volume (Tanguy and Alemayehu, 2009) – the main role of marketing cooperatives is to reduce transaction costs and to improve the bargaining power of smallholders against middlemen (Francesconi, 2009).

In the present decade, additional objectives for joining farmer organizations are to improve access to funding from the banking system, to accede support from (non)governmental institutions, to receive resources for acquiring machinery to process coffee, to enable adding value to coffee, and to comply with the rules and regulations for standards in the coffee markets. On the other hand, coffee cooperatives are increasingly promoted by the state agencies as a way to sell products more directly at the domestic market, to enhance the coffee prices based on improved product quality, and to upgrade coffee production systems and technologies. In sum, being part of a cooperative organization might enable coffee farmers to overcome problems of low income and reduce the risks in marketing coffee.

According to the literature, factors like the farmers' age, level of education, the size of the coffee farm, and location and altitude of the coffee plantation are of major importance for farmer's decision to adhere to cooperative organizations (see LeVay (1983) for a concise overview). In addition, it is expected that farmers who are integrated in some kind of cooperative are more likely to bargain higher prices and to generate a higher per capita coffee income compared to their non-organized counterparts. In the following, we will test these hypotheses using comprehensive data on the Mexican coffee sector.

### **4.3. Material and methods**

The study relies on information from the coffee census database and from a large-scale coffee field survey conducted in 2004. To guarantee a representative survey, we used the information from the coffee census to identify a sample of coffee farmers with a broad distribution of similar individual, family and farm characteristics that were retrieved from the original database.<sup>27</sup> A sample of 1,396

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<sup>27</sup> The national coffee census has been conducted by several government and non-government agencies. The database built until 2008 contains technical, economic, and social data from more than 493,000 coffee growers and includes detailed information about 776,000 coffee plots. Information refers to farm size, farmer age, size of household, market outlets,

farmers was taken from a list of 353,696 coffee plots that benefited from the productive development and coffee quality improvement programme; coffee farmers from the eight coffee-producing states of Mexico were included. The sample selection took place in two steps: first municipalities were selected according to their proportion of coffee production; secondly farmers were selected from each municipality according to farm strata (Ramírez *et al.*, 2004). This resulted in a stratified sample that is considered representative for the Mexican smallholder coffee sector.

After the sample was selected, face-to-face interviews were conducted with each coffee farmer, using a structured questionnaire. This questionnaire included a farmer's characteristics (such as age, sex, literacy, training and education); household characteristics (such as household size, family labour, emigration, income and total land owned); and a coffee orchard's characteristics (such as tree density, yield, production, type of farming system, input use and organic certification). In addition, major issues related to the coffee farmer's relationship with the market, the type of coffee sold and the price received, as well as institutional factors related to their participation in cooperatives and the kind of state support received for producing coffee were included.

Descriptive statistics regarding the key variables that are considered as possible factors influencing farmers' participation in cooperatives are included in Table 4.1. The comparison of these characteristics between members and non-members is reported in the same table. For all relevant variables, we performed a t-test analysis of means differences to identify significant differences between farmers who participate in a coffee cooperative and those who decided not to join. We subsequently used participation in a coffee cooperative for each coffee farmer as a dependent variable in the statistical analysis; this variable is defined as 1 if the coffee grower was member of a cooperative and 0 if coffee grower did not participate in any type of coffee cooperative.

To address the research questions, we relied on three different procedures. First, a probit model analysis was performed that identified the individual, family, farm and regional factors influencing the likelihood of cooperative participation. Secondly, we performed a statistical analysis of means differences regarding the price levels obtained for coffee marketing between different types of coffee delivered by farmers. This was followed by a multinomial logistic regression to identify the variables that play a role in defining the type of coffee delivered by producers. Thirdly, we performed three ordinary least square regressions. In these we used pooled and non-pooled samples of organized and non-organized producers to identify the factors influencing per capita coffee income and the possible differences between cooperative and individual coffee farmers.

The latter analysis required fundamental attention, since we needed to control for selection bias and confirm whether the subsamples reflected structural differences with respect to their performance. First, we reviewed the possibility of selection bias using a Heckman regression model. Since the inverse mills ratio turned out to be not significant, further estimates could rely on OLS

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household's assets, members of household and their individual characteristics, type of coffee system and regional characteristics.

regression. Secondly, we relied on different specifications of the regression equations and performed a Chow test analysis to evaluate the structural differences in the coefficients between organized and non-organized coffee farmers. Results indicated that there are indeed important differences between both groups that justify a separate analysis. Consequently, the sample was split into two subsamples. The final models were tested for possible endogeneity problems using the general Hausman test; results indicated that this problem was not present.

Table 4.1. Variables for membership of a cooperative (descriptive statistics and t-test).

Variable	Unit	Cooperative (N=427)		Non-cooperative (N=969)		T-test	Signifi- cance level
		Mean	SD	Mean	SD		
Individual factors							
Farmer's age	Farmer's age	47.57	14.82	50.18	14.96	3.015	***
Farmer's sex	1 if the farmer is male	0.80	0.40	0.72	0.45	-3.135	***
Ethnicity	1 if the farmer speaks any indigenous tongue	0.54	0.49	0.44	0.50	-3.391	***
Literacy	1 if the farmer can read and write	0.82	0.38	0.73	0.44	-3.733	***
Education	Schooling level	4.25	3.48	3.46	3.38	-3.980	***
Training	1 if the farmer has received training courses related to coffee	0.52	0.50	0.20	0.40	-12.52	***
Participating in the NCS	1 if the farmer participates in activities organized by the National Coffee System	0.16	0.37	0.00	0.04	-13.47	***
Institution	1 if the farmer has a relation with government institutions	0.34	0.47	0.51	0.50	5.928	***
Family factors							
Farm size	Coffee area per household member	2.06	11.69	0.69	1.13	-3.581	***
Household size	Number of members in the farmer's family	3.00	2.54	3.85	2.45	5.905	***
Family labour	Number of family members working in coffee	1.88	1.52	2.31	1.61	4.698	***
Emigration	1 if a family member emigrated to work	0.42	0.49	0.62	0.48	6.981	***
Land property	1 if the farmer owns ejidal or communal land	0.84	0.36	0.55	0.50	-10.79	***
Cement house	1 if the house has a cement roof, wall or floor	0.28	0.45	0.50	0.50	7.674	***
Electricity	1 if the farmer's house has electricity	0.44	0.50	0.67	0.47	8.345	***
Type of access road	1 if the farmer's community has access to paved road	0.17	0.37	0.24	0.43	3.135	***
Transport	1 if the manner of transportation is by car	0.63	0.48	0.72	0.45	3.338	***
Farm factors							
Altitude	Metres above sea level	1,163	785	878	626	-7.229	***
Type of farming system	1 if coffee is produced in a mountainous or traditional polycultural system	0.32	0.47	0.43	0.49	3.757	***
Machinery to process coffee	1 if the household has machinery to process coffee	0.47	0.50	0.28	0.45	-6.956	***
Regional factors							
Farmers in the village	Number of coffee farmers in the farmer's municipality	3,682	3,082	2,890	2,491	-5.076	***
Intermediaries in the village	Number of intermediaries in the farmer's municipality	5.3	10.7	4.0	6.3	-2.9	***
Organization in the village	Proportion of organized coffee farmers in the farmer's municipality	21.7	18.3	7.6	11.0	-17.8	***
Intermediary sales in the village	Proportion of coffee farmers in the farmer's municipality who sell to an intermediary	62.5	30.6	80.5	21.6	12.6	***

Note: \*\*\* refer to significance at 1%.

#### 4.3.1. Intrinsic factors influencing farmers' participation in a cooperative

Variables that are likely to influence cooperative affiliation are grouped into four categories: (a) individual factors that include variables on farmer's characteristics (e.g. the farmer's age, education and training); (b) family factors that consider variables at the household level (e.g. farm size, household size and land property); (c) farm factors that include variables related to the coffee production system (e.g. altitude, type of farm and machinery to process coffee); and (d) regional



factors that are related to the municipality context (e.g. farmers, number of intermediaries and the proportion of selling to an intermediary in the farmer's municipality). We will discuss these variables (see Table 4.1) and identify their potential role in the decision-making process towards cooperative collective action.

#### 4.3.1.1. Individual factors

The age of the coffee farmer is considered to be related to experience and work capacity. Most household heads in the sample were between 30 and 60 years old, with an average of 47.6 years for cooperative members and 50.2 years for individual farmers. Even while many cooperatives originate from earlier times, they seem to keep their attraction for slightly younger and middle-aged farmers. It is therefore likely that cooperative members still have energy to transform the practices of their cooperative from the traditional practices current during the INMECAFE era of getting economic benefits from the government towards more commercial entrepreneurial activities now.

Gender is another individual variable that might play a role in defining the farmer's position vis-à-vis the cooperative. A quarter of all household heads included in the sample were female. Even though women's participation in coffee production has been increasing in the last decades, their participation in the Mexican agricultural sector still remains low. Women are consistently underrepresented in cooperatives, and therefore their contribution to the household income and (non-)farm activities tends to be lower compared to that of individual coffee farmers.

Literacy and education are key variables that influence labour productivity and business orientation. According to the survey information, 24% of coffee farmers are illiterate, but the degree of illiteracy is substantially lower amongst cooperative members. The education variable takes years of formal schooling as an indicator, starting at primary school. About a quarter of the coffee farmers recorded no education level, 62% had between one and six years of schooling and only 12% enjoyed more than six years of schooling. Schooling levels of cooperative members were substantially higher than those of independent farmers.

Considering that people who can read and have a certain level of education may be more open to either accept institutional change and/or the innovation of production systems to escape from chronic poverty, it is expected that farmers who are able to read and have more years of schooling will be more inclined towards participation in cooperatives. This is further reinforced by their better access to targeted training courses, in which cooperative members score twice as high as independent farmers. Thus, we expected to find a positive correlation between educational level, access to and participation in training courses, and the degree of cooperative participation.

Regarding the farmer's relationship with the institutional environment, data was collected on their participation in the current industry-representing organizations, specifically their inclusion in support activities provided by the National Coffee System network at the municipal, state and federal levels. While the latter is virtually restricted to cooperative farmers, independent coffee

growers are more often related to public agencies in general. In Mexico, access to state agencies remains an important factor for subsidized input support, approval of credit requests and bargaining on transport and marketing facilities.

#### 4.3.1.2. Family factors

There are several family or household factors included in the survey as possible determinants of cooperative participation and wealth. Per capita farm size reflects the available land resources for coffee production, which turned out to be almost three times higher at cooperative farms on average. Small-scale subfamily coffee farms tend to be less interested in coffee as a commercial activity. Otherwise, very large multifamily farms are quite capable to run economic operations on their own. The members of coffee cooperatives thus own and operate viable family units with a median farm size.

The household size, considering the number of farmer's relatives that live off and economically depend on the farmer provides an indication of labour availability. Almost 35% of all coffee farmers are nuclear families without family members being available, whereas 50% reported between 2 and 6 members in the household. The availability of family labour is a very important element in attending regular coffee maintenance and production activities. Cooperatives show consistently lower family labour involvement in coffee production (even when their average coffee areas are larger), thus indicating a tendency towards labour intensification. This is partly mitigated by the lower incidence of labour emigration on cooperative farms, which might reflect somewhat improved livelihood conditions. The availability of sufficient rural employment options is considered as an incentive for cooperative membership.

Land property ownership is usually considered as a key factor for stable rural livelihoods. The survey statistics shows that 43% of the farmers has ejidal property, 21% operates on communal land and 36% owns private land. It was considered as one if the farmer had ejidal or communal land property. Cooperative members more frequently belonged to common land property regimes. We took into account that these properties are usually located in more isolated and poorer areas than private properties are, and ejidal and communal properties are more frequently related with medium- and small-scale coffee farmers, who need to rely on cooperative organizations to strengthen their market access relationships.

To consider some of the wealth characteristics of coffee-producing households, the type of housing was considered as a key factor. Sample statistics shows that, on average, 43% of houses had a cement roof, floor or walls, which indicates relatively greater wealth. While 50% of the individual farmers belonged to this category, only 28% of the cooperative farmers could count on cement houses. Similarly, access to electricity, paved roads and transport facilities were consistently higher for individual farmers. General access to roads was extremely low, reflecting the marginal conditions of many poor coffee farmers living in remote rural areas. Cooperative organization might – to a certain extent – mitigate these adverse conditions and is usually meant to enable farmers to overcome the above-mentioned wealth constraints.

#### 4.3.1.3. Farm factors

Farming factors refer to the agro-ecological environment and farming system characteristics of coffee production. The altitude above sea level is of key importance for improving coffee quality. From the sample, 20% of the farmers had their plantation below 600 metres, 32% between 600 and 900 metres, 25% between 900 and 1,200 metres, and 23% above 1,200 metres.<sup>28</sup> Whereas possibilities to engage in other agricultural activities are increasing at a lower altitude, coffee quality and options for specialization in coffee production increase with a higher altitude. Given the fact that specialization is favourable for joint marketing, we expected a positive correlation between the altitude where a coffee farm was located and the degree of cooperative integration. This was indeed confirmed in the sample.

The manner in which coffee orchards are managed by the farmers is considered equally important to capture the importance of coffee production for rural livelihoods. We distinguished four types of farming systems: sunlight (3.5%); specialized (36%); traditional (0.5%); and mountain (60%). Cooperative farmers were usually more specialized in coffee, whereas under private farmers, reliance on mountain or traditional polyculture still prevailed. Farmers located in better areas for producing coffee tended to farm their orchards in more environment-friendly ways, relying on self-produced inputs and more labour-intensive methods.

Another variable considered as part of the household assets refers to the ownership of machinery to process coffee. Cooperative farmers relied more on farm processing of coffee and thus owned more processing machinery, whereas private farmers might rely on centralized processing (thus increasing also their potential for quality improvement). Otherwise, participation in cooperatives could also be instrumental to increase access to processing equipment.

#### 4.3.1.4. Regional factors

Regional factors refer to the spatial location of the farm and the externalities at municipal and state level. From the coffee census database, we retrieved the number of farmers per municipality, the amount of intermediaries who were active in the farmer's municipality, and the proportion of coffee producers participating in local coffee organizations. We expected that these three variables produce a positive effect on the institutional environment for coffee production and trade, and thus might enhance the likelihood of cooperative participation.

Cooperatives appeared more pronouncedly in larger villages where relatively less private intermediaries were active. Moreover, affiliation to cooperatives proved more frequent in communities that had a larger overall organization grade, thus indicating the likelihood of spill-over and/or demonstration effects. Although cooperative farmers sold significantly less coffee to private intermediaries (compared to private farmers), these sales were still high (62-80%) even in villages

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<sup>28</sup> This variable was measured in metres above sea level, but was squared and then divided by 1,000 to permit a non-linear shape of its effect.

with a strong degree of cooperative organization. Cooperatives were likely to reduce the proportion of side sales, but the presence of intermediaries might also enhance local competition and push-up farm gate coffee prices.

### **4.3.2. Extrinsic factors influenced by cooperative participation**

For our evaluation of the economic effects of cooperative membership, we focused attention on income, production and price effects, comparing between farmers who are members of a cooperative with independent coffee producers and who do not belong to any type of cooperative organization. The results of this comparison are presented in Table 4.2.

#### 4.3.2.1. Household income

The household income on a per capita basis generally was 50% higher for cooperative members (12,000 compared to 8,000 Mexican pesos for individual farmers), whereas similar differences were registered for per capita coffee income. For both cooperative and individual farmers, coffee represented about 20% of the full household income. For 30-40% of the farmers, coffee was considered as a secondary income source. The economic effects of coffee production on the household income tended to be stronger for farms that were more specialized in coffee. Cooperative membership might enable further specialization, since additional risk diversification mechanisms are available at group level. In addition, the efficiency of coffee production could benefit from improved access to yield-increasing inputs and quality-improving processing options. Both effects are likely to generate positive household income effects.

This can be further supported by access to several public subsidy and support programmes that are implemented in the Mexican countryside to assist poor people to overcome poverty traps. Cooperative farmers appear to receive substantially more frequent support from these programmes, commonly known under labels like "*procampo*", "*prodesca*" and "*oportunidades*". On average, 67% of all farmers in the sample received some kind of benefits delivered by these programmes, while their coverage of cooperative members rose to even 77%. Cooperative membership may thus provide a mechanism for increased access to public support services.

#### 4.3.2.2. Coffee production

Coffee yields proved to depend strongly on the age of the coffee plantation, plant density and input applications. Cooperatives possessed slightly younger coffee trees but also less frequently made use of chemical fertilizer inputs. On average, only 7.5% of the farmers reported using chemical fertilizers, indicating that most production systems are still rather traditional. On the other hand, more cooperatives were engaged in organic coffee production. However, the latter system is still rarely used, since from the total sample of 1,396 farmers only 35 confirmed to have their coffee orchard certified as organic production.

In terms of yield and production, cooperatives reached a 12% higher coffee production per hectare, which is likely to be the result of their higher degree of specialization and somewhat more intensive

production systems. The improved access of cooperative members to public support systems to enhance coffee production and household welfare will also stimulate cooperative coffee yields.

#### 4.3.2.3. Coffee marketing

Coffee farmers relied on different market outlets, depending on the type of coffee processing. Cooperatives sold considerably more processed coffee in parchment, green or roasted form. Moreover, cooperative members were inclined to sell a larger proportion of their harvest through the cooperative channel, even while still some 50% was sold to other intermediaries (compared to 83% for individual farmers).

Table 4.2. Variables influenced by cooperative membership (descriptive statistics and t-test).

Variable	Unit	Cooperative (N=427)		Non-cooperative (N=969)		T-test	Significance level
		Mean	SD	Mean	SD		
Household income							
Per capita annual income	Per capita annual income that farmer received in Mexican pesos in 2004	11,969	20,641	8,121	9,322	-4.775	***
Per capita coffee income	Per capita coffee income (coffee income divided by household members) in Mexican pesos in 2004	2,547	4,112	1,634	1,885	-5.564	***
Importance of coffee income	1 if the coffee income is the second source of income for the household	0.31	0.47	0.42	0.49	3.563	***
Support from programmes	1 if the farmer received support of "procampo", "prodesca" or "oportunidades" programmes	0.77	0.42	0.62	0.48	-5.617	***
Coffee production							
Age of coffee orchard	Age of coffee orchard in years in 2004	13.89	8.21	15.27	10.77	2.359	**
Coffee yield	Quintals per hectare in 2004	6.57	4.61	5.88	5.59	-2.557	**
Organic production	1 if the coffee orchard is registered as organic	0.07	0.25	0.01	0.09	-6.038	***
Chemical fertilizer use	1 if the farmer applies chemical fertilizer in the coffee plantation	0.03	0.16	0.09	0.29	4.360	***
Marketing							
Type of coffee	1 if the farmer sells processed coffee (parchment, green, roasted or ground)	0.78	0.41	0.56	0.41	-7.992	***
Selling through the cooperative	1 if the farmer sold the coffee through the cooperative	0.47	0.50	0.16	0.36	-13.430	***
Selling to an intermediary	1 if the farmer sold the coffee to intermediaries	0.49	0.50	0.83	0.38	14.049	***
Selling to the consumer or export	1 if the farmer sold the coffee to the consumer or export	0.03	0.16	0.01	0.10	-2.462	**
Timing of payments	1 if the farmer received the coffee payment at the delivery of the product	0.83	0.37	0.90	0.34	3.440	***
Coffee price	Coffee price in Mexican pesos per quintal in 2004	518	183.92	478	135.15	-4.421	***

Notes: \*\* and \*\*\* refer to significance at 5% and 1%, respectively.

A quintal is 245 kg of cherry coffee, 57.5 kg of parchment coffee, 80 kg of natural dry or 46 kg of green coffee.

The timing of payment is of considerable importance for reinforcing the security of rural households. Individual farmers were more likely to receive direct payment upon delivery (90%), whereas some cooperative members had to wait for their final payment until the cooperative had processed and sold the coffee. These delayed payments – usually due to internal credit and finance constraints – resulted, however, in a higher average coffee price received by cooperative members. Trade-offs between both types of contract convinced farmers to affiliate themselves to the cooperative organization.

## 4.4. Results

We will first analyse the factors that influence farmers' participation in cooperative organizations, using a probit regression model. Hereafter, we will proceed with an analysis of coffee price differences between organized and non-organized farmers per type of coffee that is delivered. Due attention will be given to the variables that play a role in selecting the type of coffee delivered by (non-)cooperative producers, relying on multinomial logistic regression estimates. We will conclude with an analysis of the determinants of the per capita coffee income, applying an ordinary least square regression on the pooled sample and for each of the two subsamples of cooperative and non-cooperative farmers.

### 4.4.1. Likelihood of cooperative membership

To understand the factors that influence the choice for membership of coffee cooperatives, we have taken cooperative participation as a dummy that takes the value 1 if a farmer participated and 0 if he or she had not. Typical individual factors, family characteristics, farming system properties and regional factors were used as explanatory variables. The results for five different model specifications are presented in Table 4.3.

A farmer's age had a positive effect on the probability of membership of a cooperative. The likelihood of cooperative membership increases with 1% for every 5 years that farmers were older. In addition, male farmers were considerably more likely to become a cooperative member. Literacy strongly enhances cooperative affiliation; marginal effects evaluated at the mean value indicate that an increase of 1% with regard to literacy increased the probability of joining a cooperative by 8.5%. Similarly, the variable training showed a highly significant result, with a marginal effect at the mean equivalent of an almost 20% higher participation chance for each additional 1% increase in farmers' training.

Farmers with a larger per capita farm size proved to have a higher chance of joining coffee cooperatives, but the marginal effect was declining with size, indicating that medium-size farmers are the 'preferred' cooperative members. This is confirmed by the effect of improved housing conditions, which had a strong negative effect on the probability of cooperative participation. The type of land property was significant in all models, showing that farmers who owned ejidal and communal land were more likely to participate in a cooperative compared to farmers who owned privately. Farmers located at a higher altitude were more likely to participate in coffee cooperatives compared to those located at a lower altitude.

Institutional factors turned out to be equally relevant to explain cooperative membership. Farmers with more access to the state-led National Coffee System were far more likely to join cooperatives. The reverse effect might hold as well. Similarly, having access to electricity produced a positive effect on the probability of participation in cooperatives, enabling farmers to engage in more advanced coffee processing activities.

It should be noted that some commonly used individual and family factors (like education and family size) turned out not to be significant in the present model specification. On the other hand, several village factors proved to have a robust influence on the likelihood of participation in a cooperative, in particular the number of coffee growers and the proportion of organized farmers in the municipality. This point to positive scale effects of local organization. Interestingly enough, coffee sales to local intermediaries negatively affected the likelihood of cooperative membership.

Regional dummies for the states of Veracruz, Puebla and Hidalgo showed a significant result in some model specifications, generally with a negative effect on the probability of participation in cooperatives due to acceptable access conditions (and thus strong competition with traditional intermediaries). We observed the opposite result for Chiapas, which indicates the attractiveness of cooperatives in sub-marginal conditions.

Table 4.3. Factors determining membership of a cooperative (Probit model).

Variable	(1)	(2)	(3)	(4)	(5)
Farmer's age	0.005 (0.193)	0.006 (0.144)	0.006 (0.065)*	0.005 (0.142)	0.005 (0.158)
Farmer's sex	0.165 (0.163)	0.159 (0.179)	0.206 (0.072)*	0.163 (0.169)	0.112 (0.319)
Farmer's participation in the NCS	2.520 (0.000)***	2.457 (0.000)***	2.265 (0.000)***	2.469 (0.000)***	2.503 (0.000)***
Literacy	0.290 (0.048)**	0.287 (0.049)**	0.288 (0.017)**	0.301 (0.017)**	0.319 (0.009)***
Training	0.592 (0.000)***	0.611 (0.000)***	0.610 (0.000)***	0.611 (0.000)***	0.672 (0.000)***
Education	0.003 (0.874)	0.007 (0.735)			
Per capita farm size	0.046 (0.131)	0.050 (0.109)	0.069 (0.032)**	0.052 (0.094)*	0.045 (0.118)
Size of household	-0.0001 (0.996)	0.007 (0.789)	0.0304 (0.249)	0.008 (0.775)	0.015 (0.544)
Land property	0.358 (0.006)***	0.380 (0.003)***	0.469 (0.000)***	0.385 (0.003)***	0.407 (0.001)***
Cement house	-0.162 (0.256)	-0.134 (0.347)	-0.110 (0.432)	-0.147 (0.301)	-0.225 (0.098)*
Electricity	0.431 (0.011)**	0.455 (0.007)***	0.463 (0.005)***	0.461 (0.006)***	0.408 (0.011)**
Altitude squared and divided by one million	0.156 (0.037)**	0.139 (0.059)*	0.113 (0.111)	0.149 (0.045)**	0.121 (0.093)*
Type of farming system	-0.085 (0.457)	-0.132 (0.232)	-0.089 (0.415)	-0.118 (0.288)	
Farmers in the municipality divided by one thousand	0.0135 (0.496)	0.014 (0.453)	0.047 (0.011)**	0.021 (0.282)	0.017 (0.377)
Organized farmers in the municipality	0.043 (0.000)***	0.037 (0.000)***		0.038 (0.000)***	0.038 (0.000)***
Coffee sales to intermediaries	-0.011 (0.003)***	-0.016 (0.000)***	-0.019 (0.000)***	-0.014 (0.000)***	-0.013 (0.000)***
Chiapas	-0.564 (0.109)		1.044 (0.000)***		
Oaxaca	-0.010 (0.825)		0.296 (0.267)	0.208 (0.325)	0.226 (0.275)
Veracruz	-0.933 (0.007)***	-0.575 (0.008)***	-0.436 (0.191)	-0.516 (0.022)**	-0.424 (0.041)**
Puebla	-1.044 (0.024)**	-0.676 (0.066)*	-0.528 (0.243)	-0.609 (0.103)	-0.663 (0.068)*
Hidalgo	-1.082 (0.003)***	-0.780 (0.004)***	-0.710 (0.049)**	-0.711 (0.012)**	-0.751 (0.007)***
Nayarit	-0.843 (0.004)***	-0.733 (0.000)***	-0.406 (0.157)	-0.573 (0.017)**	-0.478 (0.038)**
San Luis Potosí	-0.516 (0.136)	-0.177 (0.471)	-0.0446 (0.896)	-0.129 (0.607)	-0.107 (0.661)
Constant	-1.313 (0.003)***	-1.264 (0.000)***	-1.256 (0.003)***	-1.477 (0.000)***	-1.500 (0.000)***
Observation numbers	1,250	1,250	1,250	1,250	1,342
Pseudo R squared	0.425	0.423	0.376	0.423	0.418
Log Likelihood	-445	-447	-483	-446	-480

Notes: *P-values* in parenthesis. \*, \*\* and \*\*\* refer to significance at 10%, 5% and 1%, respectively.

#### 4.4.2. Price differences between cooperative and non-cooperative coffee farmers

We registered important differences in mean coffee prices between farmers integrated in cooperatives and individually operating farmers that point to economic effects in terms of bargaining power. For a further analysis of these differences, we conducted a t-test analysis of

price differentials between pairs of farmers that deliver the same type of coffee. Hereafter, the same procedure was performed between pairs of average prices for different comparable types of coffee in the supply chain. The latter comparison was done separately for cooperative farmers and farmers who are not participating in the cooperative trade.

Taking four types of coffee sold by farmers, cherry, natural dry, parchment, and green and ground, the t-test results showed several differences between groups. Considering the totality of farmers included in the sample, results showed that farmers who were members of a cooperative sold their coffee at a higher price than those who did not belong to a cooperative (see Table 4.4).

The mean coffee prices reported show that the prices received by farmers who belonged to cooperatives and sold cherry coffee were higher than those who sold parchment and green and ground coffee. Although this is an unexpected result, the explanation is found in the fact that organized farmers deliver cherry coffee to the cooperative firm that processes and sells the coffee directly at the national or external markets. The cooperative pays the final price to their members, considering the price that the organization received minus the processing and administrative costs. This implies that cooperative farmers can compete with larger plantations in selling parchment, green, roasted or ground coffee.

Most price levels received by cooperative members were statistically different from and superior to the prices paid to non-organized farmers who sold cherry and parchment coffee. Only for natural dry coffee non-organized farmers received a price advantage, but the number of cooperatives engaged in this process was very limited. Otherwise, prices received for green and ground coffee did not differ statistically between organized and non-organized coffee farmers, indicating that no major quality differentiation takes place.

Table 4.4. Price differences between cooperative and non-cooperative members (t-test by type of coffee).

Type of coffee sold by farmers	Organization	Price <sup>1</sup>	SD	T-test	Group	T-test with next stage
Cherry	Cooperative (N=60)	586.42	324.70	-5.298	1	(1 vs 5) 2.742
	Non-cooperative (N=305)	448.82	141.15		2	(2 vs 6) -5.259
Natural dry	Cooperative (N=24)	346.79	131.37	2.026	3	(3 vs 7) -4.014
	Non-cooperative (N=81)	427.88	182.30		4	(4 vs 8) -4.194
Parchment	Cooperative (N=306)	516.89	136.79	-2.181	5	(5 vs 7) -0.745
	Non-cooperative (N=442)	497.30	115.99		6	(6 vs 8) -2.533
Green and ground	Cooperative (N=22)	539.75	191.52	-0.246	7	
	Non-cooperative (N=93)	530.89	141.19		8	

<sup>1</sup> The price is in Mexican pesos per quintal.

The results regarding the natural dry coffee prices are an unexpected outcome. A possible explanation for this finding is that in the usually remote places where farmers sell this type of coffee, the local cooperatives work with a low quantity produce and with scarce resources, which make them less competitive vis-à-vis private buyers. This obliges farmers' organizations to accept a lower price than their competitors do, since neighbouring private firms enjoy better soil and



management conditions to deliver larger quantities and to produce a better quality of coffee for an exchange with the next stage in the supply chain.

The analysis of price differences between different types of coffee also reveals that further processing tends to be an attractive business. We therefore need to compare different coffee processing pathways, following either wet or dry processing techniques.<sup>29</sup> Results indicate that farmers who sold cherry coffee consistently received a higher price compared to those who sold parchment coffee (groups 1/2 vs. 5/6). In a similar vein, the price differences of those who sold natural dry and green and ground coffee was highly favourable for the latter category of farmers (groups 3/4 vs. 7/8). This is particularly the case for cooperative farmers. Regarding non-organized producer's prices, comparisons of the prices of those who sold cherry and parchment (groups 2 and 6), parchment and green and ground (groups 6 and 8) and natural dry and green and ground coffee (groups 4 and 8) all resulted in statistically different prices.

#### **4.4.3. Factors affecting the mode of coffee selling by farmers**

To obtain more insight into the factors that play role in the type of coffee that coffee farmers normally deliver, we conducted a multinomial logistic regression analysis for the four types of coffee processing: cherry, natural dry, parchment, and green and ground. The coffee-processing stage variable was regressed against relevant individual, family, farm and regional factors. In addition, being a cooperative member was included as a dummy variable to test whether this factor is influencing the choice of the type of coffee sold.

The marginal effects after multinomial logistic regression were obtained and outcomes are presented in Table 4.5. As we can notice, cooperative membership, farmer education and cement house ownership do not show a significant influence on any of the coffee processing choices included in the model. Otherwise, support received from public agencies negatively affects cherry processing and favours parchment processing. This might indicate that farmers subject to the national coffee programme enjoy certain advantages regarding further advanced processing modes. More traditional farmers belonging to ethnic groups, who have ample household labour resources and received less training, still opt for cherry marketing. Similarly, natural drying is preferred by larger families that are in transition from a coffee poly- to a mono-culture.

Individual factors that influence the coffee processing choice refer to farmers' age (positive for cherry and negative for parchment coffee), gender (female-headed farmers prefer cherry processing), ethnicity (indigenous communities prefer natural dried coffee) and training (favourable for parchment coffee, but with a negative sign for cherry processing).

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<sup>29</sup> Note that coffee sold as natural dry can neither be compared with the cherry, nor with parchment because this type of coffee is processed using the dry way, whereas processing from cherry to parchment coffee follows the wet way. Similarly, for green and ground coffee no further processing at farm level is considered, since this is done at factory level.

Family factors also play an important role in the selection of preferred coffee processing modes. For cherry coffee, household size and the availability of electricity provide a positive effect, while coffee support programmes have a negative effect. Natural dry coffee is preferred by larger households that lost people through migration have private land ownership and receive some general institutional support. For parchment coffee, household size, altitude and access to electricity and public coffee support programmes are important enabling factors. Green and ground coffee is mainly selected by larger farmers located at average or below average altitudes.

Table 4.5. Likelihood estimates regarding the type of coffee sold by farmers (marginal effect after multinomial logistic regression).

Variable/Type of coffee sold	Cherry		Natural dry		Parchment		Green and ground	
	dy/dx	Significance	dy/dx	Significance	dy/dx	Significance	dy/dx	Significance
Cooperative (1/0)	-0.023		0.000		0.033		-0.010	
Farmer's age	0.002	*	0.000		-0.003	**	0.000	
Farmer's sex	-0.066	*	-0.010		0.073	**	0.000	
Ethnicity	-0.111	***	0.015	*	0.092	**	0.061	
Training	-0.110	***	-0.009		0.101	***	0.012	
Education	0.006		-0.002		-0.005		0.000	
Per capita farm size	0.000		-0.002		-0.000		0.002	**
Size of household	0.016	**	0.004	**	-0.023	***	0.002	
Land property	-0.018		0.011	*	-0.012		0.019	
Electricity	0.140	***	0.009		-0.150	***	0.002	
Cement house	-0.047		0.013		0.043		-0.008	
Emigration	0.006		0.013	*	-0.032		0.013	
Institutional support	-0.025		0.021	**	0.016		-0.011	
Support from public coffee programme	-0.140	***	0.002		0.140	***	-0.002	
Altitude squared and divided by one million	-0.050		-0.008		0.083	***	-0.026	*
Type of farm system	0.088	***	-0.031	***	-0.049		-0.007	
Machinery	-0.120	***	-0.060	***	0.200	***	-0.018	
Chiapas	-0.169	***	-0.013		0.239	***	-0.056	*
Veracruz	0.171	***	-0.049	***	-0.115	**	-0.007	

Notes: \*, \*\* and \*\*\* refer to significance at 10%, 5% and 1%, respectively.

Observation numbers 1,249. Pseudo R square = 0.355. Log likelihood = -897.

Finally, farm factors that influence the choice for coffee processing modes are related to location (altitude), the availability of machinery and the degree of specialization of the coffee production system. Natural dry is usually preferred on more diversified farms that suffer from a scarce availability of machinery and equipment. Parchment is used at higher altitudes and requires more machinery use. Green and ground coffee is only feasible at lower altitudes. This implies that when the altitude increases the probability to sell parchment coffee increases as well, whereas the opposite result holds for green and ground coffee.

The states of Chiapas and Veracruz were included as dummy variables. In Veracruz, cherry coffee is preferred, whereas natural dry is hardly feasible due to high rainfall. In Chiapas, parchment coffee is the main delivery mode, whereas green and ground coffee – given the prevailing mountainous conditions – results with a negative sign.

#### **4.4.4. Determinants of the per capita coffee income**

The analysis regarding the variables influencing the per capita coffee income was based on OLS regression models. First a pooled regression was performed, using all observations included in the sample. Secondly, using the probit regression (see Table 4.3), we defined a Heckman selection model to test for potential selection bias. The results of this latter analysis indicate that this problem was not present. Thirdly, two additional regressions were performed, one considering only farmers that were cooperative members and another one only with individual (non-cooperative) farmers.

We used the Chow test to evaluate the significant and structural differences in parameter and function estimates and to test whether (non-)pooling is warranted. This resulted in significant statistic differences between both regressions that justify non-pooling. Therefore, we finally present the results from three types of regressions: the pooled sample, the cooperative subsample and the non-cooperative subsample (see Table 4.6). The Chow test confirmed that the coefficients for the variables determining the per capita coffee income are different between cooperative and non-cooperative groups.

Concordantly, we performed OLS regressions for the four categories of variables (individual, family, farm and regional). All individual factors – with the sole exception of ethnicity – showed a significant result in the pooled sample, whereas literacy and education showed a significant result in the income equation of the cooperative group. Otherwise, education proved to be the only significant individual factor for the non-cooperative members group.

As part of the family factors, farm size, the availability of machinery and electricity influenced income levels in the pooled sample. Membership of cooperatives had – as expected – a positive impact on the per capita income; its coefficient indicates that affiliation to a cooperative increases the per capita coffee income with 313.90 Mexican pesos, equivalent to 2.6% of the average income. Within the cooperative subsample, farm size, private land property and access to electricity tended to increase income. Within the non-member sample, farm size had a positive income effect, whereas machinery and electricity showed a negative result, implying that increasing the public and private infrastructure may reduce the per capita coffee income. This is mainly explained by the fact that far less advanced coffee processing takes place amongst individual farmers.

For the group of farm factors, the age of the coffee plantation and type of coffee system favoured coffee income in the pooled and non-member subsample. For the cooperative subsample, income was reduced by altitude, whereas for the non-cooperative subsample income increased with altitude. This is probably related to the reduced options for coffee processing in high altitude areas, and the increased orientation of private farmers towards high-quality segments of coffee that benefit from altitude.

Regarding the regional factors, the number of coffee farmers and the proportion of organized farmers in the municipality negatively affected the per capita income in the pooled sample. This points to trade-offs between the number of suppliers (competition effect) and the degree of farmers' organization (bargaining effect). An increase in the number of intermediaries could raise the per capita coffee income as the result of a more intensive competition. This became more apparent in the cooperative subsample.

Table 4.6. Factors determining the per capita coffee income (OLS estimates).

Variable	Pooled sample	Cooperative	Non-cooperative
Farmer's age	9.068 (0.096)*	20.20 (0.166)	3.294 (0.429)
Ethnicity	-131.8 (0.433)	-319.9 (0.512)	-104.3 (0.413)
Literacy	-573.7 (0.004)***	-1,749 (0.003)***	-151.5 (0.304)
Education	116.0 (0.000)***	255.3 (0.000)***	54.40 (0.010)**
Per capita farm size	395.6 (0.000)***	376.4 (0.000)***	378.2 (0.000)***
Type of road	148.1 (0.390)	493.2 (0.379)	7.110 (0.954)
Land property	190.5 (0.219)	1,292.5 (0.019)**	-44.81 (0.686)
Machinery	-425.2 (0.007)***	-611.7 (0.132)	-282.5 (0.025)**
Electricity	-1,580 (0.000)***	-1,860 (0.000)***	-1,282 (0.000)***
Cooperative	313.9 (0.071)*		
Support from programmes	4.569 (0.977)	-43.24 (0.927)	-96.38 (0.420)
Altitude	-0.135 (0.225)	-0.448 (0.093)*	0.169 (0.072)*
Age of coffee trees	15.35 (0.026)**	39.47 (0.111)	9.593 (0.046)**
Type of coffee	446.6 (0.007)***	1,326 (0.021)**	400.9 (0.001)***
Farmers in the municipality	-0.082 (0.009)**	-0.061 (0.453)	-0.073 (0.005)***
Intermediaries in the municipality	75.69 (0.000)***	140.9 (0.000)***	2.121 (0.813)
Selling to an intermediary in the municipality	0.897 (0.810)	-2.996 (0.771)	-2.757 (0.392)
Farmers organized in the municipality	-19.18 (0.010)**	-41.47 (0.009)***	-1.667
Chiapas	1,479 (0.000)***	2,059 (0.011)**	1,048 (0.000)***
Guerrero	1,538 (0.001)***	1,511 (0.118)	1,930 (0.000)***
Veracruz	413.0 (0.067)*	676.2 (0.465)	348.4 (0.029)**
Constant	1,211 (0.021)**	139.0 (0.919)	1,772 (0.000)***
Observation numbers	1,297	397	900
R square	0.319	0.346	0.395

Notes: *P-values* in parenthesis. \*, \*\* and \*\*\* refer to significance at 10%, 5% and 1%, respectively.

The three state dummies were significant for the pooled and non-cooperative subsamples, but in the cooperative sample only Chiapas was significant with a positive sign, indicating that especially in this state participation in a coffee cooperative produced an increase in the per capita income. This reflects the long tradition of farmers' struggle and the high degree of organization that is characteristic for this state.

#### 4.5. Conclusions and outlook

This study has identified several key factors influencing the participation of coffee farmers in cooperative organizations. We obtained the data from a survey of 1,396 coffee growers stratified by municipality and randomly selected within the municipalities, and complemented with information from the national coffee census. We used probit models to detect the main factors that influence cooperative membership in the Mexican coffee sector. It appears that a farmer's age, gender (male), a farmer's access to the National Coffee System, literacy rate, participation in training events, farm size, communal land property, availability of electricity, higher altitude, the number of farmers in the municipality and the proportion of organized farmers in the municipality

all favour cooperative affiliation. Only the housing conditions (as a proxy for wealth) and the proportion of farmers in the municipality selling to intermediaries negatively affect prospects for cooperative membership. Regional differences regarding coffee production conditions also showed a significant result in influencing the likelihood for joining a cooperative.

In several respects, our results are broadly in line with findings from earlier studies (Basu and Chakraborty, 2008; Francesconi, 2009; Karli *et al.*, 2006; Ruben and Lerman, 2005; Tanguy and Alemayehu, 2009; Tanguy *et al.*, 2008) that rely on different methods to address similar questions regarding cooperative affiliation. On the effect of the farmer's age and gender, we can confirm the findings by Karli *et al.* (2006) and Tanguy *et al.* (2008, 2009) that register a positive effect of a farmer's age and male membership on cooperative membership. This might imply that Mexican coffee cooperatives represent a relatively older population and maintain a largely male-biased membership composition. In a similar vein, the positive influence of literacy on cooperative participation is confirmed, in line with results reported by Tanguy *et al.* (2009). The positive effect of a farmer's access to the National Coffee System reflects the fundamental importance of public support, concordant with similar findings by Karli *et al.* (2006) for Turkish cooperatives.

Our results do not show significant effects of education and household size and composition on the likelihood of cooperative membership. A minimum of literacy and participation in coffee training events appear to be more important than formal schooling. Most other individual and household characteristics reflected the expected effect. Local and regional factors, such as the availability of electricity, altitude and population density showed a strong and significant positive impact on the probability of cooperative participation. Better-off farmers with more resources were less likely to engage with cooperative organizations.

Regarding the effects of cooperative affiliation on coffee marketing options and farm household income, we have found consistent evidence that cooperative farmers are able to negotiate for better coffee prices, especially when delivering cherry and parchment coffee. On the other hand, our results show a negative effect of cooperative participation on the average price when delivering natural dry coffee. This implies that cooperatives enjoy a comparative advantage in coffee marketing only if some additional processing services can be included.

As part of the analysis regarding farmer's choices for different types of coffee processing, we elaborated a typology based on specific intrinsic and extrinsic factors that influence the degree of processing. Older farmers with a larger household size and less institutional support are more likely to sell cherry coffee. Otherwise, indigenous farmers with more common property farm land and some emigrated family members tend to prefer delivering natural dry coffee. Parchment coffee is typically delivered by younger and smaller households located at higher altitudes, who received training and possess some machinery that enables deliveries of parchment coffee. Finally, larger farms located at a lower altitude select deliveries of green and ground coffee. Contrary to our expectation, we did not find clear evidence that the cooperative participation exercises a direct influence on decisions regarding the type of coffee that farmers sell. Our results are consistent with

the geographic location of coffee farmers, with Veracruz mainly selling cherry coffee and Chiapas selling parchment coffee.

With regard the factors that are important in defining per the capita coffee income, we have found an overall positive effect of cooperative participation on household welfare. However, neither the richest nor the poorest coffee farmers are most affiliated to cooperatives, but more importantly, it is the middle-class farmers who benefit from the greatest welfare effects. This tends to be mediated by their improved access to external infrastructure (roads, but mainly electricity) that enables further progress in coffee processing. Only when the coffee cooperatives support upgrading and value added activities, significant price advantages can be generated.

Some limitations to the analysis need to be acknowledged. First, given the available field data, we can only draw conclusions about relevant coffee activities and unable to infer full household income effects. Higher prices may lead, however, to more attention dedicated to the coffee fields and may eventually increase the coffee income share of rural households. Secondly, differences in coffee production systems and technologies are only globally acknowledged. Cooperative affiliation may lead to an improved input efficiency and lower average input costs that positively affect net farm income, but these effects were not fully included in the data set.

Finally, our results provide consistent evidence and a sound motivation for further promoting cooperative coffee production in rural Mexico, particularly in areas where options for economies of scale and further processing are available. In addition to individual factors that enhance cooperative membership (literacy, training), there is considerable scope to support cooperative development through institutional programmes that strengthen the external infrastructure. Moreover, local and regional economies of scope readily emerge in communities where more farmers adhere to cooperative organizations, thus potentially generating a kind of snowball effect.

Further research regarding the long-term effects of rural organization on farm household welfare and bargaining power, comparing matched samples of members and non-members living in the same area, would make it possible to shed more light on the enduring effects of cooperative membership. Our material suggests that under the current wave of market liberalization in Mexico, coffee cooperatives received a new impetus that enables progress in processing, marketing and supply chain upgrading.

## Chapter 5. Farmers' cooperatives as a response to uncertainty: Empirical findings from the Mexican coffee sector

### 5.1. Introduction

Coffee is a major export crop for many developing countries and represents the second most traded world commodity after petroleum. The worldwide production in the 2008-09 harvesting season was 168 million quintals (7.6 million tons of green coffee).<sup>30</sup> Coffee generates income for 125 million smallholder farmers and their families in developing countries, who live in more than 50 developing countries including Mexico.

In Mexico, coffee is a very significant crop, both economically and socially. It is fifth in value of Mexico's total agricultural exports, and almost 500,000 farmers and their families depend on coffee for a living (SIAP, 2008). Coffee orchards are concentrated in Mexico's poorest zones, while major coffee-producing areas are mountainous, with poor communication and limited public services. At present, coffee is the primary economic activity for more than 4,500 communities located in 12 Mexican states; many of these communities have a large indigenous population. Consequently, 60% of coffee producers live in extreme poverty, with more than half of them belonging to one of Mexico's 52 ethnic groups (Fuzhi, 2007; ICO, 2009; IDEA, 2006).

Coffee has been the most important source of agricultural revenues from abroad for many decades in Mexico, generating 413 million dollars of foreign exchange annually in the nineteen nineties and up to 230 million dollars of foreign exchange annually during the last decade (Banco de México, 2010). Although coffee's relative economic importance has declined, it still remains the country's largest single export crop and a key source of foreign income (Calo and Wise, 2005; Pérez *et al.*, 2001).

Under the controlled coffee market regime, producers were organized mostly through government associations. However, after the demise of the economic clauses of the international coffee agreements in 1989, growers faced considerable uncertainty about their trading environment. Under the quota system, the basic farmers' organizations were the *Unidades Económicas de Producción y Comercialización* (UEPCs, by its initial in Spanish); but after the ending of the economic clauses of the International Coffee Agreement, most of them disappeared and some of them changed into another kind of producer organization, named producer cooperatives. Since then, producers have increasingly formed and joined cooperatives that engage in activities such as securing access to funding, adding value to the product, entering into sustainable coffee markets, providing information, and negotiating better prices and quality vis-à-vis their counterparts.<sup>31</sup> This has partially filled the gap left by the government in processing, marketing, and exporting coffee.

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<sup>30</sup> A quintal is 245 kg of cherry coffee, 57.5 kg of parchment coffee, 80 kg of natural dry or 46 kg of green coffee.

<sup>31</sup> The words organization, association, cooperation and cooperative are used synonymously in this work to avoid boring repetition, although it is recognized that each of them contains its own distinctions and connotation.

This chapter focuses on the cooperatives' response to uncertainty. We will present evidence to show that more farmers engaged in cooperatives, where the predictability about the trading environment, measured as the variance of the coffee prices at the municipal level from 2001 to 2004, was lower. In doing so, we will also answer the reverse question: to what extent has price unpredictability diminished due to cooperative participation? We will also test the relationships of variability of coffee price variability and cooperative membership with the individual coffee price and yearly coffee income.

In Chapter 4, we have used similar information and work on the factors determining the coffee growers' willingness to participate in a cooperative. The effect of cooperation on the per capita yearly coffee income was tested as well. During that work, we found that local and regional factors show a strong and significant impact on the probability of cooperative participation. Regarding the factor affecting the level of household welfare, we found that cooperation matters.

The results indicate that there is no clear link between cooperative participation and the predictability of local coffee prices. However, we have found clear evidence that – controlling for individual and municipal characteristics, education of the head of household, communication, land property, altitude, farm size, number of coffee farmers in the municipality and variance of farm size – the variability of the coffee price positively affects farmer's membership of an organization. The results also indicate that membership of a farmers' organization helps producers increase their coffee price and income.

We rely on information collected in a representative field survey conducted in 2004 throughout the eight major coffee-producing states, additional village-level data from the National Coffee Census database retrieved from 2002 to 2008, and other databases reported by SIAP (2010), ICO (2009) and CMC (2005).

The remainder of the chapter is organized as follows: Section 5.2 presents theoretical considerations of risky markets and farmers' preferences and constraints regarding rural cooperation. It also presents major characteristics of the Mexican coffee market related to these topics. Section 5.3 outlines data used in the study and the methods we applied. Section 5.4 highlights the empirical approach. Section 5.5 proceeds with the presentation of empirical results grouped into four parts: (1) the variability of the local coffee price and its effect on the degree of organization; (2) market price variability as affected by the degree of cooperation; (3) the effects of price variability and cooperation on the individual price; and (4) the influence of market uncertainty and cooperation (membership) on the annual coffee income. Finally, in Section 5.6 we draw some conclusions and policy recommendations to strengthen the economic role of cooperatives in the Mexican coffee sector.

## **5.2. Theoretical considerations**

In times of uncertainty, farmers have an additional incentive to participate in cooperatives. In normal times, the incentive for forming a cooperative comes from the potential benefits of



economies of scale and of a better negotiating position vis-à-vis the traders. If uncertainty is added, farmers may seek information from colleagues to better know what the market may bring in terms of prices and access to traders. Without such collaboration, traders are likely to strike different deals with different farmers. This would result in a high (cross-sectional) variance of the prices paid to different producers. In the event that farmers know more about the market because they have obtained more knowledge of the prices other farmers received, the variance of the prices paid is likely to be less. Similarly, if many traders can arbitrage between supplying farmers, this may also lead to a low level of variance. This also requires intensive knowledge of what farmers have to offer and on the low costs of arbitraging. Besides receiving better coffee prices, organized growers may join a cooperative to vertically integrate with a processing stage and thereby achieve higher prices for their product. On the other hand, it would be easier for coffee intermediaries to deal with organized farmers. Thus, we expect that by forming cooperatives both farmers and intermediaries win by reducing transaction costs.

As described by ICO (2005), market prices are influenced by several factors. Those factors are the result of the transactions of agents intervening in the commodity. Other, less important or less related factors are also determining the coffee price path and volatility.

Price volatility is an important concern for the different actors in any supply chain. The market uncertainty generates difficulties in planning and the development/implementation of effective market policies. Particularly, in the case of the coffee market, volatility is directly linked to the primary supply and demand; this change is particularly important when prices fall. Also, this volatility is influencing the producers and other primary agents' behaviour. Higher price volatility implies a higher standard deviation; by contrast, a market registering a lower price variability will produce a lower standard deviation.

ICO (2005) found that the price volatility became higher under the free trading system than under the economic clauses of the International Coffee Agreement. This phenomenon has been observed particularly after 1993. The same study found that the coffee price volatility is increasingly related to the investment fund activities in the last decade, and less to the market factors and more to the environment factors.

From one year to the next, local prices will vary in response to the world market price and in response to changes in local conditions, such as changes in weather and trading networks. If trading channels are relatively rigid, farm gate prices are likely to follow external prices quite closely, while margins between farm gate and export prices are rather fixed. If, however regimens change (due to traders exiting or entering) every year, these margins may vary from one year to the next. Another reason for local prices to not follow export prices completely are local quality changes and environmental characteristics, such as infrastructure and/or weather conditions. As Figure 5.1 shows, the margins between state and international prices change from year to year.

If arbitrage between villages is rather costly because of a lack of infrastructure, it will not secure equal pricing over space. Over time, however, prices may still be stable relative to export prices, if the same traders purchase the coffee year after year. Fluctuations in the relationship between local prices and export prices over time are an indication that this is not the case (or that quality fluctuations play an important role, which is not observable). Membership of cooperatives and the better communication that comes with it may substitute for stronger competition among traders. It might result in a reduced spatial variation of prices and thereby in more stable price relationship with the export markets. This can be tested by checking whether the degree of organization of the farmers at the municipal level has a positive effect on the local residual variance of the coffee prices, after accounting for international coffee price fluctuations.

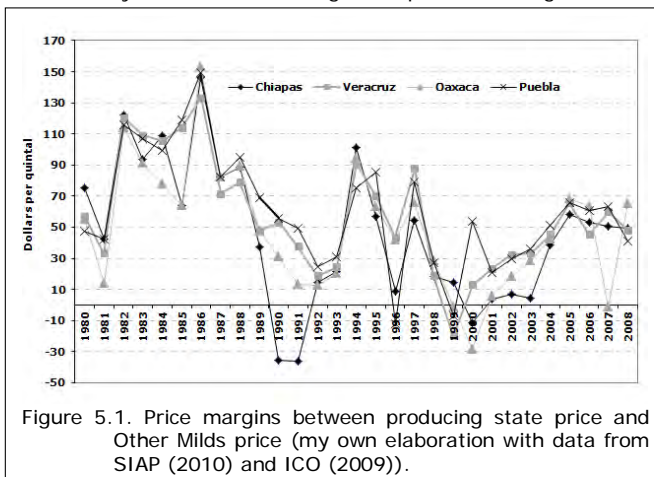


Figure 5.1. Price margins between producing state price and Other Milds price (my own elaboration with data from SIAP (2010) and ICO (2009)).

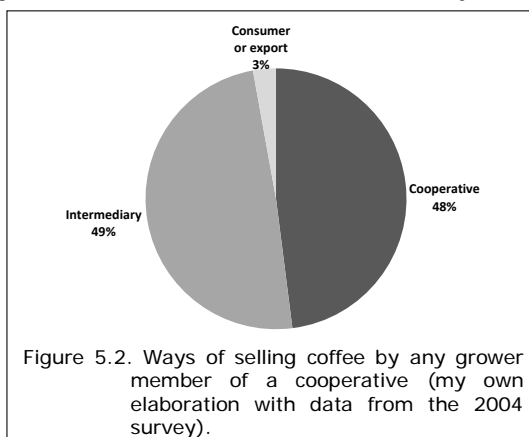
Coffee farmers face a number of difficulties. Generally, they are located in areas with poor infrastructure and service provision. Their income is highly volatile because of the fluctuation of coffee prices. As a result of isolation in some areas, intermediaries normally work under imperfect competition. An increase in the number of purchasers was expected after the end of the economic clauses of the International Coffee Agreement (ICA) and the demise of INMECAFE in 1989, but this has not happened at the processor level; the number of local processors and exporting companies has remained the same or has even decreased in some years. As some interviewed intermediaries told us, shortly after the ending of the quota system, several primary traders related to local investors disappeared from the coffee market, and then traders from multinational companies spread in some of the producing regions. Nowadays, in some places there are smaller and medium-sized primary traders in producing areas than there were under the controlled system, but many of them are not registered in the coffee product system; thus, when checking the statistics, it appears that there are fewer primary traders than there were before 1989.

Coffee growers in Mexico face two main risks. One comes from production fluctuations due to adverse weather and pests or diseases, and the other comes from the market due to the volatility of local prices, which in itself is a result of volatile international coffee prices and exchange rate fluctuations. The second risk is arguably the more important one. Price fluctuations cause problems for the individual growers in planning their investments and in maintaining their coffee plantations. Farmer cooperatives are also hindered by coffee price variability in collecting, processing, and marketing the product. Specifically, cooperative managers do not know the amount and quality they will be able to buy in the coming months.

As there currently is no market regulation, the world coffee price fluctuations are transmitted directly to the coffee producers, who bear most of the impact of price volatility. We argue that for many coffee farmers, price volatility can be handled more efficiently through processing and selling the coffee collectively rather than doing so individually (Gjolberg and Steen, 1999). The possibly better price for farmers can come in two ways: one by selling more downstream of the supply chain and one by acquiring more negotiation power vis-à-vis their buyers. Another way to tackle these market issues is by selling through the future market mechanism.

Defining a rural cooperative as an association of persons who work together to achieve certain objectives, we can distinguish cooperatives from other economic organizations in the sense that cooperatives are voluntary associations of people, where decisions are based on member participation and representation and not on capital voting power (for a variety of types of cooperatives, their constitution and objectives, see Levay (1983)). As there are large economies of scale in processing and marketing, individual farmers are disadvantaged due to the high transaction costs related to their usually small production size (Tanguy and Alemayehu, 2009). The main advantage of marketing cooperatives is then that they reduce transaction costs and thus improve the bargaining power of smallholders against middlemen (Francesconi, 2009).

Under the free coffee market, the federal and state governments have shortly promoted cooperatives. Some coffee grassroots organizations (UNORCA, CNOC) have recently been promoting farmer organizations as well, as the way to sort the collecting, processing, and selling of the product in a more profitable manner. According to information coming from the Mexican Coffee Census (SIAP, 2008), only 13.8% of the coffee producers participate in some kind of cooperative. But only a minority of farmers joins a cooperative and if they are members, they do not normally sell all their coffee via the cooperative. This is what Figure 5.2 shows for the farmers surveyed in 2004.



Producer cooperatives work in the same market as private companies do. The cooperatives compete with transnational buyers to purchase similar coffee. Yet, normally, cooperatives are at a disadvantage because private buyers typically have the capacity to pay the total value of the product upon receipt, whereas cooperatives lack the cash money to do so; they often pay a first instalment, about 50% of the value upon receiving the coffee. Cooperatives complete payment upon finishing the harvest season (Pérez *et al.*, 2001). Thus, because transnational companies do not have budget constraints, they are often active in buying coffee directly from both organized and non-organized farmers. Furthermore, having these two very different competitors in the same market has implications for their behaviour. They are forced to align prices, services and buying

station; normally, private buyers are adapting to the cooperatives' way of working, and sometimes cooperatives try to adapt to the private buyers; this means that they try to pay similar prices and to establish their buying centre near to the others. Additionally, some other issues are similar among competitors in every producing region, such as the quality, time in the season, and deals.

The firms' adaptation to cooperatives' functioning could be beneficial or problematic for both organized and non-organized farmers placed in the same area. It depends on the efficiency of the cooperatives' operations. As a result, as has been mentioned by Milford (2004), purchasing prices are normally higher in areas where cooperatives are present than in areas where such organizations are not operating. We expect, however, that also in places where cooperatives are working inefficiently the coffee price will be lower.

The development of grower organizations has been supported by the government. Federal and state agencies require coffee growers to be organized if they want to apply for some subsidy; in addition, some support to increase long-term investment in processing plants is given only to organized producers. In the last two decades, government agencies have been supporting farmer organizations to increase investments in producing, processing, and marketing coffee; they do so mainly through two programmes: "*fondo de inversión y capitalización*" and "*proyectos productivos*." Other government support to organized producers has been oriented to facilitate the communication and information exchange regarding the market condition. To do so, the federal government has been financing programmes such as "*promoción del consume del café*" and "*coberturas de precios*"; the first one was supported with 4.48 million dollars and the second one with 8.14 million dollars in 2009. Additionally, through the government's economic support in a similar vein, market information has been distributed through the platform of the CPS and the AMECAFE.

Karli *et al.* (2006) has shown that variables such as education, communication, income, farm size, medium and high technology variables, influence the farmer's decision to participate in organization. Thus, it has been found that small and medium-sized farmers are more likely to join an agricultural cooperative than wealthier farmers are. Particularly in Chapter 4, we found that age, gender, farm size, the level of organization at the village level, among other factors, favour cooperative formation; whereas the housing condition and the proportion of producers selling to private traders at village level negatively influence cooperative filiation. In the same chapter, we found a positive effect of cooperation on the per capita coffee income.

At a higher level, several small cooperatives have joined in grassroots organizations that give them a voice in formulating regional and national policies. This process can be observed in more populated coffee-producing states such as Oaxaca, Chiapas, Guerrero, and Veracruz. Thus, cooperatives which have emerged in many ways have been involved in a variety of strategies; the most successful types of coffee grower cooperatives have been those that have been oriented on work in organic and fair trade coffee (Pérez *et al.*, 2001).

### **5.3. Empirical approach**

We considered the variability of the coffee price over eight years (2001-2008) at the municipal level as a dependent variable to be tested against the level of organization coming either from the 2004 survey or from the 2001 National Coffee Census database. We expected a higher degree of organization in 2004 in municipalities with a higher variability of coffee prices from 2001 to 2004. Considering the influence that the level of organization can have in the market, we also expected that municipalities that register a higher level of organization in 2004 would have a lower level of variability in coffee prices evaluated from 2005 to 2008.

In this chapter, we use a unique approach. By using coffee prices over an eight-year period at the village level, we were able to have a variable related with the variability of coffee prices. This variability is also expressing the structural differences among coffee-producing municipalities. Then, to test the effect of the cooperation registered in 2004 on the variability of the coffee price, we took the period from 2005 to 2008 and got the variability of the coffee price only on this period of time. In the same vein, we evaluated the possible effect of the variability of the coffee price from the 2001–2004 period on the level of cooperation registered in 2004. By doing so, we were able to control for a possible recursive effect of cooperation and the variability of the coffee price.

In our analysis of the decision to join a cooperative, we introduced the density of coffee producers and the variance of farm sizes at the municipal level as explanatory variables. A large number of coffee farmers in the municipality implies low transaction costs in organizing a cooperative. At a given number of farmers, a larger variance of farm sizes in the municipality indicates a greater diversity of interests. This may hinder the formation of cooperatives. We also expected that a higher number of similar producers in the same municipality would make it easier to organize cooperatives. Additionally, we expected large-scale coffee producers to be less willing to join a cooperative because they have better options for vertical integration and creating their own coffee brand. On the other hand, we expected small- and medium-scale farmers to be more likely to join agricultural cooperatives as they have more to gain (Karli *et al.*, 2006).

Factors like the level of education, the size of the coffee farm, and the location and altitude of the coffee plantation are of some importance in a farmer's decision to get affiliated with a cooperative (see Levay (1983) for a concise overview). We also expected that farmers who live in a municipality with better market characteristics to commercialise coffee, have less incentives to cooperate. In the following section, we will test these hypotheses by using comprehensive data on the Mexican coffee sector. The procedure applied here is the same as in Chapter 4 of this thesis. Yet, we dropped some variables (farmer participation in the NCS, literacy, training, per capita farm size, type of farming system, organized farmers in the municipality and coffee being sold to intermediaries), while farm size, altitude squared and variance of farm size, and the mean and variance of the coffee prices from 2001 to 2004 at the municipality level were added in this

chapter.<sup>32</sup> By including these variables, we try to test how much easier it gets for farmers to be organized as an effect of their similarity at the municipal level. With this procedure, we also try to capture the effect that the uncertainty and variability of the coffee price have on cooperative formation. Thus, the model specification in the present chapter differs much from the similar one used in Chapter 4.

The economic effect of cooperatives on farmer benefit was evaluated by testing whether being a member of a grower organization increased the coffee price and farmers' income. This test is a fundamental one to shed light on the role and impact of cooperatives; it relates to the relevant policy discussion on the importance of grower organizations with regard to increasing coffee producers' economic benefits. The principle applied to these two sections is that cooperation increases coffee prices by reducing transaction costs, as it generates some value added to the product, and increases farmers' bargaining power over buyers. At the same time, grower organizations can reach more economically attractive markets (Tanguy *et al.*, 2008) which results in higher economic benefits. We expected that organized producers would have a higher income than those who are not cooperative members.

#### **5.4. Data and methods of analysis**

Data was collected in a survey of the eight main producer states in Mexico in 2004 (Ramírez *et al.*, 2004). This information was complemented with information included in the Coffee Census database (SIAP, 2008). In addition, to measure price uncertainty and calculate the mean and the variance price in the 2001–2004 period, we used municipal data on prices for eight years, constructing a panel with data coming from the SIAP databases (SIAP, 2010). Using these panel data, we tested for the effect of farmer organization on the price variability, by applying an ordinary least square regression. For this procedure we used data for the 432 municipalities listed in the Census, which included the 66 municipalities considered in the 2004 survey, of which the prices were available for most of the eight-year period.

The National Coffee Census was administered mainly in 2001. Both, the 2004 survey and the Census, include individual, family, farm, market, and regional characteristics. In the survey, a sample of 1,396 farmers was taken from a list of 353,696 coffee plots benefited with the “*desarrollo productivo y mejoramiento de la calidad del café*” (productive development and coffee quality improvement) programme. The sample selection took place in two steps: first, municipalities were selected according to their proportion of coffee production; secondly, farmers were chosen from each municipality according to farm strata (Ramírez *et al.*, 2004). This resulted in a stratified sample that is considered representative for the Mexican coffee sector.

The SIAP average annual rural coffee prices were weighted by the total monthly production. It is representative of the price paid to coffee growers during the corresponding period of time. These

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<sup>32</sup> The NCS is a non-governmental instance constituted to serve as mechanism for permanent planning, communication and consultation between different actors in the Mexican coffee supplying chain.

statistics are generated yearly for the main crops farmed in Mexico. To do so, the next expression has been applied:

$$ARCP = \frac{\sum_{i=1}^n (P_i \cdot Q_i)}{\sum_{i=1}^n Q_i}$$

ARCP = Average Rural Coffee Price.

$i = 1, 2, \dots, n$  represents the number of months when the coffee is marketed.

$P_i$  = Average coffee price in the  $i$  month.

$Q_i$  = Coffee production in the  $i$  month.

Thus, the ARCP is equally representative of the municipal, state and federal level. These prices, which are reported on a yearly basis, are an average for the whole range of qualities and growers in the municipality. The registration of the price in each producing region falls under the responsibility of the SAGARPA, which has offices spread all over the coffee-producing areas, named Support for the Sustainable Rural Development Centres (CADERS, by its initials in Spanish). Each month, personnel from this ministry interviews producers and intermediaries randomly selected from each producing region to get the average coffee price. Then, these prices are sent to the Agriculture and Livestock Information System (SIAP, by its initials in Spanish), which processes and publishes the statistics (personal communication with SIAP personnel). These coffee prices have been reported on the SIAP website annually since 2001 (SIAP, 2010).

The SIAP statistics report the price in cherry coffee equivalents. To make this comparable across producing regions, the parchment and dry beans coffee price is used as a standard measure. For example, the price of a kilogramme of parchment coffee is divided by 4.35 to get the price of cherries. This factor is the same as considering a quintal of parchment coffee to be equivalent to 57.5 kg, whereas a quintal of cherry coffee is equal to 245 kilogrammes. Using the SIAP statistics, we can compare the Other Milds and fob prices with the average rural price. Figure 5.3 shows the local prices as well as the margins between fob and Other Milds and the rural prices.<sup>1</sup> The high variation of the rural price over the last 28 years is clear enough. The margin between the export prices (fob and Other Milds) and the rural prices also fluctuates; during the nineteen eighties, the price margins were larger than they were during the last two decades. At the end of the nineteen nineties and the beginning of the 21<sup>st</sup> century, a low margin was recorded.

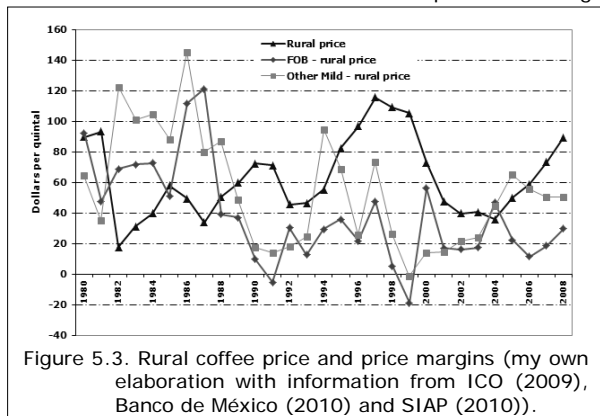


Figure 5.3. Rural coffee price and price margins (my own elaboration with information from ICO (2009), Banco de México (2010) and SIAP (2010)).

<sup>1</sup> Fob price was computed by dividing the total coffee export value by the volume exported; the information are reported by the Banco de México (2010), and the Other Milds prices are reported by the ICO (2009).

The work to build the National Coffee Census database was done by sending technicians and qualified personnel to take the measurement of each plot with a coffee orchard with the aid of GPS, and to interview the owner of each coffee plantation. This information was then noted down and organized to construct a unique database (SAGARPA, 2001). While the major part of the information was collected in 2001, since then other information has been added to the National Coffee Census. The database built until 2008 contains technical, economic, and social data of 493,497 coffee growers. Information about farm size, a farmer's age, household size, market outlets, assets in the household, members of household and their individual characteristics, type of coffee system and regional characteristics can be retrieved from this information (SIAP, 2008).

Table 5.1. Names and descriptive statistics of variables included in the analysis (N = 1,396).

Variables	Definition and unit	Mean	SD
Individual			
Farmer's sex	1 if the farmer is male	0.74	0.44
Ethnicity	1 if the farmer speaks any indigenous language	0.48	0.50
Education	Schooling level in years starting in primary school	3.70	3.43
Cooperative member	1 if the farmer is a cooperative member	0.31	0.46
Predicted cooperation	Prediction of being a cooperative member from the probit regression	0.29	0.25
Family			
Cement house	1 if the house has a cement roof, wall or floor	0.43	0.50
Electricity	1 if the farmer's house has electricity	0.60	0.49
Type of road	1 if the farmer's community is accessed by a paved road	0.22	0.41
Farm			
Coffee price	Mexican pesos per quintal (2004)	491	153
Coffee income	Annual coffee income in Mexican pesos (2004)	3,652	3,336
Land property	1 if the farmer owns ejidal or communal land	0.64	0.48
Altitude	Metres above sea level	915	358
Farm size	Hectares of coffee	1.89	6.89
Age of coffee trees	Age of the coffee plantation in 2004	14.85	10.08
Market			
Type of coffee	1 if the farmer sells processed coffee (parchment, green, roasted, or ground coffee)	0.63	0.48
Ratio intermediaries/farmers	Number of intermediaries in 2005 divided by the number of coffee farmers in the farmer's municipality multiplied by 1,000	1.31	1.93
Mean of coffee prices	Mean of the coffee price in the farmer's municipality from 2001 to 2004 (Mexican pesos per quintal)	376	111
Variance of coffee prices	Variance of the coffee prices in the farmer's municipality from 2001 to 2004 (in thousands of Mexican pesos per quintal)	8,482	11,094
Regional and state			
Farmers in the municipality	Thousands of coffee farmers in the municipality from the National Coffee Census (only municipalities included in the 2004 survey)	3.13	2.71
Level of organization	Percentage of farmers organized in the municipality according to the National Coffee Census (2001).	11.86	15.18
Variance of farmer's size	Variance of farm size in the farmer's municipality according to the 2004 survey sample (in thousands)	26.13	95.95
Chiapas	1 if the coffee household is in the state of Chiapas	0.27	0.44
Guerrero	1 if the coffee household is in the state of Guerrero	0.03	0.17
Hidalgo	1 if the coffee household is in the state of Hidalgo	0.11	0.32
Nayarit	1 if the coffee household is in the state of Nayarit	0.11	0.32
Oaxaca	1 if the coffee household is in the state of Oaxaca	0.14	0.35
Puebla	1 if the coffee household is in the state of Puebla	0.07	0.26
San Luis Potosí	1 if the coffee household is in the state of San Luis Potosí	0.04	0.20
Veracruz	1 if the coffee household is in the state of Veracruz	0.21	0.41

Note: A quintal is 245 kg of cherry coffee, 57.5 kg of parchment coffee, 80 kg of natural dry beans, or 46 kg of green coffee.

The names and descriptive statistics of the variables used in this chapter are depicted in Table 5.1. We considered the standard deviation of the residuals calculated from a panel database (the procedure is explained below) as a dependent variable. Membership of an organization in 2004



(survey data) was measured as one if a coffee producer was a member of a cooperative and zero otherwise. We used the same measure for organized membership reported in the National Coffee Census database (2001). The individual coffee income was calculated from the survey database by multiplying the coffee production with the individual price received by farmers in 2004.

We relied on five steps to test the relationship between cooperation and price uncertainty, and between market uncertainty and predicted cooperation with the individual coffee price on the one hand and household coffee income on the other (see Table 5.2).

Table 5.2. Summary of the various steps followed in this chapter.

Step	Method	Source of information	Relationship
1	OLS regression in panel data	SIAP and ICO coffee prices.	To find the relationship between the local and international coffee prices. The standard deviations (SD) of the residual (2001–2008, 2005–2008) were obtained. The first period for 66 and 432 municipalities.
2	Probit regression	2004 survey, ICO, CMC, and National Census.	Regression of cooperative membership with individual, family, market, and regional characteristics. The predicted membership of a cooperative was obtained.
3	OLS regressions	SD of the residual from the first step and level of organization from the 2004 survey and Census database.	The effect of level of organization in the variability of coffee prices from 2005 to 2008 and the effect of the level of organization in 2001 on the variability of prices from 2001 to 2008 (using 66 and 432 municipalities).
4	OLS regression	Predicted cooperation from the second step, 2004 survey, CMC, SIAP, and Census information.	The effect of cooperation and market instability on the level of individual coffee prices gathered in 2004.
5	OLS regression	Predicted cooperation from the second step, 2004 survey, CMC, SIAP, and Census information.	The effect of cooperation and market instability on the level of the annual coffee income estimated in 2004.

During the first step, an ordinary least square regression was made using panel data on the local coffee prices of 432 municipalities included in the Mexican Coffee Census database. The local coffee prices over eight years were regressed on international prices (Other Milds) to get the residual. From this step we got the standard deviation (SD) from the period from 2005 to 2008, which we hypothesized to be affected by the degree of cooperative membership at the municipal level. We investigated this issue for a sample of farmers included in the 2004 survey; we included only 66 municipalities within these data. The standard deviation from 2001 to 2008 came from the same regression as well; we then investigated the relationship of this with the level of organization (2001) at the municipal level (see Figure 5.4).

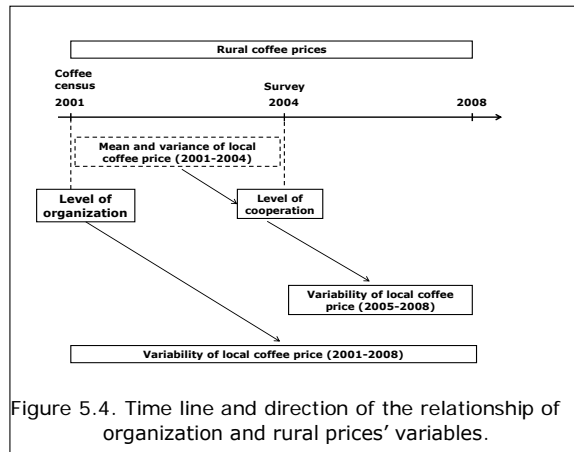


Figure 5.4. Time line and direction of the relationship of organization and rural prices' variables.

We calculated the local mean and variance of the coffee prices using the same panel database of 432 municipalities. These results we then took as explanatory variables in a probit estimation that related the membership of a cooperative in 2004 to farmer, family, farm, market, and regional characteristics. Also, in addition to the local price characteristics, we included the variance in farm sizes per municipality in the membership regressions, to capture the ease with which farmers could organize themselves: the more heterogeneous the farms, the more difficult it might be. We took some market variables calculated by using the municipality database as explanatory variables in the OLS regressions applied in the fourth and fifth steps. These were done to identify the effect of cooperation and price variability on the individual coffee price and to identify the factors influencing individual coffee income, respectively.

For the second step, we used a probit model to identify the individual, family, farm, market and regional factors affecting the farmer's likelihood of joining a cooperative. To test the effect of market uncertainty (the variability of coffee prices) on the willingness to join a cooperative, we used the observed membership of a cooperation as dependent variable as well as individual, household, market and regional characteristics, including the mean and variance of the coffee prices at the municipal level from 2001 to 2004. From this step we obtained the predicted probability to be member of a cooperative, which was then included as explanatory variable in the regressions of the individual coffee price and a household's coffee income.

During the third step, we carried out three OLS regressions relating the standard deviation over the 2005–2008 period to cooperative membership in the 2004 survey and relating the standard deviation in 2001–2008 to cooperative membership in 2001 (obtained from the National Coffee Census). For this second period, we ran two regressions, one using only the data on the municipalities included in the 2004 survey (to make the results comparable to the first regression), and the other using all the municipalities included in the National Coffee Census database (see the illustration in Figure 5.4). We also controlled for other variables at the municipal level.

During the fourth step, we executed an OLS regression to find out the effect of cooperation and price variability on the individual coffee price. The individual coffee price was hypothesized to be positively related to cooperative membership and negatively to price variability; the variables were regressed together with some individual, household and regional characteristics as explanatory variables.

During the fifth step, one OLS regression was done to identify the factors influencing the coffee income received by the 1,396 farmers included in the 2004 survey. This procedure allowed us to find the effect that cooperation has on the welfare of organized growers. To figure out whether organized farmers get a higher price than not-organized farmers do and establish that this is unrelated to the variability of the coffee price, we included an interaction term of predicted cooperation with the variance of local coffee prices from 2001 to 2004 as an explanatory variable.

## 5.5. Empirical results

### 5.5.1. Market characteristics versus cooperation

The first step was to regress the local prices of the 432 municipalities on the world market prices (Other Milds) and to calculate the residual variance. We had prices over eight years, from 2001 to 2008. With a 1% significance level, the results showed a positive and strong correlation between these prices (see Appendix 2). This result means that the local prices closely follow the world market prices (Other Milds) reported by ICO (2009).

The decision to join a cooperative can be expressed by the general and simplified form of a discrete choice model. In this case, a producer will choose to be a cooperative member if the expected benefits of joining a cooperative are greater than the cost involved (Masten and Saussier, 2000)

We generated a set of variables that describe the farmers' individual and households' characteristics, as well as some specification of their location and states; we also considered some market characteristics they face. Table 5.3 lists the variables that were included in the regressions.

We estimated the determinants of cooperative membership in a probit model for four different specifications, as presented in Table 5.3. The specifications differed in the inclusion of the mean and variance of the coffee prices before the year in which membership was measured i.e., 2004 (see Figure 5.4).

Table 5.3. Market factors influencing participation in coffee cooperatives (marginal effects after probit estimations; state dummies included, but not reported).

Variable	(1)	(2)	(3)	(4)
Farmer's sex	0.073 (0.011)**	0.074 (0.007)***	0.084 (0.004)***	0.085 (0.004)***
Education	0.007 (0.044)**	0.007 (0.007)***	0.008 (0.033)**	0.008 (0.032)**
Cement house	-0.040 (0.295)	-0.039 (0.296)	-0.048 (0.201)	-0.056 (0.134)
Electricity	0.050 (0.210)	0.053 (0.194)	0.061 (0.129)	0.026 (0.528)
Land property	0.111 (0.000)***	0.110 (0.000)**	0.022 (0.004)***	0.093 (0.004)***
Altitude	-0.0004 (0.016)**	-0.0004 (0.016)**	-0.0004 (0.020)**	-0.0003 (0.062)**
Altitude squared and divided by 1,000	0.0002 (0.011)**	0.0002 (0.010)***	0.0002 (0.005)***	0.0002 (0.016)**
Farm size	0.003 (0.234)	0.003 (0.241)	0.003 (0.227)	0.005 (0.102)
Farmers in the municipality	0.008 (0.106)	0.009 (0.103)	0.012 (0.019)**	0.004 (0.498)
Variance of farm size	0.256 (0.041)**	0.253 (0.044)**	0.216 (0.206)	0.444 (0.315)
Mean of the coffee prices from 2001 to 2004		0.0001 (0.728)		-0.003 (0.000)***
Variance of the coffee prices from 2001 to 2004			0.006 (0.000)***	0.035 (0.000)***
Constant	-0.165 (0.000)***	-0.250 (0.601)	-0.525 (0.213)	0.605 (0.228)
Observation numbers	1,298	1,298	1,279	1,298
Pseudo R square	0.251	0.251	0.269	0.280
Log likelihood	-586	-586	-573	-564

Notes: P-values in parenthesis. \*, \*\* and \*\*\* refer to significance at 10%, 5%, and 1%, respectively.

The type of land ownership is very significant in all models, showing that farmers who owned ejidal and communal land were more likely (11%) to participate in cooperatives as compared to farmers who owned private land. Male heads were 7% more likely to participate than female heads were. Although an increase in the percentage of female heads of rural households was registered, coffee organizations apparently continue to be male-biased. Above 850 metres, altitude had a positive

effect on participation in coffee cooperatives. This indicates that producers who have better natural conditions to produce a better quality coffee are more willing to participate in organizations.

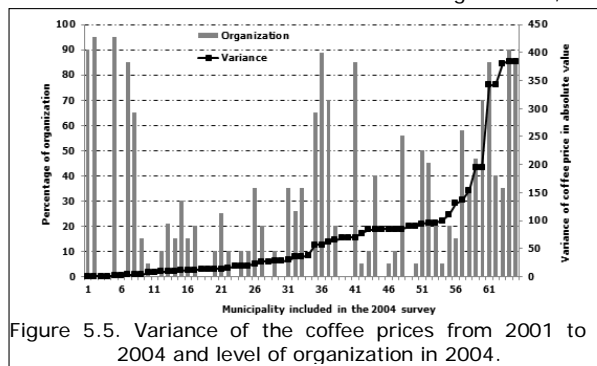
Our approach is novel in that it includes characteristics of the municipalities. Among these, we see that the more farmers there are in a municipality, the higher the degree of membership is. This result is confirming our theory. Furthermore, the more variation in farm size there is, the higher the membership is, too. This is surprising, as less homogeneous groups are more difficult to organize. Yet, they may very well organize themselves in different cooperatives, as these each by themselves are rather homogeneous.

The mean and the variance of the coffee prices from 2001 to 2004 correlated with membership in 2004; the first with a negative and the second with a positive sign. Hence, the poorer the conditions were for marketing coffee, the stronger the motives for membership were. This finding can be related to the information presented in Figure 5.5, which shows an increase in the level of organization when the variance of the coffee prices increased. The overall results included in Table 5.3 indicated that the degree of education, and whether the producers owned ejidal or communal land, increased the probability of participation in a cooperative, whereas owning private land reduced the producers' likelihood of participation. From this we can derive that middle-class coffee producers were the ones more likely to participate in cooperatives. Similar results have been reported by Francesconi (2009) and Tungay & Spielman (2009) for studies done in Ethiopia.

In summary, results indicated that there is a positive correlation between the farmer's sex (male), education, traditional land, an altitude over 850 meter above sea level, the number of farmers in the municipality, the variance of farm size and membership of a cooperative. We also found that the higher the variances of the local price and the lower its mean, the more farmers join a cooperative.

### 5.5.2. Organization and the variability of local coffee prices

As Figure 5.5 shows, the variances of local coffee prices from 2001 to 2004 were hardly correlated with the level of organization in 2004, although higher levels of organization were often found with higher levels of variance. Using cross-sectional data as we did for the level of organization, we could not test for the direction of such a relationship. For that reason, we used the variance of the coffee prices measured from 2001 to 2004 to test their effect on the level of cooperation in 2004; in the same vein, we tested the effect of membership in 2004 on the residual variance of the coffee prices measured from 2005 to 2008.



From the panel data built with the municipal and international coffee prices across eight years, the standard deviation (SD) of residuals per municipality was calculated. This SD then indicated the variation in local prices that cannot be accounted for by external prices. We then took this municipally constructed variable as a dependent variable and regressed on municipal, market, and regional factors. To avoid circular causation, we related the SD over a certain period to the level of organisation at the start of the period. The results of the estimation are reported in Table 5.4.

We carried out three OLS regressions. One considered the standard deviation of the residual coming from the municipality price from 2005 to 2008 as a dependent variable, while two considered the standard deviation of the residual coming from the municipality price from 2001 to 2008 as a dependent variable. Of these two, one was done using only the municipalities included in the 2004 survey, and the other was done using all the municipalities included in the National Coffee Census. The first of the three regressions considered the degree of organization calculated from the farmers surveyed at the municipal level as an explanatory variable, whereas the last two considered the level of organization at the municipal level calculated from the Coffee Census database (see Figure 5.4).

The level of organization did not come out as a significant factor of the residual variability of the rural price. The outcomes show that – up to 1,300 metres – the higher the altitude, the lower the price variability, and that a higher number of farmers in the municipality resulted in a higher price variability. The variance of farm size at the municipal level and the ratio of intermediaries to farmers did not show a significant relationship to the price variability, but the signs are plausible: more diversity and less competition might lead to more price variability. The major coffee-producing states (Chiapas, Veracruz and Oaxaca) have much lower levels of residual variation of the coffee prices compared with other states (Puebla, Hidalgo, Nayarit and San Luis Potosí).

Table 5.4. Factors affecting the variance of local coffee prices (OLS estimates).

Variable	Standard deviation of the residual of local price		
	From 2005 to 2008 and survey municipalities	From 2001 to 2008 and survey municipalities	From 2001 to 2008 and Census municipalities
Level of organization in 2001		0.056 (0.292)	0.011 (0.641)
Level of organization in 2004	-0.004 (0.893)		
Altitude	0.028 (0.091)*	0.037 (0.007)***	0.005 (0.136)
Altitude squared divided by 1,000	-0.011 (0.184)	-0.018 (0.008)***	-0.001 (0.510)
Ratio intermediaries/farmers	-0.283 (0.425)	-0.011 (0.969)	-0.018 (0.427)
Farmers in the municipality	0.456 (0.088)*	0.290 (0.174)	0.129 (0.451)
Variance of farm size	3.341 (0.642)	2.449 (0.673)	3.848 (0.348)
Chiapas	-9.241 (0.000)***	-5.025 (0.031)**	-3.964 (0.000)***
Veracruz	-4.701 (0.025)**	-3.272 (0.048)**	-3.532 (0.000)***
Oaxaca	-7.964 (0.006)***	-5.360 (0.008)***	-4.264 (0.000)***
Puebla	0.518 (0.853)	-0.391 (0.861)	1.600 (0.097)*
Constant	0.411 (0.952)	-1.980 (0.725)	12.69 (0.000)***
Observation numbers	66	66	424
R square	0.311	0.266	0.162

Notes: P-values in parenthesis. \*, \*\* and \*\*\* refer to significance at 10%, 5%, and 1%, respectively.

The level of organization became significant when we dropped state dummies from the first regression, but this is not significant in the other two regressions. In short, we did not see the expected relationship between residual variances of the coffee price and the level of organization,

or at least the expected effect of the level of organization on the market stability was not evident in this model specification.

The lack of effect of the degree of organization on the predictability of the local coffee price might be attributed to the small share of sales of cooperative members that go through the cooperative. Members are not marketing more than 50% of their coffee through the cooperatives. In addition, as said above, the average degree of organized producers is around 12% at the municipal level (according to the Coffee Census database). These two elements might prevent cooperatives from exerting a strong influence on the local market conditions.

### **5.5.3. The influence of cooperation on the individual coffee price**

To investigate which variables explain the level of the individual coffee price, the coffee prices that each producer obtained in 2004 was included in a linear regression model as dependent variable. Thus, the coffee price was regressed on a set of variables depicting producer's individual, family, farm, market, regional and state characteristics. A simple model representing this relationship can be written as:

$$Y_i = \alpha_i + x_i' \beta + e_i \quad (1)$$

where  $Y_i$  denotes the individual coffee price for producer  $i$ ,  $x_i$  is a vector which includes the above-mentioned variables representing producer characteristics,  $\beta$  represents the parameters to be estimated and that are associated with the explanatory variables, and  $e_i$  represents a stochastic error term.

The variables included in the regression model that estimates equation (1) and their descriptive statistics can be found in Table 5.1. These variables are also constructed based on information from the 2004 survey and other sources indicated in the data and method section.

In accordance with our theory, the predicted cooperation showed a positive effect on the individual coffee price. This relationship confirms part of the result obtained in the t-test done on a cross-sectional base, using the 2004 survey data; the t-test gave a result opposite to the one obtained in this OLS regression. That is because the first one used prices at the municipality level, whereas the latter used the individual coffee price. The OLS output also shows that selling a more processed product helps in getting a higher price (see Table 5.5).

Even when the farm size showed a significant result and with a positive effect on the individual price, its coefficient is very small, to show the power on the negotiation of larger producers against their buyers. Having more competition can be translated in a higher coffee price; we confirmed this expectation with the positive correlation between the ratio of intermediaries/farmers at the municipality level and the individual coffee price. As was expected, the mean coffee price from 2001 to 2004 showed a positive relationship with the individual coffee price. The number of

farmers at the municipality level gave an unexpected result, as it indicated that having a higher number of growers at the village level reduces the level of the price received by farmers. An explanation for this to happen is that bigger municipalities in terms of the number of coffee farmers are located in more isolated places; they communicate less and may be faced with less competition among traders.

Table 5.5. Market characteristics and cooperation on the individual coffee price (OLS estimates).

Variable	Coefficient
Cooperative member	81.57 (0.009)***
Electricity	-0.42 (0.971)
Altitude	0.01 (0.827)
Altitude squared divided by 1,000	-0.01 (0.685)
Type of coffee	43.24 (0.000)***
Farm size	1.34 (0.021)**
Ratio intermediaries/farmers	12.72 (0.000)***
Farmers in the municipality	-6.31 (0.001)***
Mean of the coffee prices from 2001 to 2004	0.13 (0.009)***
Constant	418.53 (0.000)***
Observation numbers	1,246
R square	11.84

Notes: P-values in parenthesis. \*\* and \*\*\* refer to significance at 5% and 1%, respectively.

We investigated whether in a municipality with a higher level of organization the coffee price was higher as well. To do so, we used the same model to run a regression including a dummy as explanatory variable; it was calculated with data from the Census database (SIAP, 2008) accounting for the level of organization (more than 5% mean 1) at the municipal level (see the output in Appendix 2). The output shows a significant negative correlation of the level of organization with the coffee price. Having more than 5% of organized farmers in the municipality reduced the coffee price to 43 Mexican pesos per quintal. It seems that the coffee prices were lower in municipalities where a higher level of organization was registered in 2001.

#### 5.5.4. The effect of market variability and cooperation on the coffee income

We used an OLS regression to relate the coffee income to membership and other factors. We included five categories of variables (individual, family, farm, market, and regional) in the analysis. In order to avoid possible endogeneity, we used the predicted probability obtained in step two (see Table 5.2). The results are presented in Table 5.6. They show that the predicted membership of cooperatives has a positive effect on coffee income; its coefficient indicates that affiliation to a cooperative increased the coffee income in 2004 by some 3,251 Mexican pesos per year.

As expected, ethnicity negatively affects the household coffee income. Ageing trees had positive effects on the income. The farm size and the type of road access positively affected the coffee income as well. These results indicate that larger-scale farmers had more income than small-scale farmers had. We can say that coffee-producing areas with better communication are more attractive to coffee buyers. This may mean more competition, and hence, perhaps a higher coffee income under these conditions.

According to the results of these regressions, the type of coffee shows a positive correlation to income. This implies that coffee growers who normally sell processed coffee had a higher coffee income than those who did not process the product. The mean coffee price at the local market from 2001 to 2004 positively influenced the coffee income. This shows the beneficial effects of past prices – probably through better maintenance of the trees – on the current yield and/or quality.

This relatively higher coffee income received by organized coffee farmers is confirmed also by checking the difference of farmers' price and the average price reported by SIAP at the municipal level in 2004. Organized farmers registered a margin of 16.7 dollars per quintal, whereas non-organized farmers registered 13.8 dollars per quintal (SIAP prices are in cherry presentation, whereas the producers' prices are in cherry, parchment, green, and ground presentations). Other variables such as land property, the number of coffee farmers at the municipal level, the local variance of coffee prices from 2001 to 2004, and the interaction terms of the predictability of cooperation and variance of the coffee prices did not show any relation to the coffee income under this model specification. Thus we can state that there is no evidence that the variability of the coffee price is generating an effect on the coffee income, either for organized or non-organized farmers.

Table 5.6. Market characteristics and cooperation on coffee income (OLS estimates).

Variable	Coefficient
Ethnicity	-930.04 (0.000)***
Education	83.96 (0.003)***
Cooperative member	3,251 (0.005)***
Type of road	514.09 (0.026)**
Land property	-257.40 (0.0291)
Altitude	2.68 (0.022)**
Altitude squared divided by 1,000	-1.16 (0.061)*
Farm size	132.26 (0.000)***
Age of the coffee plantation	25.05 (0.006)**
Type of coffee	1,128 (0.000)***
Farmers in the municipality	50.10 (0.240)
Mean of coffee prices from 2001 to 2004	6.98 (0.000)***
Variance of coffee prices from 2001 to 2004	-31.474 (0.253)
Predicted cooperation x variance of the coffee price	54.341 (0.204)
Constant	-1,491 (0.064)
Observation numbers	1,250
R square	17.06

Notes: P-values in parenthesis. \*, \*\* and \*\*\* refer to significance at 10%, 5%, and 1%, respectively.

Generally, the overall results from this step indicate that cooperative membership had a positive effect on the coffee income. Perhaps cooperatives were likely to attract extension, public services, and to modify the market characteristics for input and services. As Milford (2004) has mentioned, cooperatives may bring in government funds, increase innovation as they bring new production technology and approaches, and help members to increase their knowledge. In many cases, both positive and negative commercial benefits from these changes can be spread to neighbouring farmers, including those who are not members of grower organizations. As the mean of the coffee prices and other variables included in the regressions indicate, the better the market condition for coffee, the higher the coffee income.



## **5.6. Conclusions and policy recommendation**

This study shows that while farmers appear to opt for cooperative membership, more often when faced with a higher price variability (and lower prices), this does not seem to affect the price variance itself. Cooperative membership does lead to higher incomes from coffee, however. The lack of effect on the price variability can be ascribed to the fact that farmers do not sell all their coffee to cooperatives and that the share of organized farmers is relatively low. Hence, membership does not affect municipal prices that much.

With regard the elements inducing the participation of coffee farmers in cooperative organizations, similar to the findings of Karli *et al.* (2006), we found that education positively influences farmers' willingness to join a cooperative. We found, however, a negative correlation of private land ownership with cooperative affiliation. This finding is a little contradictory in the sense that we expected that private land owners are the ones with more education; but considering the findings from Chapter 4, we sustain that the middle-educated and the middle-wealthiest coffee producers are the ones who most often join a cooperative.

According to our results, we did not find any clear evidence that a village with better market characteristics shows a lower level of cooperation. More variance of the coffee prices from 2001 to 2004 induced more cooperation, whereas the higher the mean of the coffee prices from 2001 to 2004 was, the lower the willingness was to cooperate. It seems that selling coffee as an individual grower increases the chance to earn from the temporal high coffee price.

With regard to the factors correlated to coffee income, we found cooperative participation to have an overall positive effect. Our model specification was able to capture this relationship even when we did not control for the spill over effect that organization has. Indeed, non-organized coffee farmers living in the same producing area might have to take some of the same benefits or losses received by the organized coffee farmers as the direct effect of the cooperative.

Our findings suggest that government aims and intentions to increase cooperation will increase the farmers' economic benefits. Even though the governmental, police and non-governmental agency support of coffee cooperatives does not directly benefit the very poor coffee producers, we maintain that those poor farmers can benefit from cooperative effects by the spill over. Accordingly, our results may contribute to improve programmes supporting the Mexican coffee sector.

Organized coffee farmers are receiving higher coffee prices than those who are not organized. This is a result of the fact that the organization is helping producers to reduce transaction costs in collecting, processing and selling the product.

Even when the participation in a coffee cooperative is not translated in a reduction of the market instability, the higher individual coffee price and coffee income received by organized coffee farmers make a big enough difference to motivate producers to join an organization.

According to our theory and our results, better market conditions for coffee reduce the probability of farmers joining a cooperative. Thus, coffee farmers facing more market instability are more likely to join a cooperative. Thus, coffee farmers facing more market instability are more willing to participate in a producer organization. We argued that those smallholders who are placed in a location with a lack of public services will be the first to be interested to have a cooperative. They will do so to improve their negotiation power vis-à-vis their buyer, but also to benefit from various government programmes supporting the coffee sector.

## **Chapter 6. Household diversification and its effect on the annual coffee income: Evidence from the Mexican coffee sector**

### **6.1. Introduction**

The process of liberalization of the Mexican economy of the nineteen eighties opened the door to imports and exports of raw materials because of a decrease in regulations at the border. On the other hand, a drastic reduction of support from the government to the coffee sector took place, ending the domestic regulation of the coffee market at the beginning of nineteen nineties. These changes pushed coffee farmers to adapt to the relatively free coffee market during the nineteen nineties and two thousand tens. As part of this process, coffee-producing households have been increasingly engaged in diversification activities within and outside the coffee sector. Some coffee smallholders shifted resources away from their coffee parcels and concentrated on subsistence crops or on other income-generating activities. However, as coffee production represents invested capital, many farmers did not abandon or remove their coffee trees (Calo and Wise, 2005) and instead aimed at vertical integration by taking up the on-farm processing of coffee.

That the coffee prices reached historically low levels in the world market in the early two thousand tens exacerbated this process. Producer prices in Mexico, which stood at 213 Mexican pesos per quintal in 1990 and reached 534 pesos in 1995, subsequently fell to 388 Mexican pesos per quintal in 2002. By 2005, rural prices had recovered to 542 Mexican pesos per quintal (ICO, 2009).

Diversification has been defined as a form of household risk management but also as a response to prices. Income diversification implies adopting agricultural activities different from the traditional one, or non-agricultural activities. Diversification also means changing the use of assets available and reallocating labour to other activities, such as wage labour or self-employment, or migration (Reardon *et al.*, 1992; Ellis, 2000a). Thus, diversification includes any combination of activities not related to the conventional coffee production to generate positive effects on the total household income. In this study, we will include a particular form of diversification, namely vertical diversification within the coffee sector, i.e. selling coffee that has undergone some on-farm processing.

Some earlier research has been done on the strategies of producing, processing, and marketing coffee by coffee-producing households in Mexico (Avalos-Sartorio, 2006b; Calo and Wise, 2005; Díaz, 1996; González and Nigh, 2005; Renard, 1991). Yet, no one has studied Mexican farmers' behaviour with regard to diversification and the effect that reduced coffee prices had on a certain type of diversification. The main questions addressed in this chapter are: what are the driving factors, and in which direction do they drive the diversification of the livelihood of coffee-producing households? Did coffee growers respond to the low coffee price around 2003 by increasing diversification? Did structural characteristics at the municipal level influence diversification? And how did this diversification influence the level of farmers' annual coffee income?

The study is restricted to the effects on the coffee income only instead the total household income. This is dictated by the available data. On the other hand, the wealth of data permits the inclusion of lagged variables as dynamic factors, such as past diversification, in the analysis of household decisions to begin with certain types of diversification. We used data collected in a representative field survey, conducted in 2005 throughout the five major coffee-producing states in Mexico and could relate these households to the Census of 2001. We took additional village-level data from the National Coffee Census database retrieved from 2001 to 2008 and other databases reported by SIAP (2010), CMC (2005), and INEGI (2011) as a source of information. We distinguished between six categories of variables: (1) natural capital (altitude, age of the coffee plants, and yield); (2) human capital (the farmer's gender, ethnicity, literacy, and education); (3) physical capital (electricity, type of road, and land property); (4) social capital (cooperative membership, farmers and population at the municipal level); (5) diversification (diversification in 2001 and in 2005); and (6) market issues (the ratio of intermediaries/farmers, coffee prices, the variance of coffee prices, and the price margin). In this, we introduced the lagged variables of diversification in 2001 to better capture the effect of the fall in coffee prices on the diversification in 2005. To this we applied a multivariate probit to allow for correlation among diversification options.

In this chapter, the farm household is the principal unit of analysis. The overall hypothesis to be tested is that diversification increased from 2001 to 2005 as a response to the low coffee prices; that change would be captured by internal and external factors explaining diversification. Particularly, we expect that external factors, such as market and natural capital, would dictate the way in which households will diversify their livelihood in response to the current economic conditions.

Even when we think that the coffee price is the variable that coffee growers primarily take into account to make a decision in the long run regarding their investment, during the low coffee price period (2001–2004) many other things happened that may have influenced the coffee growers' decision to diversify. One of the biggest and direct influences on the producers' decision-making may have been the change in the general organization of the coffee sector. During this period, the change from the MCC to the NCS was carried out. Furthermore, a coffee support programme named the Stabilization of Coffee Pricing Fund started in 2002. This subsidy programme encourages producers to rely more on coffee in the long run, thus increasing the investment in coffee orchards and in processing facilities (see the information included in Chapter 2).

The results indicate that the institutional environment, such as the number of coffee farmers and the coffee-price margin at the municipal level (like a lower local price), is positively correlated with the coffee farmers' decision to engage in "coffee-extra" activities, i.e. turning to on-farm processing and selling coffee on further downstream in the supply chain. Those factors, together with particular natural, human and physical kinds of capital, capture the households' response to low coffee prices. A poor institutional environment for coffee in the municipality, which we measured as the differences in the coffee price margin in 2003 and the coffee price margin in 2005 (the higher the differences, the worse the institutional environment for coffee), reduces the willingness to engage in coffee-extra and non-agricultural activities. There is consistent evidence

that general diversification and these coffee-extra activities in 2001 had significantly positive effects on the annual coffee income in 2005. Clearly, the fall in the coffee price during the 2001–2004 period made farmers turn to more diversification.

The rest of the chapter is organized as follows. Section 6.2 will present theoretical considerations to explain the coffee growers' response to a low coffee price. Section 6.3 will describe the data and method used in the study; here, we will also present statistics from the survey and the National Coffee Census of 2001. Section 6.4 will present some major characteristics of the diversification in Mexican coffee sector. Section 6.5 will specify the models used in the analysis. Section 6.6 will proceed with the presentation of results, grouped into two parts: 1) how factors, including low coffee prices, relate to diversification; and 2) how factors, including diversification, influence the annual coffee income. In the last section, we will draw conclusions and discuss their implications for policy and outreach in Mexico's coffee-producing areas.

## 6.2. Theoretical considerations

There are many reasons why coffee-producing households diversify their sources of income. The decline and variability of the coffee prices, partly as a result of the liberalization of the coffee market, have induced many farmers to diversify their sources of income. This process does not exclude the possibility of diversification within the traditional commodity, in this case within the coffee sector. More than two decades ago, coffee farmers started to diversify their livelihood; however, investments in such changes have been restricted and constrained by the endowment at the coffee growers' disposal. Diversification implies adopting different crops (horizontal diversification), engaging in different value-adding activities (vertical diversification within coffee processing), or even diverting away from the agricultural sector (Barghouti, 2004; Eakin *et al.*, 2005). We distinguished each of these by c for coffee-extra, a for taking up other agricultural activities, and n for non-agricultural activities. Farms that continued only to sell unprocessed coffee beans were considered non-diversified (nd).

From a theoretical point of view, the major change that coffee growers witnessed between 2001 and 2005 was the drop in coffee prices. Producer prices fell from 692 Mexican pesos per quintal in 2000 to 445 pesos in 2001 and 388 pesos in 2002. They then rose again to 439 Mexican pesos per quintal in 2003, 405 pesos in 2004 and 543 pesos in 2005.<sup>34</sup> Taking into account that the levels

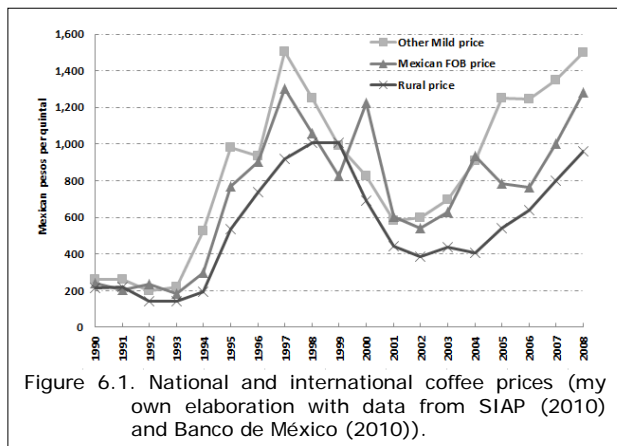


Figure 6.1. National and international coffee prices (my own elaboration with data from SIAP (2010) and Banco de México (2010)).

<sup>34</sup> The coffee prices are in real Mexican pesos.

prevailing in the second part of the nineteen nineties were between 500 and 1,000 Mexican pesos per quintal (see Figure 6.1), the prices around 2002 were very low and many farmers found it difficult to continue their business.

Such low coffee prices make growing other crops more attractive, but, as coffee is a tree crop, a decision to reallocate land to other crops is not easily taken, and some land may not be suitable for other crops at all. The low prices induced farmers not to hire as many workers as before and to offer lower wages. The common practice of sharecropping also implies that the wages of workers fell. The returns to household labour fell as well. Off-farm wage employment and migration then became better paying alternatives to this family labour, but growers had to compete with laid-off workers for these jobs.

Finally, the low prices for raw coffee only partly translated into lower prices for the processed coffee products. Sales at the consumer level are attractive as they depend on the gross margin between the selling price and the price of raw coffee, and this margin increased when international prices fell.

Thus, three broad fields of diversification became of interest to the farm household: a) going for further processing of the coffee and selling more downstream in the supply chain (c); b) adopting other crops, either on former coffee land or other land held by the household (a); and c) accepting non-farm employment or migration (n). In alternatives c and a, the family would divert labour from growing coffee to alternative employment on the farm, while in n, the reduction of on-farm labour coincided with more outside employment.

Figure 6.2 shows a box diagram in which land and labour of the household are allocated to possibly two crops. A non-diversified farm household is represented by the solid arrow from O to A, exhausting the two available resources. If coffee prices fall and wages fall with it, the optimal labour intensity of coffee goes up, as indicated by the arrow AB. This opens the possibility of growing a second crop, typically less labour-intensive, for which some land is

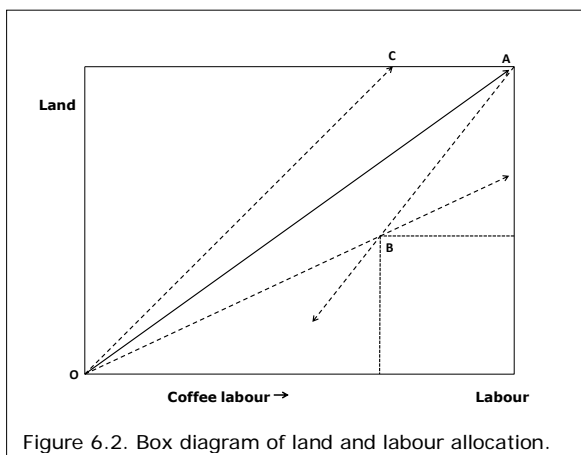


Figure 6.2. Box diagram of land and labour allocation.

made available by reducing coffee land. This new efficient use of the resources is given by point B, with a corresponding lower use of labour and land for coffee. If, however, coffee land cannot be used for other purposes, or the option value of keeping the trees alive is high enough, then an optimal point in C may arise, where all land is devoted to coffee, but not all labour is used for it. In the first case, the lower coffee prices are translated into a higher labour intensity through the mechanism that real wages fall sharper than real land rental prices, on account of the labour-

intensive nature of coffee production. This higher intensity is reflected in the slope of the new line OB, compared with OA. In the second case, land is not mobile, and the effect of lower prices falls upon land more than it does on labour. Land rental prices fall sharper than real wages, and a lower labour intensity becomes optimal. This is shown by the arrow OC. The lower intensity leads to a surplus of labour on the coffee farm, indicated by the distance CA in the box diagram. The surplus can find employment either outside the farm or by going for value-added activities such as the on-farm processing of coffee.

In this chapter, we categorised the households assets into five groups: 1) natural capital, which refers to the households' endowment of natural resources; these are stocks from which resources useful for livelihoods are derived (land, water, trees, mountains and lakes); 2) human capital, which refers to human skills, capability, and knowledge (skills, education and health); 3) physical capital, which comprises assets brought into existence by economic production processes (stores, processing plants and machinery); 4) social capital, which refers to the social networks and associations in which people participate and from which they can derive benefits that complement their living (networks, membership of formalised groups); and 5) financial capital, which consists of the stocks of money to which the household has access (a bank account, cash money and credit sources) (Carney, 1998; Ellis, 2000b).

The households' decision to diversify can be a result of two types of motivation: 1) external factors (a fall in coffee price) push farmers to do so, or 2) internal factors (family labour growth, increased land) motivate farmers to reach certain goals or levels of productive investment (see Figure 6.3). Some farmers may feel secure only producing and selling coffee on the regional market without processing. Indeed, around 18% of the coffee producers included in the 2005 survey had not registered any of the

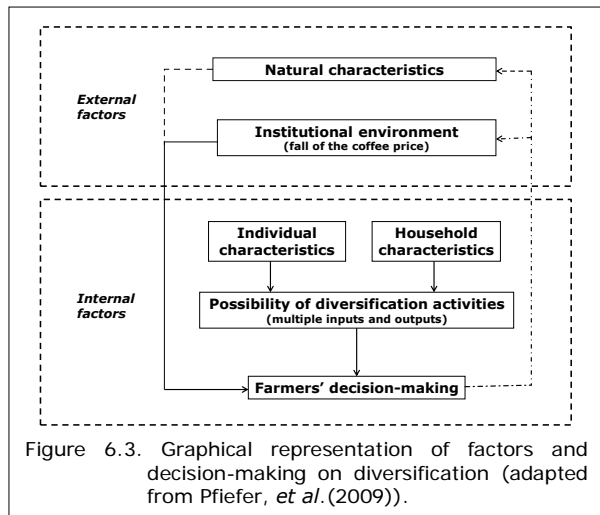


Figure 6.3. Graphical representation of factors and decision-making on diversification (adapted from Pfeifer, *et al.* (2009)).

three types of diversification defined above. As a consequence, 82% of the coffee-producing households included in the sample were represented in one, two, or the three diversification groups. The change in the relative prices of coffee and other possible crops is a factor of change in the farmer's behaviour or willingness to diversify. In this case, a relatively long period of low coffee prices and the relatively unstable coffee prices may lead to an increase in the household's interests in diversifying their livelihood.

Figure 6.3 is a representation of the factors influencing the household's decision to diversify. There is a direct link between the external factors, natural characteristics and institutional environment

and the farmers' and households' characteristics, both of which are internal characteristics. Those four groups shape the decision to diversify. As other scholars have stated (Pfeifer *et al.*, 2009) among these internal factors feature farm size, farm type, education, and the farmer's age.

If coffee farmers do not have access to additional land, they have two options for diversification. Firstly, they can introduce a crop that can be farmed in the same coffee plantation, such as oranges, wood trees, bananas and ornamental plants. Secondly, they can remove coffee trees to establish any other crop or livestock that is feasible in the same natural conditions (see Figure 6.4).

Figure 6.4 shows the three groups of activities that farmers or households can diversify into, and relates them to the land owned by and labour available in coffee-producing households. We state that under the market uncertainty and changes in the institutional environment, mainly expressed in low rural coffee prices, households are forced to diversify their portfolio of income. Thus, if coffee households have enough family labour available, human capital does not work as a constraint in undertaking any diversification, but land does. In this case, there are clear differences between large-scale and small-scale land owners.

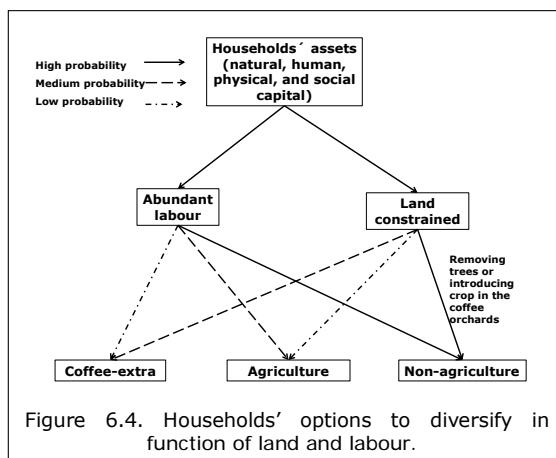


Figure 6.4. Households' options to diversify in function of land and labour.

It is also important to look at the reduction in the quantity and quality of maintenance activities necessary to farm coffee when the coffee price fell. Evidence from the 2005 survey indicates that 79% of coffee farmers reduced the maintenance of their coffee orchards as a result of long periods of low coffee prices; the highest response pertained to a reduction in weeding and pruning of the coffee orchards (see Table 6.1). In other words, when coffee prices are lower, coffee producers react by reducing the practices carried out in the coffee plantations. This kind of modification on farming coffee has a negative effect on the household's decision to use the family labour to work in the coffee plantations. Also, the reduction of the maintenance (investment in coffee) has a negative effect on the coffee-producing areas as many producers behave in a similar way; as a result of this reduction, a decline of the labour demand is felt in the coffee sector.

Table 6.1. Coffee growers' response to low coffee prices during the 2001–2004 period.

Strategy undertaken	% of growers included in the 2005 survey (N=2,294)
Reduce fertilization	31.0
Reduce weeding	66.7
Reduce pruning	58.5
Cut the coffee plantation	3.8
Introduce other crops	8.3
Rent out the land	1.7
Increase family labour	50.8
Go elsewhere for some wages	17.8
Join a cooperative to process coffee	7.6

Source: My own elaboration with data from the 2005 survey.



### 6.3. Data and methods

The analysis is based on data from a representative survey made in 2005, which has information on 2,294 coffee-producing households of five main coffee-producing states of México. This database includes information related to household size, assets, agricultural production, family labour, migration, the market participation, education, organization, and programmes financed by the government. This survey was carried out by the Regional Centre of the Autonomous Chapingo University, located in Huatusco, Veracruz, Mexico.

The survey information was complemented with data from the Mexican coffee census, which dates from 2001 and had been updated until 2008 (SIAP, 2008); it includes information related to the growers' characteristics, coffee orchards, public services, family education, characteristics of the household's house, assets

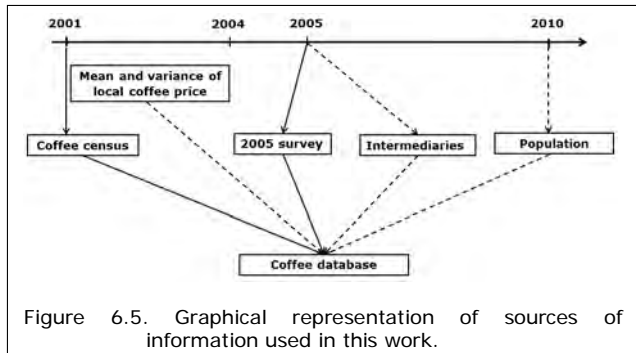


Figure 6.5. Graphical representation of sources of information used in this work.

ownership by coffee-producing households, and the way and types in which coffee was sold by the growers.

Additionally, we obtained the number of coffee intermediaries that were registered at the municipal level in 2005 from the Mexican Coffee Council (2005). From the Informatics Agricultural and Livestock System (2010), we obtained the coffee price at the municipal level in the 2001–2004 period, and we included information regarding the total population at the municipal level (see Figure 6.5) obtained from the National Institute for Statistics, Geography, and Informatics (2011). Using this information, we calculated variables that were later included in the regressions. The states where the survey was administered were Chiapas, Guerrero, Oaxaca, Puebla, and Veracruz. They account for 95% of the total coffee farmers, 95% of the total area planted with coffee, and 97% of the total production in Mexico.

For the purpose of this chapter, we categorized the activities considered in the diversification options into three groups, each of which constitutes a dependent variable.

- 1) Coffee diversification (coffee-extra). We started from the fact that the households included in the survey sample were all coffee farmers. Among the diversified coffee-producing households, we included those growers who were not simply coffee producers but also participated in additional activities related to coffee. If coffee farmers were selling coffee through cooperatives, selling coffee with some value added (parchment, dry beans, green, roasted and ground), selling the coffee at other markets beyond regional ones, or were producing certified coffee, they were considered as vertically diversified. If a coffee household was involved in at least one of the activities listed above, we classified it into

this group. From the 2005 survey we gathered that 66% of growers sold parchment coffee, 5.6% sold green roasted or ground coffee, 21.2% sold through a cooperative and 15% sold organic coffee. In total, there were 1,518 coffee growers in this category of diversification.

- 2) Agricultural diversification. Here, we considered all other agricultural or related activities that coffee farmers or coffee-producing household members undertook as part of their business activities, which were not part of the coffee sector. Some of the most common activities included here were farming staple foods (corn, beans), raising livestock (pigs), and participating in forestry-related activities. According to the 2005 survey, 283 households farmed basic grains, 104 farmed corns, and 34 farmed sugar canes. In this group of activities 497 coffee growers were registered.
  
- 3) Non-agricultural diversification. This group of options includes all the economic activities that coffee farmers or coffee-producing household members undertook, that were not directly linked to farming. It includes business activities (processing products other than coffee, providing services, marketing outputs), construction, professional activities, hand-made crafts, house workers, employees, agricultural workers, and emigration. Statistics from the 2005 survey shows that 547 households reported to have members who had emigrated, 37 households had members who engaged in professional activities, 25 households had members who were drivers and 12 households had members engaged in construction activities. We registered a total of 1,042 coffee growers as having diversified into non-agricultural activities.

The dependent variables considered in the regressions were computed from the survey database (2005), taking into account the definition of each type of diversification listed above. All the dependent variables referring to diversification in our analysis are dichotomous ones that only take the values of one or zero depending on whether a household adopted this activity or not. Coffee income was computed by multiplying the individual average coffee price reported in 2003 and 2004 with the individual coffee production. A household was diversified if the coffee-producing household adopted at least one of the three groups of diversification considered, and zero otherwise (corresponding to non-diversified in that particular group of activities). The source of the lagged explanatory variables was the National Coffee Census database (dated as 2001), and some variables were calculated using data from complementary sources (see Table 6.2 and Figure 6.5).

To take into account the role that the institutional environment plays in the farmers' decision to diversify, we considered the variables of market characteristics, specifically the ratio of the number of coffee intermediaries divided by the population of coffee farmers at the municipal level. We also considered the total number of coffee farmers at the municipal level as part of the institutional environment for coffee production. From the National Coffee Census database, we computed the total number of coffee farmers registered in each of the municipalities included in the sample. A higher concentration of farmers meant better environmental conditions for coffee production. In order to find some links to the potential for employment, we included the variable of the total

population in the farmers' municipality. We obtained this information from the National Institute for Statistics, Geography and Informatics (2010).

Table 6.2. Descriptive statistics of variables included in the analysis (N = 2,294).

Variables	Unit and specification	Year	Mean	SD
Dependent variable				
Not-diversified	1 if the farmer does not have any of the diversification options	2005	0.06	0.24
Coffee-extra	1 if the household has engaged in coffee diversification	2005	0.79	0.41
Agriculture	1 if the household has engaged in agricultural diversification	2005	0.26	0.44
Non-agriculture	1 if the household has engaged in non-agricultural diversification	2005	0.54	0.50
Coffee income	Natural logarithm of the annual coffee income in Mexican pesos	2005	9.97	1.36
Natural capital				
Altitude	Metres above sea level divided by 1,000	2001	0.98	0.37
Age of coffee plants	Strata of the age of coffee trees <sup>1</sup>	2005	2.77	1.58
Yield	Quintals per hectare	2005	11.36	11.31
Human capital				
Gender	1 if the head of household is male	2001	0.76	0.43
Farmer's age	Age of the head of household	2001	41.56	14.43
Indigenous	1 if the farmer speaks an indigenous language	2001	0.36	0.48
Literacy	1 if the farmer can read and write	2001	0.80	0.40
Education	Schooling level of the head of household <sup>2</sup>	2005	1.86	1.69
Family labour	Number of members in the farmer's household who are between 15 and 60 years old	2005	2.18	1.62
Physical capital				
Total land	Total land (in hectares) owned by the household	2005	12.92	26.69
Type of road	1 if the household's community has access to paved or terrain road	2001	0.85	0.36
Land property	1 if the farmer owns ejidal or communal land	2001	0.56	0.50
Social capital				
Coffee farmers	Number of coffee farmers in the municipality divided by 1,000,000	2001	0.003	0.003
Total population	Number of people who live in the municipality divided by 1,000,000	2010	0.05	0.07
Diversification				
Lag non-diversified	1 if the farmer does not have any of the diversification options	2001	0.17	0.38
Lag coffee-extra	1 if the household has engaged in coffee diversification	2001	0.70	0.46
Lag agriculture	1 if the household has engaged in agricultural diversification	2001	0.10	0.30
Lag non-agriculture	1 if the household has engaged in non-agricultural diversification	2001	0.29	0.45
Market issue				
Ratio intermediaries/farmers	Number of intermediaries divided by the number of coffee farmers in the farmer's municipality, multiplied by 1,000	2005	1.96	3.15
Coffee price	Average amount of Mexican pesos per quintal farmers received in 2003 and 2004	2005	704.30	191.20
Variance of the coffee price	Variance of the coffee price in the household's municipality in the 2001–2004 period (in millions of Mexican pesos per quintal)	2004	0.01	0.02
Price margin	Difference of the average coffee price at the municipal level and the Mexican fob coffee price (in thousands of Mexican pesos per quintal)	2003	0.19	0.18

Note: A quintal is 245 kg of cherry coffee, 57.5 kg of parchment coffee, 80 kg of natural dry, or 46 kg of green coffee.

<sup>1</sup> Strata of the age of coffee trees in years: 1 (<= 6), 2 (7–10), 3 (11–15), 4 (16–20), 5 (21–30), and 6 (>=30).

<sup>2</sup> The education was measured as follows: 0=not educated, 1=incomplete primary school, 2=complete primary school, 3=incomplete secondary school, 4=secondary school, 5=high school, 6=technical school and 7=bachelor's degree.

As we suspected, some variables we were using as explanatory were behaving as though they were endogenous. To test this, we applied the procedure described by Pfeifer *et al.* (2009), who also used a multivariate probit. The procedure consists of two steps for testing instrumental variables (Wooldridge, 2002). As a result of this endogeneity test, we dropped electricity as an explanatory variable and included the type of road that households' communities had access to. The hypothesis that other explanatory variables were not endogenous could not be rejected. In this procedure, we

included the lagged variables (diversification groups measured in 2001) as potentially endogenous variables. The results indicated that no exogeneity problem was present for the non-diversified, agricultural and non-agricultural activities; in the case of the coffee-extra, this problem was present but at significance level of 10% only.

For all factors explaining the type of diversification, the individual test of significance was done after a multivariate probit estimation; the result of this indicates that all explanatory variables included in this model specification were important in explaining the type of diversification coffee growers undertake.

For the Ordinarily Least Square regressions, two types of test were done. One was the Durbin-Wu Hausman test to figure out whether some explanatory variables were endogenous or not; the test also considered the lagged variables for each of the diversification groups. We found that this problem was not present in the second model specification.

#### **6.4. Diversification in the 2005 survey and its statistics**

While diversification may reduce risk by spreading production activities to various enterprises, additional risks are also involved in the adoption of new strategies. The greater part of this risk comes from having little skill, knowledge, or experience required by the new activities. Adopting new crops, livestock, or non-agricultural activities require the adaptation of technology to the natural resources and existing infrastructure in order to produce and process different goods. Also, to be competitive requires having knowledge of product quality and market settings. These uncertainties are translated into livelihood risks for producers who engage in different livelihood strategies (Barghouti, 2004; Varangis *et al.*, 2003).

Even when there is good reason not to depend solely on coffee production, there are many coffee-producing households that still continue under this system. Data from the 2005 survey show that 6% of the households depend only on coffee income for their living. For some coffee-producing households, their ancestors already produced coffee; accordingly, actual farmers want to remain coffee producers to maintain the family tradition. Yet, out of economic need, they are forced to spread their sources of livelihood more widely. Additional reasons to produce coffee under the current environment are: coffee assures an income, even if it is reduced; coffee is subsidized; coffee is more profitable than other crops; coffee is an easy job; coffee provides personal satisfaction; and coffee maintains environmental conditions (from a personal interview with the main stakeholders of the Mexican coffee sector).

All activities described above have a payoff in economic terms. When coffee growers proceed to vertical integration, they gain a more stable coffee market; even when the price they receive is not so high, it helps in avoiding a more reduced coffee income, particularly when farmers live in places without a well-functioning coffee market. Other gains of processing the product is that the coffee growers can keep the coffee for a longer time than if they had to sell it in cherry form. This allows them to improve their negotiation position vis-à-vis the traders. Producing differentiated (organic

and Fair Trade) coffee helps growers to receive higher and more stable prices compared with the price received by growers in a similar institutional environment. Even though many coffee smallholders have found other sources of income within the coffee sector, many others do not have the training, technical assistance, financing, or market access for this to be an economically viable alternative (Stephanie and Seth, 2005).

Coffee households engaged in agricultural activities receive economic benefits mostly in getting a product to complement their daily diet; that is important, as they reduce their direct expenditure on food in this way. Also, this complementarity is important in places where the food market is not working properly. To produce staple foods and fruits, growers do not need to use a huge portion of land or devote much labour. With regard to the agricultural activities, raising livestock or producing some trees for wood is another way of saving that helps coffee households to face shocks either in their cash crops or in the family (Reardon *et al.*, 1992). By producing sugar cane, oranges, lemons, banana leaves and avocados, households may complement the income they have as coffee producers.

If the households have extra land to be used for the production of other crops besides coffee, they have enough reason to diversify their agricultural activities. This strategy helps households to use the available land better. Having other crops can also be seen as a complementary activity during the year. This makes sense, considering the fact that the demand for labour to farm coffee is not constant during the year or even during the picking season. However the combination of several crops enables coffee-producing households to use their resources in a more efficient manner, and, at the same time, increase the total household income. As the 2005 survey shows, 17% of the households included in the sample were producing crops related to their daily dietary needs, notably corn, beans and bananas.

Pérez-Grovas (2001) has shown that coffee farmers owning less than two hectares of coffee plantation do not need to hire labour to resolve the demands of farming coffee in terms of weeding, fertilizing, pruning, controlling the shade and plagues, and renewing trees. Normally, picking is the most labour-demanding activity and is done by the whole family, including the children. These small landholders normally integrate orange, avocado, lemon, and banana plants as part of their shade trees. These products are useful to complement the coffee households' diet. In brief, with these additional trees and staple crops, an average-sized household can keep itself busy the whole year.

Coffee farmers who do not have the asset endowment to combine with the external factors to diversify their income in the agricultural sector have no other option but to emigrate. Therefore, in the last two decades, many young people from coffee-producing regions migrated to work in large cities within Mexico or in the United States. This practice was not common among coffee-producing households before 1990. In recent years, migration has in part been a survival strategy for many coffee-producing households. The money received from migrated members is normally used to cover the household's consumption and to make some home improvements. In a few cases the funds received from this source have been used to invest in businesses. Also, this kind of resource

helps in funding the expenditure of producing, processing marketing coffee and other products (Davis, 1999).

The non-agricultural activities, mainly earning some wage in urban areas or migrating to the United States, helps the coffee household economies to derive a constant income throughout the year. As the 2005 survey indicates, 25% of the households registered members who have migrated. The diversification options that households have depend on their asset endowments and external factors (Ellis, 2000b).<sup>35</sup> Considering that the rich households have a better endowment to diversify, they benefit the most from diversifying their livelihood (Ellis, 1998).

Income diversification is more than just income generation. In most cases, diversification increases employment in rural areas (Varangis *et al.*, 2003). Also, diversification of income sources is considered to be one of the strategies farmers use to reduce household income instability and to reach the minimum income to survive. As Reardon *et al.* (1992) have argued, in the absence of agricultural insurance markets, rural households have to look for income diversification activities in order to ensure a minimum income for their households. Seeing the importance of diversification in stabilizing incomes and reducing rural poverty, governments in developing countries have an increased interest in promoting diversification (Abdulai and CroleRees, 2001).

Another motive to diversify is the idea that having more than one commercial product increases the times throughout the year when growers can receive cash. This type of diversification of activities can help producers save money by investing in agriculture with the earnings from other crops. This way of spreading income facilitates households in resolving their food needs throughout the year. Additionally, having more than one commercial crop helps producers reduce the market risk. However, as some authors (Barrett *et al.*, 2001) have argued, that this type of strategy is less effective because the prices of the crops produced within the same area are highly correlated, as they share the same market characteristics.

The majority of coffee farmers in Mexico are small landholders. According to the 2005 survey, the average area of land owned by coffee-producing households is 12.9 hectares, and on average they devote 7.2 hectares to coffee. Thus, the land owned by the household and not farmed with coffee is, on average, 5.7 hectares; yet, 35% of farmers included in the 2005 survey did not have any extra land for agricultural activities.

According to the 2005 survey, there was an increase of 19% of households that hired labour to farm and harvest coffee from 2001 to 2005. The increase in hired labour may be the result of outmigration during those years. Large-scale farmers in terms of land ownership were the ones who registered the highest percentage of hired labour to work in coffee; 80% of the households

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<sup>35</sup> A household has been defined as a group of people who, while living in the same place (house), share meals and make joint or coordinated decisions with regard to resource allocation and use (Ellis, 1998).

with more than 5 hectares hired labour to work in the coffee orchards and 75% of them also hired labour to harvest this product.

The 2005 survey indicated that 94% of the total households were classified as being diversified in 2005. More than 78% of the surveyed households engaged in diversification within coffee production, 12% with agricultural activities and 30% with non-agricultural activities. Of the total number of interviewed coffee farmers, 2.4% engaged in all three groups of diversification activities (binary triplet indicating 1 1 1) at the same time. Therefore, many coffee-producing households can be considered as being diversified and some of them engaged in pluriactivity.

Table 6.3. Characteristics of diversified coffee-producing households included in the database.

Type of diversification	Binary triplet	Frequency		% large-scale farmers <sup>1</sup>		% older heads of household <sup>2</sup>		% in large coffee municipalities <sup>3</sup>		% with terrain or paved road <sup>4</sup>	
		2001	2005	2001	2005	2001	2005	2001	2005	2001	2005
Non-diversified (nd)	(0 0 0)	335	117	<b>24.78</b>	<b>23.08</b>	<b>31.34</b>	<b>44.44</b>	<b>36.41</b>	<b>37.61</b>	87.16	88.72
Coffee-extra (c)	(1 - -)	1,344	1,518	<b>36.53</b>	<b>36.03</b>	<b>25.07</b>	<b>23.85</b>	<b>57.07</b>	<b>54.87</b>	<b>82.37</b>	<b>82.94</b>
Agriculture (a)	(- 1 -)	192	497	33.85	<b>41.05</b>	28.65	25.96	<b>40.63</b>	<b>56.33</b>	86.45	85.31
Non-agriculture (n)	(- - 1)	559	1,042	31.48	<b>30.04</b>	25.58	<b>30.04</b>	51.70	<b>48.18</b>	<b>88.37</b>	88.96
(c a)	(1 1 -)	117	413	<b>41.03</b>	<b>40.68</b>	27.35	24.46	<b>26.50</b>	<b>59.08</b>	81.20	84.26
(c n)	(1 - 1)	355	803	33.52	33.25	23.66	<b>23.66</b>	55.21	<b>48.94</b>	83.66	<b>87.05</b>
(a n)	(- 1 1)	70	185	34.28	37.30	21.43	23.24	<b>40.00</b>	50.27	87.14	87.57
(c a n)	(1 1 1)	42	157	<b>47.62</b>	36.31	23.81	22.29	<b>21.43</b>	51.59	80.95	85.99

<sup>1</sup> Greater than or equal to eight hectares of the total land owned by households.

<sup>2</sup> More than fifty years old.

<sup>3</sup> Farmers located in municipalities with more than 2,000 coffee growers.

<sup>4</sup> Household's community has access to terrain or paved road (proxy for a non-isolated location).

Notes: The frequency is in numbers whereas the other figures are percentages of all households with the indicated diversification pattern. In bold are the numbers that are significantly different from the rest of the households. The c, a and n include the combination of c a, c n and a n, while the latter two include the c a n. A hyphen (-) in the triplet indicates that that particular activity can assume any value (of 0, 1).

There was an increase in diversification of around 13.7% in 2005 compared to 2001. A higher increase was registered within the coffee-extra diversification. This may have been a response to the low coffee prices between 2001 and 2004. Data included in Table 6.3 also indicates that younger heads of household were more inclined to engage in coffee diversification. The statistics show that households located in municipalities with a denser coffee grower population had the tendency to diversify into coffee-extra.

In 2005, there had been some changes in the households in all four diversification options compared with 2001. No less than 20.2% of the surveyed households were non-diversified in 2001, whereas 5.1% were (still) non-diversified in 2005 (see Table 6.4). Considering the three groups of diversifications, the biggest change was registered in the agricultural one, which changed from 7.5% in 2001 to 21.7% in 2005.

The survey of 2005 only includes coffee income, not the total household income. To shed some light on the relative role of coffee incomes, we report in Table 6.5 the income data derived from a survey held in 2004 that did include measures for both types of income. This survey among 1,396 growers showed clear differences in the per capita coffee income among the households that had engaged in different types of diversification. The highest per hectare income was registered by those that were non-diversified. The households that had a more diversified livelihood reported the

lowest per capita coffee income. This indicates that those economic units were less supported by coffee production than by other activities.

Table 6.4. Changes within diversification options between 2001 and 2005.

Year	2005					Total
	Option	Non-diversified (nd)	Coffee-extra (c)	Agriculture (a)	Non-agriculture (n)	
2001	Non-diversified (nd)	75	172	86	131	464
	Coffee-extra (c)	18	851	244	325	1,438
	Agriculture (a)	18	80	29	45	172
	Non-agriculture (n)	7	415	138	541	1,101
	Total	118	1,518	497	1,042	3,175

Source: My own elaboration with data from the National Coffee Census and 2005 survey databases.

Note: Some farmers are repeated in some options; for that the sum of the total is higher than the number of households included in the 2005 survey.

The group of non-diversified households registered the highest annual income per hectare. This suggests that these households were receiving money from sources other than coffee, as they did not have a high level of coffee income. The group of households more diversified within agriculture and non-agriculture (- 1 1) are the ones that registered the lowest per capita annual income. Overall, coffee income represented a small part (some 20%) of the total household income.

We did not use the 2004 survey as a source of information in this chapter, because the information about the diversification crops, labour and the response to low coffee price scenario was only included in the 2005 survey. Furthermore, the 2005 survey covered a larger number of producers than the 2004 survey did and better reflected the responses to the low coffee prices and the structural differences among municipalities.

Table 6.5. Household income from the 2004 survey (in Mexican pesos).

Type of diversification	Binary triplet	Frequency	Per capita annual coffee income	Per capita annual income*	Per hectare annual income
Non-diversified (nd)	(0 0 0)	225	<b>1,159</b>	<b>5,326</b>	<b>10,240</b>
Coffee-extra (c)	(1 - -)	896	<b>2,241</b>	<b>10,847</b>	<b>7,514</b>
Agriculture (a)	(- 1 -)	130	<b>986</b>	<b>5,316</b>	8,179
Non-agriculture (n)	(- - 1)	603	<b>1,639</b>	<b>8,492</b>	<b>9,588</b>
(c a)	(1 1 -)	20	1,150	7,560	5,278
(c n)	(1 - 1)	257	2,078	<b>10,677</b>	8,322
(a n)	(- 1 1)	97	<b>933</b>	<b>4,987</b>	9,157

Source: My own elaboration with data from the 2004 survey.

Notes: In bold are the numbers that differed significantly from the rest of the households. The c, a and n include the combination of c a, c n and a n, while the latter two include the c a n.

\* The total income includes income from government programmes such as *oportunidades* or *progres*a and can be higher than the per capita annual coffee income even for non-diversified households.

Survey statistics show that the average coffee yield was 10.6 quintals per hectare in 2001 and 11.6 in 2005. Given that in 2005 the coffee price was higher, this increase in yield was not so large; this can be seen as an expression of the low maintenance that coffee orchards received during the period of low coffee prices (from 2001 to 2004). It is also evident that households that diversified with coffee-extra increased their coffee yield by 2.1 quintals per hectare, whereas the non-diversified households reduced their yield by 2.2 quintals per hectare between 2001 and 2005.

As Table 6.6 shows, the households diversified into coffee-extra register the highest area of coffee orchards, whereas those with three groups of diversification register the lowest. Table 6.6 also indicates that land without coffee is very important for the households' decision to diversify into



any of the three groups of diversifications. The extra land owned by the household diversified into agriculture is 9.6 hectares, whereas the households that are not diversified have on average 1.9 hectares without coffee. Looking at the same factor in the other diversification options allows us to conclude, that to engage in agriculture, coffee-extra and agriculture, or in the three groups of diversifications at the same time, coffee households must have a greater portion of extra land available.

Table 6.6. Average variables of farmers/households engaged in coffee-extra and other activities in 2005.

Factor	Non-diversified	Coffee-extra	Agriculture	Non-agriculture	Coffee-extra and agriculture	Coffee-extra and non-agriculture	Agriculture and non-agriculture	Coffee-extra, agriculture and non-agriculture
Hectares with coffee orchard	6.27	7.42	6.72	6.95	6.58	7.17	5.55	<b>4.90</b>
Yield of coffee (quintals per ha)	11.62	11.34	<b>12.46</b>	<b>10.79</b>	<b>12.21</b>	<b>10.70</b>	12.37	11.62
Total land owned by the household	<b>8.18</b>	<b>13.99</b>	<b>15.76</b>	<b>11.66</b>	<b>16.23</b>	12.61	13.26	12.99
Land without coffee orchard (ha)	<b>1.90</b>	<b>6.57</b>	<b>9.03</b>	<b>4.71</b>	<b>9.65</b>	5.43	7.70	8.09
Family members working in coffee	<b>2.65</b>	<b>1.74</b>	<b>1.80</b>	1.97	<b>1.63</b>	<b>1.79</b>	1.82	<b>1.66</b>
Ratio of family members working in coffee/hectares with coffee orchard	0.78	<b>0.65</b>	<b>0.63</b>	<b>0.84</b>	<b>0.60</b>	0.70	0.67	0.63
Hiring labour to work in coffee (1=yes)	0.77	0.81	<b>0.77</b>	0.80	0.77	0.80	0.77	0.77
Annual coffee income (in Mexican pesos)	53,728	70,107	78,457	63,573	75,235	63,477	69,364	49,730
Per capita annual coffee income (considering only family members who work in coffee) (in Mexican pesos)	34,867	58,971	62,419	52,691	60,252	53,816	54,451	37,487
Percentage of family labour used to harvest coffee	35.67	52.27	44.56	46.23	46.52	46.97	44.79	46.25
Percentage of family labour used to farm coffee	42.82	<b>49.57</b>	<b>53.10</b>	48.95	<b>55.90</b>	<b>50.22</b>	<b>54.77</b>	<b>57.34</b>
Profit in Mexican pesos per quintal	103.63	<b>121.16</b>	129.36	<b>82.36</b>	<b>144.21</b>	103.09	115.81	112.82

Source: My own elaboration with information from the 2005 survey database.

Notes: In bold are the numbers that differed significantly from the rest of the households. The c, a and n include the combination of c a, c n and a n, while the latter two include the c a n.

The number of coffee growers located in the households' municipality was higher for those with coffee-extra than it was for the rest. This suggests that households placed in a better institutional environment for coffee are more focused on coffee-extra diversification than those located in municipalities with a lower number of coffee producers. Coffee-producing households situated in municipalities with a higher number of coffee farmers and in more isolated places engaged more in diversification with coffee-extra activities (see Table 6.3), whereas households headed by a male farmer were more oriented on diversification into agricultural activities.

The data discussed above indicate that almost all (94%) coffee households in 2005 were diversified, and more so than they were in 2001 (81%). Those that changed typically moved into coffee-extra and non-agricultural activities. Those that did not diversify characteristically had rather small farms with older heads; these farmers lived in municipalities that had smaller numbers of coffee growers. Households that opted for coffee-extra activities were their opposites: rather large farms with younger heads, situated in large coffee-growing communities. Those that had non-agricultural sources of income tended to be female-headed more often.

The preferred choices of coffee-extra and non-agriculture showed, according to a 2004 survey, the highest scores for per capita household income. Coffee income generally formed 20% of the total income and only slightly more in the non-diversified and coffee-extra households.

The next section will go into the possible determinants of the choices made, focussing on endowments as a factor of portfolio choice, or as a factor of the change in portfolio, and on the role of prices and their variability. The latter aspect could show whether there is reason to believe that the extremely low coffee prices between 2001 and 2005 induced some diversification.

## **6.5. Models specification**

### **6.5.1. Factors influencing diversification**

The factors that we have been discussing in the previous sections were analysed using two distinct econometric models. Model 1 analyses the specific choice that households make regarding the three diversification groups. To the three options we added the default choice of non-diversification so as to avoid a potential selection bias. Since we considered four options at the same time as dependent variables, with three of these not being mutually exclusive, we ran a multivariate probit. Applying this model, we carried out three regressions. The first considered the variables that may play a role in the household's decision on diversification in the four directions. The second added to those variables a set of four explanatory variables, each characterizing the choice that the household had made in 2001. Finally, the third included a variable depicting the differences in the coffee price margin in 2003 and the one in 2005.

The inclusion of the lagged choice made the outcome more oriented toward the dynamics of the choices made by the household. Whereas the first regression model dealt with the general relationship between the endowments and environment of the household and the choices made, the second regression – by including the earlier choice – captured the effects of whatever had changed between 2001 and 2005, notably (but not only) the low coffee prices. The third regression model tried to capture the structural differences among coffee-producing municipalities and the effect of inter-municipal differences in price changes.

The models allowed for non-exclusive choices for types of diversification. Thus, a household could go for c (coffee-extra), a (agriculture) or n (non-farm income), any combination of these three, or being non-diversified. If it chose a combination, the household was modelled as if it separately opted for two or three possibilities. This engendered a high degree of possible correlation between the diversification choices, and the use of a multivariate probit model enabled us to account for these correlations between the options chosen. The main correlation came from the competition in resource allocation. Land, for example, was divided among one or two diversification groups; labour could be divided over all four diversification groups considered. In addition, unobservable characteristics of the household caused choices to be correlated.

Model 1 examined any of the three diversification options defined above: coffee-extra, agricultural, and non-agricultural activities as dependent variables, in addition to a non-diversified one. Each of

these dependent variables, complemented with a set of explanatory variables, is one equation. By using a multivariate probit model, the four corresponding equations were estimated simultaneously, allowing for a possible correlation between those groups. As Pfiefer *et al.* (2009) have affirmed, this kind of estimation maximizes the likelihood based on a quadri-variate normal distribution that can be estimated using a simultaneous technique known as the SUR.

The models can be written as:

$$\begin{aligned}
 y^* \text{ non-diversified} &= \beta_n X + \varepsilon_n \\
 y^* \text{ within coffee} &= \beta_r X + \varepsilon_r \\
 y^* \text{ agriculture} &= \beta_g X + \varepsilon_g \\
 y^* \text{ non-agriculture} &= \beta_o X + \varepsilon_o
 \end{aligned}$$

$$\text{with } \varepsilon_i \approx N(0, \Omega)$$

$$y_i = 1[y^*_i \geq 0]$$

and

$$\Omega = \begin{bmatrix}
 1 & \sigma_{n,r} & \sigma_{n,g} & \sigma_{n,o} \\
 \sigma_{n,r} & 1 & \sigma_{r,g} & \sigma_{r,o} \\
 \sigma_{n,g} & \sigma_{r,g} & 1 & \sigma_{g,o} \\
 \sigma_{n,o} & \sigma_{r,o} & \sigma_{g,o} & 1
 \end{bmatrix}$$

The coefficient  $\beta_i$  and the correlation of the residuals between the choices were estimated with the same estimation procedure. We also included some X variables that were recorded in 2001, to consider the effects of an earlier orientation on the later diversification. Four lagged variables were included as explanatory, one for each of the diversification types plus one for the non-diversified. By including those variables, we tested whether all the factors listed as explanatory variables for diversification in 2005 were able to capture the households' response to the fall in coffee prices between 2001 and 2005 as well as other factors in this period.

Model 1-A, using only endowments and environmental conditions as explanatory variables, was meant to reflect the traditional economic approach to explain activity choices. Producers with better land endowments were expected to opt for land-intensive activities, those with abundant labour for labour-intensive activities, et cetera. This estimation could show the importance of these endowment variables for the choices made, and under the prevailing conditions. These conditions included the prevailing prices of products from these activities. In conditions where input markets are not well integrated (land is not rented out frequently, labour is not so mobile), endowments were expected to play a stronger role than conditions.

Model 1-B, which included dummies for the earlier choice as explanatory variables, should typically attribute many of the endowment effects to these dummies; the more so, the less these endowments change over time. Land is rather fixed, while household size is fixed to a lesser extent; having coffee trees can also be considered a rather fixed factor. For those choices in 2005

that were not the same as those in 2001 and could not be attributed to these dummies, we relied upon the other variables for an explanation. Endowments were then expected to play a secondary role and changes in the conditions surrounding the household could have more of an influence. Thus, we expected effects of the low coffee price to come out more clearly in this model than in model 1-A.

As part of the natural capital, the location and specific characteristics of the land owned by the coffee households are important in the way coffee is farmed and the possibilities coffee growers have for adopting agricultural activities. In more isolated places and with more sloped land, the introduction of other crops is more difficult. Around 50% of the coffee producers have land at above 1,000 meters above sea level.

According to the 2005 survey, two thirds of the coffee households were headed by men. Gender can be important in portfolio choices, as agricultural activities require physical strength and are more insecure for women. The adoption of additional activities, different from the ones traditionally undertaken by the coffee households, may also require new skills, for which education can be important. The 2005 survey indicated that the mean level of education of household heads was lower than primary school, while many farmers had not been to school and were illiterate. More educated heads were found in wealthier households. These households can diversify into more favourable labour market conditions (Ellis, 1998). Differences in human capital and asset specificity may lead to differences in the degree and types of diversification (Perz, 2005).

The availability of family labour should be a determining factor in diversification. The 2005 survey indicated that 80% of the surveyed households had less than 4 members between the ages of 15 and 60. In addition, information from the National Coffee Census indicates that coffee households had less than two people permanently working in coffee production.

Owning limited resources as physical capital allocated to coffee production may push households to diversify into agricultural and non-agricultural activities. On average, coffee households own 5.7 hectares without coffee; depending on the land characteristics, this resource can be used to farm other crops or to raise livestock. As stated by Ellis (2000), not only do households' factor endowments, such as land and labour, help people shape their strategies, but public infrastructures such as roads and electricity do as well. For example, the availability of roads or accessibility to markets can restrain farmers from some economic activities, not only because of the impossibility to transport inputs and outputs, but also because of the market failure for many goods (Reardon *et al.*, 1992). The households' access to terrain or paved road was taken as an indication of accessibility. Survey statistics indicate that 52% of the households had electricity in their house, while 15% of the coffee households were located in communities with a lack of access to paved or terrain road.

Social capital also plays an important role in the opportunities open to households' members. If coffee producers are located in places where many of their neighbours are coffee producers, the opportunities to form cooperatives and to adopt technology for producing and processing coffee are

better. In our sample, 52% of the coffee producers lived in municipalities with more than 2,000 coffee producers. By itself, having more growers around favours growing coffee and the coffee-extra activities; but if coffee prices fall, the influence will be felt sharper in those specialized villages than in more diversified villages. These changes also depend on the natural and social capital present in each coffee-producing area. In addition, on improved labour and food markets agglomeration effects can be expressed.

Finally, we included the recent conditions in the coffee market. Coffee prices were captured in two variables, one showing the variance of coffee prices at the municipal level in the four years before 2005, and one showing the gap between the municipal price and the fob price in 2003, the year with the lowest farm gate prices. A larger gap indicated a lower price at farm level. The average margin between the municipal and the fob price was 192 Mexican pesos per quintal.

To better capture the changes that occurred in recent years, mainly the fall in coffee prices between 2001 and 2005, we introduced the lagged choice variables. We added one dummy variable for each of the diversification types observed in 2001, plus a dummy variable for being non-diversified in 2001. With these dummies, the equations came close to fixed effects specifications.

### **6.5.2. The effect of diversification on the annual coffee income**

In this section, we will present the results in two steps. First, we will describe and analyse the main variables that affect the farmers or households' decision for any of the three types of diversification groups or for non-diversification. Secondly, we will discuss the effect of lagged variables on the direction of diversification as a response to the low coffee price scenario.

The results of the multivariate probit regressions are shown in Tables 6.7 and 6.8. We see that all types of capital have something to contribute to the choice. In each category we find variables with significant effects. Variables related to the coffee market also significantly affect choices.

The choice of diversification per se can be investigated by looking at the first column. It shows that in municipalities with a higher variance of coffee prices, or lower prices as such (i.e. higher margins), producers chose against diversification. Those who made this choice were otherwise characterized by their older age, the fact that they had more labour and less land at their disposal, their being located at lower altitudes and in larger municipalities with less specialization into coffee growing, similar to what we showed in the earlier tables.

If a choice was made for some form of diversification, low and variable prices prevailing before 2005 discouraged a move into coffee-extra activities and favoured the growing of other agricultural crops.

Those who turned to additional coffee activities, such as drying and roasting, typically had opposite characteristics to those who did not diversify at all. Not only did the effects of prices work out in

the opposite direction, this also applied to the effects of location (more at a higher altitude, in smaller specialized municipalities) and to household characteristics (headed more often by younger heads with less labour and more land at their disposal). These opposite movements are also reflected by the robustly negative estimate for the correlation between the error terms of the two latent variables (-0.69).

A choice for off-farm work was made by households that were in many ways similar to the non-diversified ones in that such a choice was made by households at lower altitudes that had little land and were located in communities not specialized in coffee. They deviated, however, in that off-farm work was more often chosen by female-headed households and by those well connected by infrastructure. Coffee prices as such did not play a role in this choice. A further deviation was that there is a strong and negative residual correlation with the first choice of non-diversification.

Finally, additional agricultural crops were chosen by households with more land and little labour, situated at higher altitudes (just like coffee-extra), and facing low coffee prices, that were typically male-headed. The residual correlation with coffee-extra was also positive (and was the only positive score).

Table 6.7. Multivariate probit estimation for non-diversified, diversified within coffee, agricultural and non-agricultural groups without lagged variables.

Group of variables	Variable	Non-diversified	Coffee-extra	Agriculture	Non-agriculture
Natural capital	Altitude	2.050 (0.018)**	-1.115 (0.025)**	-1.298 (0.001)***	0.587 (0.119)
	Altitude <sup>1</sup>	-1.260 (0.008)***	0.883 (0.001)***	0.655 (0.001)***	-0.373 (0.048)**
Human capital	Gender	0.236 (0.065)*	0.035 (0.678)	0.621 (0.000)***	-0.603 (0.000)***
	Age of farmer	0.022 (0.001)***	-0.018 (0.000)***	0.001 (0.889)	-0.008 (0.050)*
	Age-inverse	10.99 (0.131)	-7.397 (0.210)	2.344 (0.635)	-5.814 (0.211)
	Education	-0.024 (0.796)	-0.010 (0.885)	-0.034 (0.565)	0.001 (0.990)
	Education squared	0.008 (0.572)	-0.079 (0.422)	0.002 (0.858)	0.005 (0.584)
Physical capital	Family labour	0.108 (0.000)***	-0.151 (0.000)***	-0.065 (0.004)***	0.009 (0.651)
	Total land	-0.009 (0.021)**	0.010 (0.000)***	0.004 (0.000)***	-0.004 (0.009)***
	Type of road	0.099 (0.534)	-0.411 (0.001)***	-0.026 (0.781)	0.300 (0.001)***
Social capital	Coffee farmers	-98.99 (0.000)***	123.9 (0.000)***	18.65 (0.159)	-25.52 (0.030)**
	Total population	2.959 (0.001)***	-4.951 (0.000)***	-1.433 (0.051)*	0.598 (0.292)
Market	Variance of coffee price	6.539 (0.085)*	-6.867 (0.016)***	-2.127 (0.450)	1.946 (0.443)
	Price margin	1.120 (0.008)***	-2.402 (0.000)***	0.833 (0.002)***	0.384 (0.104)
Constant		-4.101 (0.000)***	3.036 (0.000)***	-0.676 (0.084)*	0.619 (0.087)*
Observation numbers		1,794			
Likelihood		-3,027			
Correlations: Non-diversified			-0.690 (0.000)***	-0.239 (0.000)***	-0.612 (0.000)***
Coffee-extra				0.099 (0.044)**	0.033 (0.498)
Agriculture					-0.251 (0.000)***

Notes: P-values in parenthesis. \*, \*\* and \*\*\*, refer to significance at 10%, 5%, and 1%, respectively.

<sup>1</sup> Altitude squared and divided by 1,000.

Summarizing, we saw a group of households at lower altitudes, better connected and with relatively little land, that turned to off-farm work if female-headed and otherwise stick to just growing coffee. At higher altitudes, and less well connected, households went for coffee-extra if the prices were good and the community was more specialized; they turned to other agricultural activities if this was not the case. The low and volatile prices before 2005 have deterred households from diversification, and especially from undertaking more coffee-related activities.

The results in Table 6.7 show that both internal and external characteristics of the households matter for the choice of activity and extent of diversification. We now move to the second estimation, in which the earlier choices of the households were included as additional explanatory variables. This should allow for all kinds of conservative effects, like specific capital built up in a job, or in extra-coffee activities; or the costs of switching from one type to another.

Table 6.8. Multivariate probit estimation for non-diversified, diversified within coffee, agricultural and non-agricultural groups with lagged variables.

Group of variables	Variable	Non-diversified	Coffee-extra	Agriculture	Non-agriculture
Natural capital	Altitude	2.334 (0.014)**	-1.122 (0.032)**	-1.283 (0.001)***	0.323 (0.459)
	Altitude <sup>1</sup>	-1.352 (0.010)**	0.823 (0.004)***	0.645 (0.001)***	-0.249 (0.260)
Human capital	Gender	0.334 (0.024)**	0.012 (0.892)	0.631 (0.000)***	-0.800 (0.000)***
	Age of farmer	0.023 (0.002)***	-0.019 (0.000)***	0.001 (0.830)	-0.009 (0.061)*
	Age-inverse	10.78 (0.220)	-7.041 (0.272)	2.500 (0.612)	-7.593 (0.187)
	Education	-0.055 (0.883)	0.006 (0.935)	-0.045 (0.451)	-0.039 (0.544)
	Education squared	0.008 (0.613)	-0.011 (0.280)	0.004 (0.688)	0.011 (0.265)
Physical capital	Family labour	0.109 (0.001)***	-0.158 (0.000)***	-0.064 (0.005)***	0.012 (0.602)
	Total land	-0.009 (0.058)*	0.009 (0.000)***	0.004 (0.001)***	-0.004 (0.003)***
	Type of road	0.067 (0.704)	-0.317 (0.015)**	-0.016 (0.867)	0.312 (0.002)***
Social capital	Coffee farmers	-79.96 (0.012)**	97.23 (0.000)***	16.00 (0.237)	-50.64 (0.001)***
	Total population	2.693 (0.009)***	-4.197 (0.000)***	-1.381 (0.063)*	0.894 (0.189)
Diversification	Lag non-diversified	0.784 (0.002)***	-0.455 (0.003)***	0.161 (0.277)	-0.029 (0.875)
	Lag coffee-extra	-0.352 (0.124)	0.798 (0.000)***	0.150 (0.210)	0.100 (0.544)
	Lag agriculture	0.630 (0.001)***	-0.200 (0.104)	-0.052 (0.663)	-0.333 (0.009)***
	Lag non-agriculture	-0.940 (0.000)***	-0.349 (0.001)***	0.003 (0.972)	2.272 (0.000)***
Market	Variance of coffee price	3.300 (0.497)	-3.855 (0.220)	-1.904 (0.511)	2.134 (0.458)
	Price margin	0.453 (0.389)	-1.764 (0.000)***	0.888 (0.002)***	0.415 (0.138)
Constant		-4.313 (0.000)***	2.757 (0.000)***	-0.839 (0.039)**	0.571 (0.228)
Observation numbers		1,794			
Likelihood		-2,555			
Correlations: Non-diversified			-0.722 (0.000)***	-0.313 (0.000)***	-0.449 (0.000)***
Coffee-extra				0.096 (0.068)*	0.037 (0.531)
Agriculture					-0.345 (0.000)***

Notes: P-values in parenthesis. \*, \*\* and \*\*\*, refer to significance at 10%, 5%, and 1%, respectively.

<sup>1</sup> Altitude squared and divided by 1,000.

The results are surprising in that many of the coefficients of Table 6.7 reappear in Table 6.8. The effects of household-level endowments (age, family size, farm size, etc.) were of the same magnitude, even if now we controlled for the earlier choices, and found these to be significant.

There are strong conservative influences of the earlier choices, notably when these were off-farm, or in coffee-extra. Also, the chances of being non-diversified in 2005 were higher if producers were non-diversified in 2001. These choices in favour of continuity negatively affected choices for diversification, and significantly so for those who had off-farm work. Those who had other crops than coffee in 2001 typically became non-diversified in 2005, and had a smaller chance to enter into off-farm work.

The addition of these earlier choices led to smaller effects of the prices on the choices made in 2005. The size of the coefficients roughly halved, contrary to our expectations. This indicates that

these price conditions (variance and level) may have been permanent rather than particular for the crisis period.

The above models show diversification as a response to endowments and (changing) conditions, and amount to a reduced form approach, as the actual returns to each type of diversification were not included in the model. Theory suggests that households choose that type of diversification that gives them the highest return to their assets (Reardon *et al.*, 1992; Ellis, 2000a).

We had no data on the total household income and therefore cannot go into detail on this particular question. We did have data, however, on the coffee income and could investigate how the choice affected this particular part of the income. We will evaluate the effect of the general diversification, the earlier choice of diversification type and the predicted probabilities taken from the multivariate probit model on the annual coffee income in the next section.

## **6.6. The effect of diversification on the annual coffee income**

### **6.6.1. Models specification**

Model 2 evaluated the effect of internal and external factors on the annual coffee income. As the dependent variable was a continuous one, we used OLS regressions. For this model, we carried out three regressions. Regression 1 considered also the lagged variable of general diversification in 2001. Regression 2 considered the lagged variables of the four dependent variables, measured in 2001 as explanatory variables. To conclude, regression 3 took into account the prediction for the four equations included in Model 1 (non-diversified, coffee-extra, agricultural, and non-agricultural diversification with the lagged variables) as explanatory variables. This procedure allowed us to test whether the type of diversification was related to the annual coffee income. In the three OLS regressions of Model 2, we considered explanatory variables that were measured in different years (see the description of the variables in Table 6.2). The specific output for each of the two models specified above are presented and discussed in the next section.

The first explanatory variable we considered in this regression was the altitude. Because the higher the altitude, the higher the qualities of coffee drink, we hypothesized that growers located at a higher altitude would receive a better price, resulting in a higher coffee income. The age of the coffee trees was considered as part of the factor explaining the annual coffee income. We expected a positive relationship between the age of the coffee plants and the income. The same relationship between annual coffee income and yield was also expected.

In the group of human capital, the first variable included was the age of the coffee growers. It was hypothesized that older growers would be able more often to report a higher coffee income. The variable of being indigenous was the second kind of human capital considered here. We considered that if the heads of households are indigenous, their coffee income would be lower. This is because the rural Mexican indigenous communities are normally found in mountainous and hilly conditions, which were not fully captured by the other variables.



Other variables considered as part of the human capital were literacy and education. To be able to get more complex technology to produce, process and market coffee, it is easier if growers can read. This possibility increases with the education level. So, as being unable to read limits growers in their ability to understand newspapers, use the Internet and understand figures, we hypothesized that being illiterate negatively affects one's coffee income, whereas education may have a positive effect.

Land ownership was another variable we considered as part of the factor explaining the level of coffee income. In Mexico, three types of land tenancy occur: private, ejidal and communal. The distribution of land took place at the beginning of the last century, to the effect that the private properties were the better ones in terms of fertility, location and slope. We hypothesized that coffee growers with ejidal and communal land would have a lower annual coffee income.

Following up on the results of the choice model, we considered the lagged of diversified, non-diversified, coffee-extra, agricultural and non-diversified variables, plus four predicted variables from the earlier model as explanatory ones. We used predicted values of the contemporaneous portfolio (rather than actual values), as the current portfolio choice may have been affected by the coffee income. The effects of these earlier or current choices on the income were not easily predictable, as they depended on how the choice itself corrected the influence of the other variables.

In the market domain, three factors explaining the annual coffee income were considered. The first of them was the ratio of the number of intermediaries to that of coffee farmers. A higher ratio can lead to more competition among intermediaries; more competition will therefore be in line with a higher coffee price. Consequently, we expected that a higher ratio would correspond to a higher annual coffee income. The second variable in this group was the municipal coffee price, which obviously should be positively related to the coffee income. The last variable considered here was the variance of coffee prices at the municipal level, measured from 2001 to 2004. We considered that a greater variation in the coffee price would induce lower levels of investment, since coffee growers are risk averse. Accordingly, we expected a negative relationship between the variance of the coffee price and the annual coffee income. This effect might be reversed if higher variances deter risk-averse farmers from entering into coffee growing, so that only those remain who can afford some variability of prices. These 'insiders' are then rewarded by higher than average returns. The positive income effect would then be the compensation for the disutility of variable prices.

### **6.6.2. Results of factors influencing the annual coffee income**

We used the natural logarithm of the annual coffee income as a dependent variable. To test the effect of diversification on the income from coffee production, we performed three OLS regressions: regression 1 included the lagged variable of general diversification; regression 2 included the lagged of coffee-extra, agricultural, and non-agricultural variables; and regression 3 included the

predictions of non-diversified, coffee-extra, agricultural, and non-agricultural diversification obtained in the multivariate probit model. Results are shown in Table 6.9.

We recall from Table 6.6 that households diversified in coffee reported an annual coffee income that was 16,379 Mexican pesos higher than that reported by the non-diversified households. Similarly, households diversified into coffee-extra plus agriculture registered an average annual coffee income that was 5,125 higher than that of the households diversified into coffee-extra only. On the other hand, households diversified into coffee-extra plus non-agricultural activities, and those households participating in the three types of diversifications simultaneously, had a lower average annual coffee income than the non-diversified ones had. Indeed, measured by the coffee income alone, coffee households seemed to have had an economic incentive to diversify into coffee-extra and a combination of coffee-extra and agricultural activities, but not into non-agricultural activities.

The regressions reported in Table 6.9 attributed the coffee income to a range of explanatory variables. In the group of natural capital, the altitude and the yield were the only variables of importance for the annual coffee income. An altitude below 940 metres above sea level showed a positive effect on the annual coffee income, whereas an altitude higher than 940 showed a negative effect on the annual coffee income. This is a surprising result, as we expected that an even higher altitude would positively affect the coffee income through a better coffee quality. The size of the effect is small, however. The yield of coffee orchards is positive correlated to the level of the annual coffee income: the yield increased by one quintal per hectare, which led to an increase of 6.2% in the annual coffee income.

In general, households classified as diversified in 2001 enjoyed a 19.7% higher annual coffee income than the non-diversified ones. The results from regression two confirm that this is mostly due to the households that were engaged in coffee-extra diversification in 2001.

The predicted values of the diversification into coffee-extra and agriculture, obtained from model 1, show a positive effect on the yearly annual coffee income. While this is an obvious result for specialization into coffee-extra, it is not for the diversification into other forms of agriculture.

The variables relating to the coffee market positively correlated with the annual coffee income. An increase of the coffee price of 10 Mexican pesos per quintal will increase the annual coffee income by 2%. The findings related to the ratio intermediaries/farmers at the municipal level and the individual coffee price suggest that when the households are located in municipalities with a better institutional environment for coffee, their annual coffee income will be higher.

Regarding the variance of the coffee prices at the municipal level, the result shows a positive effect on the annual coffee income. This may confirm a selection effect leading to higher incomes for those that took the chance. This result contradicts the effects of the other variables included in the market domain. One explanation for this to happen is that the municipalities with a higher variance constitute a better environment for marketing coffee. In fact, the number of coffee producers and

the ratio of intermediaries to farmers per municipality are positively correlated with the price variance.

Table 6.9. Factors determining the log of the yearly coffee income (OLS estimates).

Group of variables	Variable	Regression 1	Regression 2	Regression 3
Natural capital	Altitude	0.406 (0.157)	0.378 (0.187)	0.994 (0.001)***
	Altitude <sup>1</sup>	-0.185 (0.195)	-0.189 (0.187)	-0.529 (0.000)***
	Age of coffee plants	0.013 (0.360)	0.015 (0.285)	0.016 (0.265)
Human capital	Yield	0.063 (0.000)***	0.063 (0.000)***	0.062 (0.000)***
	Age of farmer	0.006 (0.048)**	0.006 (0.049)**	0.007 (0.019)**
	Age-inverse	0.083 (0.981)	-0.211 (0.952)	-0.939 (0.788)
	Indigenous	-0.301 (0.000)***	-0.319 (0.000)***	-0.379 (0.000)***
	Literacy	0.188 (0.013)**	0.193 (0.010)**	0.185 (0.013)**
	Education	-0.040 (0.431)	-0.044 (0.391)	-0.025 (0.620)
Physical capital	Education squared	0.032 (0.000)***	0.032 (0.000)***	0.030 (0.000)***
	Land property	-0.100 (0.038)**	-0.118 (0.015)**	-0.162 (0.001)***
Diversification	Lag of diversification	0.197 (0.001)***		
	Lag of non-diversified		-0.067 (0.502)	
	Lag coffee-extra		0.192 (0.016)**	
	Lag agriculture		-0.090 (0.252)	
	Lag non-agriculture		-0.039 (0.491)	
	Prediction non-diversified			-0.187 (0.603)
	Prediction coffee-extra			0.607 (0.000)***
	Prediction agriculture			0.867 (0.001)***
	Prediction non-agriculture			-0.113 (0.240)
Market issue	Ratio intermediaries/farmers	0.021 (0.005)***	0.022 (0.003)***	0.031 (0.000)***
	Coffee price	0.002 (0.000)***	0.002 (0.000)***	0.002 (0.000)***
	Variance of coffee price	6.957 (0.000)***	6.376 (0.000)***	7.077 (0.000)***
Constant		6.942 (0.000)***	7.087 (0.000)***	6.335 (0.000)***
Observation numbers		1,676	1,676	1,666
R square		0.543	0.546	0.560

Notes: P-values in parenthesis. \*, \*\* and \*\*\* refer to significance at 10%, 5% and 1%, respectively.

<sup>1</sup> Altitude squared and divided by 1,000.

According to the results included in the prior section, the higher the variance, the lesser the willingness of the coffee growers to diversify into coffee-extra. It seems that municipalities that register a higher variability of the coffee price also are the ones to provide more opportunity for producers to sell raw coffee (the unprocessed product) at a higher price. Thus, this coffee producer will register a higher yearly coffee income.

The overall results from the OLS regressions indicate that coffee-producing households with more assets have a higher annual coffee income than their counterparts and that diversification matters in improving the coffee-producing households' welfare.

## 6.7. Conclusion and policy recommendation

The main results of this research indicate that coffee households may have responded to the low coffee price scenario by increasing their diversification. As a potential response to the fall in coffee prices, coffee producers tend to increase their diversification in general. In particular, from 2001 to 2005, they have increased their agricultural diversification and coffee-extra and reduced their non-agricultural diversification.

By introducing lagged variables related to diversification in 2001 and applying a multivariate probit regression, we were able to capture the households' response to low coffee prices (and possibly to other effects that we ignored). By doing so, internal and external factors captured the changes in the households' decision-making regarding diversification.

The overall results indicate that an improved institutional environment for coffee induces more diversification into coffee-extra activities, while it reduces the likelihood that coffee-producing households engage in agricultural and non-agricultural diversifications or no diversification at all.

With respect to the factors that are important in the coffee households' decision-making about diversification into the specific groups of activities, our results were similar to those reported by other researchers (Abdulai and CroleRees, 2001; Barrett *et al.*, 2001; Van den Berg, 2010). They also argued that a male head of the household and the number of coffee farmers at the municipal level reduced the likelihood that households would engage in non-agricultural activities.

Results from our multivariate probit model suggest that the worse the conditions for pure coffee production, the greater the probability that coffee-producing households will decide to diversify by means of agricultural activities. At the same time, they will be less willing to vertically integrate their coffee production.

Coffee-producing households located in more accessible places have higher annual coffee incomes than those households located in more isolated locations. Hence, public services, such as improving the accessibility to coffee-producing communities, are very important in increasing the annual coffee income.

By diversifying their livelihood, coffee households try to change their orientation from raw coffee production to a more integrated approach, to meet the demands of the final consumer. In doing so, they try to meet the market's changing demands and adapt to the current economic situation. In this context, public concern should shift from simply providing the necessary support for traditional coffee producers to acquiring the new skills and services that a diversified household demands.

The diversification involves many specific investment areas that need to be covered by public or private sectors. Thus, the government and policy makers have to work at creating an institutional environment, technology and a rural infrastructure in accordance with the new demand. Additionally, the government should facilitate the improvement of the institutional environment for the private sector to provide inputs and services according to the emerging needs of the diversified sector.

## Chapter 7. Discussion and conclusion

### 7.1. Introduction

In Mexico, the majority of coffee farmers have small-scale operations and lack incentives to become organized as coffee producers. Also, smallholder coffee growers are very diverse (often drawing from various indigenous groups) and live widely dispersed; their leaders therefore have a difficult job organizing them. Conducting small transactions, on the other hand, often with limited physical accessibility and in areas with poor communication, means that farmer organizations face many challenges to meet the growers' needs. For this reason, it is very costly and time-consuming for small-scale coffee growers to engage in cooperatives, and often there is not enough economic incentive to be part of them. However, producer organizations can be a solution to the limited bargaining power of smallholders. As theory tells us, producer organizations can also help with reducing transaction costs (Ruben *et al.*, 2007b).

The liberalisation of the Mexican coffee sector has brought both drawbacks and benefits to some of the major players. The free market has made large-scale processors and exporters prosperous, and multinational coffee firms have also adapted well to the current institutional environment. By contrast, small and medium-scale farmers have gradually lost their ability to compete and participate in the coffee market, as they now face many more constraints. In this way, the main gaps left by the decrease in state participation in the coffee sector have been covered by private agents. Some of them have benefited by dominating not only in the policymaking sphere but also in the establishment of the institutional environment operating in this industry.

Taken together, all the topics we have worked on in this thesis justify the relevance of this research, the main aims of which were to investigate the institutional setting prevailing in the Mexican coffee sector and its structural changes over time. Relevant topics to discuss the institutional performance included: the contract arrangements and trade performance, the factors influencing the growers' willingness to join a cooperative, the effects of cooperation on market instability, the influence of cooperation on the growers' welfare, and coffee producers' response to the falling coffee price through their engagement in diversification activities.

We organized the thesis into seven chapters; four of them are empirical ones. Chapter 1 contains a general introduction of the research and presents the organization of the thesis. Chapter 2 describes the importance, structure and organization of the coffee sector. Chapters 3 analyses and presents information regarding the contract arrangements between traders and the traders' performance in the Mexican coffee supply chain. Chapter 4 deals with main factors influencing farmers' decision to get organized in a cooperative and the effect of this organization on the welfare of coffee households. Chapter 5 provides some evidence of the effect of price instability on cooperation, and the influence of cooperation on the predictability of the local coffee price. Chapter 6 presents some evidence of the coffee growers' response to the fall in coffee prices through the adoption of more diverse ways of earning a livelihood. Chapter 7 provides a discussion and conclusions about the main results reached in this research. In this concluding chapter, we will

present some overall policy implications based on the general answers to our main questions. Through these concluding remarks, we would like to draw attention to the role of the government and policymakers in supporting the reorientation of the coffee policy and institutional settings required to improve the performance of the coffee sector and the livelihoods of the producers.

The remainder of this chapter will continue as follows. Section 7.2 summarizes and discusses the main findings and their scientific relevance with respect to the topics addressed in this research: contract arrangement and trader performance, factors influencing cooperation, cooperation and price instability, and diversification as a response to the low coffee price. Section 7.3 deals with policy implications of our results. At the end, in Section 7.4, we will present some limitations we faced during this work and offer some thoughts on future research.

## **7.2. Summary and discussion of the main findings**

In **Chapter 2**, we have shed light on the structure of the coffee sector and its changes over time. Our results suggest that there have been many causes to make these institutional changes happen. Currently, minifundia are more widespread in the coffee sector than they used to be under the quota system. Over the last two decades, the size of coffee growers in the Mexican coffee sector has decreased.

As has been argued by some scholars (Renard, 2008, Giovannucci and Juárez, 2006), the coffee supply chain is being controlled by multinational firms, that determine the rules of the market both at the domestic and the international level. On the other hand, there is no strong grower organization to provide counter balance to the multinationals in the policy making arena. This situation asks for government intervention in establishing an institutional environment, including market information and services, to assist small- and medium-scale coffee growers in increasing their income.

Small- and medium-scale coffee producers are facing many difficulties to survive as coffee growers; many of them can only continue as coffee producers because of the various government programmes supporting the coffee sector. Indeed, in an evaluation done by FAO (2007), it was found that 30% of the interviewed coffee producers affirmed that if not for the coffee programmes, they would no longer be part of the coffee sector. Thus, recent public policies developed in the last two decades actually have prevented more producers from exiting the coffee sector, but they did little for the improvement of the yield, production, coffee quality and reliability of the coffee sector.

As in most food commodities, the long-term trend in coffee prices is downward, suggesting that global supply reductions could have beneficial short- and long-term effects. According to ICO statistics (2009), in recent years international coffee prices have shown a fluctuation of around 50% annually, whereas during the regulated period, prices fluctuated approximately 15% around their average defined price (Sasha and Breger, 2010). This situation puts growers and other partners in the coffee supply chain in a difficult position when it comes to making investments and planning activities.

Contrary to other studies (Bussolo *et al.*, 2007) that tell us that agricultural liberalization has been beneficial for the poor, we found that this is not the case for the Mexican coffee sector. Small-scale coffee growers have been harmed by the coffee price variability and the lack of opportunities to participate in the domestic and international market.

The path and differences occurring between the rural and international coffee prices have varied from period to period. Under the controlled system, coffee growers participated in the international price to a lesser extent than they do under the free market. Yet nowadays, coffee growers are paying for everything they need in producing, processing and marketing the product; this situation translates to a huge difference with what they used to do under the quota system. In this chapter, we argued that farmers were better off under the quota system than they are under the free market. In those days, the government, through its various agencies, was providing almost all the requirements producers had. For this reason, even when the share of coffee growers in the export price was small, they were receiving a relatively larger amount of money that they receive under the current situation.

In the actual organization of the Mexican coffee sector, many agents have been involved. Some of the most central participants in the coffee arena are the ministries of agriculture at the federal and regional levels, associations of firms (processors and exporters), grassroots grower organizations and farmer cooperatives. Yet, according to our findings, clearly the most prominent actors have been the multinational firms, as they have been able to set up many types of market arrangements that best fit their interests, at the different locations and with both small- and medium-scale processors.

By participating in the IRO, buying, negotiating, processing and selling, coffee producer organizations are filling some of the gaps left by the disappeared INMECAFE. Farmer cooperatives and grassroots grower organizations help producers to negotiate resources from the government budget, connect and negotiate relations with international agencies, and provide services to improve farmers' competitiveness (e.g. technical assistance, quality improvement, and building the infrastructure to process the product). Yet, the analysis done in this chapter indicates that not much progress has been made in that respect. In part, the lack of results is also a consequence of the fact that not many coffee producers are participating in organizations and that they have less capital and resources to invest in the coffee industry.

During the last two decades, many government programmes have been developed to support the coffee sector. They have been set up with the aim to keep the coffee industry working and to guarantee economic activity for landholders located in many coffee-producing regions. However, our analyses indicate that there is no clear evidence of a recovery of the yield and production in this sector. The average coffee yield has dropped from 10.6 quintals per hectare in 1996 to 7.5 quintals per hectare in 2008 (Akaki and Huacuja, 2006; SIAP, 2010).<sup>36</sup>

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<sup>36</sup> A quintal is 245 kg of cherry coffee, 57.5 kg of parchment coffee, 80 kg of natural dry or 46 kg of green coffee.

In **Chapter 3**, we dealt with the main objectives of identifying the factors explaining the contractual choices of traders working in the Mexican coffee supply chain, and assessing the performance of coffee traders in four coffee-producing regions. The major results indicated that being a roaster and selling cherry coffee negatively affects traders' use of contracts, whereas being vertically integrated has a positive effect on contracting. The findings also suggest that selling cherry coffee, participating in a competitive environment and having contracts positively influence intermediaries' performance, while being a roaster has a positive effect on the gross margin.

Our outcomes are in line with what Avalos-Sartorio (2006a) has indicated, in the sense that the liberalization would benefit producers and consumers by increasing the primary selling price and reducing the final buying price. Our results are also in agreement with the logic specified by Fischer *et al.* (2009), that functioning in a competitive environment is a factor that may increase the probability of contractual agreements between agents, as they have to secure the provision of the product and the market in which that product will be sold.

The results we obtained in this chapter are coincident with those found by other scholars such as Winter-Nelson and Temu (2002), who specified that the costs of marketing output fell substantially with liberalization, but that the transaction costs associated with financing the production rose. These results are also in line with the ones reported by Mose (2007) and Schroeter and Azzam (1991), who concluded that the lack of competition leads to higher marketing margins, which decreases the efficiency in the supply chain. However, there are differences in terms of the commodity that was studied and the context in which the research was done. Yet, we found that marketing margins diminish as competition increases between intermediaries, as was expected. From this result we can say that if liberalization increases competition, this also brings benefits to coffee growers because they receive higher farm gate prices.

One of our results shows that coffee agents have engaged in different activities as a response to the transition from a state-led commodity chain to a liberalized environment. Some of them decided to integrate vertically in order to reduce transaction costs and achieve higher efficiency in the market, relying on a larger volume of product to increase their profits; others invested in assets that allowed them to add value to their product and to have larger margins per units of product sold. Also, by doing so, traders avoid having to enter into contractual agreements with other agents. This result is in line with the argument of Shervani *et al.* (2007), that under high asset specificity and high uncertainty, the firms will embrace a highly integrated channel in all cases to obtain more benefits from their investment. As part of the analysis, we conclude that there are risks and uncertainty issues in the coffee sector that lead traders to engage in practices like selling cherry coffee.

We also found that the lack of supporting market institutions, like credit bureaus, proper infrastructure and clear regulations for the business have resulted in inefficient markets. The latter indicates that there is room for government intervention. In order to have a more efficient supply chain, these costs have to be reduced by giving technical support and increasing the skills of



traders (regarding marketing, branding, managing their own business), by improving access to information, credit, and by providing the proper infrastructure to diminish transaction costs.

By analysing intermediaries' behaviour and performance, we were able to determine that marketing margins diminished as competition between traders increased. This means that liberalization has indeed brought trader entry into the market, which resulted in lower marketing margins. Credit constraints and uncertainty have made most traders neglect investing in new technologies and machinery. We can therefore conclude that there has been liberalization but no real modernization in the Mexican coffee sector. Consequently, we argue that for the Mexican supply chain to become competitive, huge investments and improvements have to be made, both in technology and the institutional environment at all stages of the coffee supply chain.

In **Chapter 4**, we identified the variables that contribute to the coffee growers' willingness to become a member of a cooperative. Furthermore, we examined the significance, relative importance and direction of variables influencing the per capita coffee income. Our results showed that a farmer's age, gender (male), a farmer's active participation in the National Coffee System, the literacy rate, participation in training events, farm size, communal land property, the availability of electricity, a higher altitude, the number of farmers in the municipality and the proportion of organized farmers in the municipality all favour cooperative affiliation. On the other hand, housing conditions, the proportion of farmers in the municipality and selling to intermediaries negatively affect the prospects for cooperative membership. Regional differences regarding coffee production conditions also showed a significant result in influencing the likelihood that a farmer joins a cooperative.

Our findings are in line with what the theory has stated (Karli *et al.*, 2006; Levay, 1983), but we did find some additional factors that positively or negatively influence the coffee growers' willingness to join a cooperative. In addition, we discovered that being a cooperative member not always helps coffee growers to receive a higher coffee price. Membership of a cooperative helps to increase the coffee price the greater the involvement in processing and selling more downstream of the supply chain. Indeed, our results show a negative effect of cooperative participation on the average price for delivering natural dry coffee. This implies that cooperative's members enjoy a comparative advantage in coffee marketing only if some additional processing services can be included as part of the work done by the cooperative. Here, a more specific study needs to be done to determine the direction of causality, e.g. whether growers selling natural dry coffee receive a lower price because they have joined a cooperative or that the lower prices are an incentive to join the cooperative. If the latter is the case, it is possible that even when producers are joining cooperatives, it does not help enough in receiving a higher price than their counterparts receive.

Overall, in several respects, our results are broadly in line with findings from earlier studies (Basu and Chakraborty, 2008; Francesconi, 2009; Karli *et al.*, 2006; Ruben and Lerman, 2005; Tanguy and Alemayehu, 2009; Tanguy *et al.*, 2008) that rely on different methods to address similar questions regarding cooperative affiliation. On the effect of farmer age and gender, we can confirm the findings by Karli *et al.* (2006) and Tanguy *et al.* (2008, 2009), that register a positive effect of

farmer age and male membership on cooperative membership. This implies that Mexican coffee cooperatives represent a relatively older population and maintain a largely male-biased membership composition. In a similar vein, the positive influence of literacy on cooperative participation is confirmed, in line with results reported by Tanguy *et al.* (2009). The positive effect of a farmer's access to the National Coffee System reflects the fundamental importance of public support, concordant with similar findings by Karli *et al.* (2006) for Turkish cooperatives.

With regard the factors that are important for defining the per capita coffee income, we discovered an overall positive effect of cooperative participation on household welfare. This tends to be mediated by their improved access to external infrastructure (roads, but mainly electricity) that enables further progress in coffee processing. Only when the coffee cooperatives support upgrading and value-adding activities, significant price advantages can be generated. Thus, it seems that investing in processing plants helps producers to receive a higher coffee price. These results are in line with the finding by Tanguy and Alemayehu (2009) and Francesconi (2009), that cooperatives have much to do with reducing transaction costs related to a small production size and volume.

One way in which farmer organizations can help their members is by operating a centralized infrastructure to process the coffee. Centralized processing allows these organizations to maintain standards and a consistent quality necessary for sales to the specialty market, or to develop good and long-standing relationships with their buyers. This may even be conducive to coffee growers' entry to the organic and fair trade market. We agree with what Stephanie and Seth (2005) have stated, that cooperatives and grassroots organizations can support farmers who live too far from centralized buying or processing centres; they can help with an affordable, efficiently processed, transported and marketed product. We were able to derive this conclusion as we include some variables (e.g. road, electricity) as a proxy for remote places where coffee households are located.

Cooperatives have to be as efficient as other intermediaries working in the same market to bring economic benefits to their members and their neighbouring growers; otherwise they bring losses to all of them. If coffee cooperatives work efficiently, they can push the coffee price upwards. Thus, the welfare of organized (and some non-organized) growers might increase as well. These unions also have to work on improving the coffee quality and then bargain for a better coffee price.

Further research regarding the long-term effects of rural organization on farm household welfare and bargaining power, comparing matched samples of members and non-members living in the same region, enabled us to shed light on the enduring effects of cooperative membership. Our material suggests that under the current wave of market liberalization in Mexico, many coffee cooperatives have received some government subsidies that enable them to overcome difficulties in processing, marketing and supply chain upgrading.

In **Chapter 5**, we evaluated cooperation as a response to market uncertainty and the effect of cooperation on the coffee market instability. The results indicate that there is no clear link between cooperative participation and the predictability of local coffee prices. However, when we controlled for gender, the education of the head of household, communication, land property, altitude, farm

size, the number of coffee farmers in the municipality, the variance of farm size at the municipal level, and the variability of the coffee prices, we found clear evidence that the variability of the coffee prices positively affects farmer's likelihood of becoming a member of an organization. The results also indicate that membership of a farmer organization helps producers to increase their coffee price and income.

The overall results indicate that the degree of education and whether the producers owned ejidal or communal land increased the probability of their participation in a cooperative. This result is in line with the findings of Karli *et al.* (2006), that education positively influences farmers' willingness to become a cooperative member. However, we found a negative correlation of private land ownership with cooperative affiliation. From this result we can derive that middle-class coffee producers were those more likely to participate in cooperatives. Similar results have been reported by Francesconi (2009) and Tungay & Spielman (2009) for studies done in Ethiopia. This result is also in line with the theory (Karli *et al.*, 2006) and with what we found in Chapter 4.

In accordance with the theory, too, is our finding that this better income for organized coffee growers, besides having a higher productivity and production, may be the reason why they join a cooperative. By doing so, they integrate vertically with a processing stage and thereby achieve higher prices for their product. On the other hand, it would be easier for coffee intermediaries to deal with organized farmers than with individual ones; in this respect, traders reduce transaction costs and are able to pay higher coffee prices to their suppliers. However, in line with what Milford (2004) has stated, purchasing prices are normally higher in areas where cooperatives are present than in areas where such organizations are not operating. Yet, we also found places where cooperatives are working inefficiently, and here the coffee price tends to be lower accordingly.

The higher variance in the coffee prices from 2001 to 2004 induced more cooperation, whereas the higher the mean of the coffee prices was in this period, the lower the willingness was to cooperate. It seems that selling coffee as an individual grower provided more opportunities to earn from the temporary high coffee prices. This conclusion is opposite to what Gjølberg and Steen (1999) have argued, in the sense that for many coffee farmers, price volatility can be handled more efficiently through processing and selling the coffee collectively rather than doing so individually. Anyway, coffee growers can have access to a better price in two ways. One is to sell more downstream of the supply chain and have more negotiation power vis-à-vis their buyers, which can become possible by joining a cooperative. The other way is to sell through the future market mechanism, which is much more accessible for small- and medium-sized growers – when they take part in a cooperative.

Apart from the above similarities and differences between our results and what other scholars have found, in Chapter 5 we furthermore shed light on the analysis of information we gathered from different sources and at different points in time. In this way, we were able to build a panel database, using the prices at international, national and village levels. To this we added the prices over a period of eight years that we subsequently related with the households' characteristics of coffee growers included in the 2004 survey. Moreover, the research done in this chapter is rather

unique in that it addressed the effect of the variability of coffee prices on cooperation as well as the vice versa effect. In this research, we were able to avoid the recursive effect of the relationship between the local coffee prices and cooperation, as we used the organization in 2001 and in 2004 and the variability of prices in two periods (2001–2004 and 2005–2008).

The investigation done in this chapter showed that while farmers appear to opt for cooperative membership more often when faced with a higher price variability (and lower prices), this does not seem to affect the price variance itself. Cooperative membership does lead to higher incomes from coffee, however. The lack of effect on price variability can be ascribed to the fact that farmers do not sell all their coffee to cooperatives and that the share of organized farmers is relatively small. Hence, membership does not affect local prices that much. Even when the participation in coffee cooperatives is not translated into a reduction of market instability, the higher individual coffee price and coffee income received by organized coffee farmers make enough of a difference to motivate producers to join an organization.

In short, we do not see the expected relationship between residual variances of the coffee price and the level of organization, or at least the expected effect of the level of organization, on the market stability in our model specification. The lack of effect of the degree of organization on the predictability of the local coffee price might also be attributed to the small shares of sales of cooperative members who go through the cooperative. Anyhow, our results suggest that the work done by cooperatives did indeed influence the market characteristics. As Milford (2004) has mentioned, cooperatives may provide access to government funds, increase innovation as they introduce new production technologies and approaches, and help members to increase their knowledge. In this way, cooperative members, too, are able to enjoy a higher coffee price and income than their counterparts in the same coffee-producing region.

The existing organizations of small- and medium-scale coffee producers are not well prepared for attending to the needs of the social sector. These unions ought to increase their financial and organizational management capacity to operate in a more successful way; they also need to have skilled staff of their own to be able to conduct profitable businesses. These organizations lack the methods and operational capacity to reduce the high operational costs, to control transaction costs and to achieve economies of scale in the processing, storage, transporting and marketing of the produce (Stephanie and Seth, 2005).

Our findings indicate that the government's aims and intentions to increase cooperation might increase the farmers' economic benefits. Even though politicians, government and non-governmental agencies may provide support to coffee cooperatives, this does not directly benefit the very poor coffee producers. However, we maintain that those poor farmers can expect clear benefits from cooperative through the spillover effects. Accordingly, our results may contribute to the improvement of programmes supporting the Mexican coffee sector.

In **Chapter 6**, we analysed the coffee households' response to a low coffee price by means of diversification and the effect of this on their annual coffee income. Our results indicated that a

better institutional environment for coffee production, like the number of coffee farmers and the coffee-price margin at the municipal level, is positively correlated to the coffee farmers' decision to engage in coffee-extra activities. Those factors – combined with some natural, human and physical kinds of capital – are effectively capturing the benefits generated by the households' response to a low coffee price scenario through an increase in their livelihood. Results from our multivariate probit model suggest that the worse the conditions for pure coffee production are, the greater the chance that coffee-producing households will decide to diversify their agricultural activities. At the same time, farmers will be less willing to vertically integrate with coffee.

With respect to the factors that are important in the coffee households' decision to diversify into the specific groups of activities, our results were similar to those reported by other scholars (Abdulai and CroleRees, 2001; Barrett *et al.*, 2001; Van den Berg, 2010). Our results indicated that a male head of the household and the number of coffee farmers at the municipal level reduced the likelihood that the households would engage in non-agricultural activities.

By introducing lagged variables related to the diversification in 2001 and applying a multivariate probit regression, we were able to capture the households' response to low coffee prices (and possibly some other effects that were ignored). By doing so, internal and external factors capture the changes in the households' decision-making regarding diversification. Overall results show that both internal and external characteristics of the households matter with respect to the choice of activity and the extent of the diversification. Our results are in line with the argument of Ellis (2000) and Reardon *et al.* (1992), that not only households' factor endowments, such as land and labour, help people shape their strategies, but public infrastructures such as roads and electricity help as well.

Beside those results and their coincidence with the theory, we shed light on the introduction of lagged variables in the analysis. By including lagged variables, we could find the long-term effect of diversification on households' livelihood and coffee income. We found consistent evidence that a general diversification and coffee-extra activities in 2001 had a significant, positive effect on the annual coffee income in 2005. Clearly, the fall in the coffee price during the 2001–2004 period made farmers proceed with their diversification. If periods of low coffee prices will recur under the prevailing domestic and international organization of the coffee sector, this will result in an increase of diversified households in coffee-producing areas in the years to come.

According to theory, and depending on the assets endowment owned by the coffee households, if growers do not have access to additional land, they have two options to diversify (on-farm). Firstly, they can introduce another crop that can be farmed in the same coffee plantation, such as oranges, wood trees, bananas and ornamental plants. Secondly, they can remove coffee trees to establish any other crop or livestock that is feasible in the same natural conditions. Our results indicate that households diversify into one, two or all three groups of activities defined in this chapter. That is part of the correlation we found among the various options of diversification. This correlation came from the competition in resource allocation that is usual in coffee households and from the

complementarity between the various diversification groups, which showed a positive correlation in the latter case.

By introducing a number of variables at the municipal level, we were able to test the effect of the institutional environment on the households' livelihood; and by introducing the coffee price margin between municipal and export prices, it was also possible to capture the effect of structural differences with regard to diversification among municipalities. The overall results derived from our investigation indicate that an improved institutional environment for coffee induces more diversification within coffee-extra activities and reduces the chance that coffee-producing households engage in agricultural and non-agricultural activities. Consequently, if the government wants to preserve the coffee sector as a productive contributor to the whole economy, forestry and diversity preservation, it is advisable to create the needed institutional environment for coffee and to provide better public services mainly for those farmers living in remote areas. However, as the coffee production represents invested capital, many farmers did not abandon or remove their coffee trees (Calo and Wise, 2005), even when they engaged in other economic activities. Thus, under the recurrent periods of low coffee prices, coffee growers reduced their maintenance of the coffee orchard and used part of their available assets endowment for other activities. According to Reardon *et al.* (1992) and Ellis (2000b), this process means changing the use of the assets available and reallocating labour to other activities, such as off-farm wage labour, self-employment or migration.

The diversification involves many specific investment areas that need to be covered by public or private sectors. Thus, the government and policymakers have to work at creating an institutional environment, technology, and a rural infrastructure according to the new demand emerging in the Mexican coffee-producing regions. Additionally, the government should impose clear rules for the private sector to make it provide inputs and services according to the emerging needs of the diversified sector.

As the results included in Chapter 6 show, creating a better institutional environment and reducing uncertainty in the coffee market can help coffee producers to increase their confidence in coffee (the adoption of coffee-extra activities). As a result, there will be less pressure on coffee growers to pursue other sources of income besides coffee. As the data tell us, coffee producers have recently been depending less on coffee and more on other income sources, such as wage labour, other economic activities and subsidy programmes.

One important conclusion we can derive from our results is that the diversification of farmers' livelihood contributes to the increasing capabilities of the coffee households. This means that the policies needed are the ones that reduce constraints to diversification and widen its possibilities. In this sense, we agree with what theory tells us: initiatives that are effective in creating better conditions for diversification in remote areas, which many coffee-producing regions in Mexico are, are urgently needed. Among the most important of them are those concerning rural credit, the provision of technology and information, risk-reducing markets, access to rural services, an increase of communication and the provision of skills and education (Ellis, 1998).

### **7.3. Policy implications**

Following the reforms since the eighties in Mexico, the government's role in agricultural markets (including coffee) has changed dramatically. As Avalos-Sartorio (2006a) has stated, policymakers during the eighties expected that the move to a market-based agricultural economy would bring efficiency because it would generate a better link between domestic and international prices. It was expected that the liberalization would benefit both producers and consumers by increasing the selling price and reducing the buying price.

The current government participation in the coffee sector is focused on a deregulation of the market, to allow agents involved in the supply chain to participate freely. Because of this, it is necessary for the government to provide public goods and to develop clear rules for governing the free market. If a good institutional environment and the most needed public services are provided, the coffee market will become less uncertain. So, as the theory suggests, more impartial government participation and economic support targeting rural areas are required to improve the performance of the coffee sector.

According to the OECD (2007), Mexico's agricultural sector requires public investment to improve inspection services, information about markets and information technology, and research and technological development. This kind of investments should be directed toward the sector as a whole and not specifically toward a particular crop or system, as is happening in the coffee sector. In the same vein, institutions should supply information, advice and alternative conflict resolution mechanisms, encouraging parties to cooperate and behave in a trustworthy manner. Thus, by creating a better institutional environment, the government would be able to assist many partners in the supply chain.

Apart from removing barriers to vertical integration, it is necessary to provide opportunities to small- and medium-scale processors and intermediaries for doing business in the coffee sector. This may imply, for instance, the provision of suitable insurance or intermediary facilities that small-scale individual producers cannot provide themselves. This is also an important topic when a future investigation is required in order to assess the relative benefits to producers of alternative government interventions.

The coffee sector requires some centralized planning while the most important characteristics of each state and coffee-producing area must be taken into account as well. Before applying any economic resource to support the coffee sector, it is advisable to identify the most appropriate instruments; this should be done in constant interaction with the main partners in the coffee sector. The procedure for detecting their needs has to include the definition of objectives and goals on both the short and the long term. It is important to provide subsidies at the most appropriate time and use the instances that best fit in with the local and regional conditions and the specific type of work to be done. As one of the interviewed producers leaders said: 'Good planning is only possible when we look beyond the increase in production and we look ahead by means of five year programmes at least'.

Even while everybody thinks it very important to invest in coffee orchards and processing plants to recover the dynamics that coffee used to have, many coffee growers do not do so. This reflects the fact that they do not rely much on the future of this crop. As one representative of a grassroots farmers' organization told us: 'Producers are uncertain about the near future of coffee. We feel that there isn't any good plan for the sector for the coming twenty years, and to invest under this uncertainty means a lot of risk'. Coffee growers feel that there is no secure coffee market and the institutional setting is very weak, or at least it is not in line with the demands for the social sector participating in this crop.

Coffee production, more than many other crops, is an environmentally friendly crop that depends much on the natural conditions. The conservation of natural resources has been one of the most important justifications to keep the coffee sector working, but additionally, this sector helps in preserving the social and economic characteristics of many poor rural provinces and households in Mexico.

Coffee continues to be one of the most important crops in the country. This product has great importance in terms of natural, social and economic issues, as one of national leaders has stated. Nevertheless, any decision with regard to supporting coffee has to be based on all the important factors pertaining to this sector. Our research results suggest that the support given to this sector by the Mexican government is not provoking the expected responses in terms of yield and total production.

Because of the great importance of the coffee sector, we advise to continue supporting it but not only with subsidies directly to coffee. It is necessary to provide subsidies to those small stakeholders and their families who live in coffee-producing regions. Subsidies can be justified because of the maintenance of natural resources besides coffee production. Thus, these kinds of producers will have the option to diversify their livelihood without losing government support. By doing so, other goals may be reached, such as increasing rural non-agricultural activities without damage to the natural conditions, creating more employment opportunities, reducing emigration, and enhancing the economic conditions of all coffee-producing areas. In agreement with some of the institutions representing the government in the coffee sector, we suggest support to rural development rather than an effort to increase the coffee production.

Nowadays, the smallholders related to coffee production are no longer primarily farmers, but instead rely on a wide array of livelihoods, including coffee production. They have to do so in order to better ensure their living. This is a very different situation from the one prevailing during the quota system era, when many of the small-scale coffee growers were relying solely on coffee production for their maintenance. According to our results, one way of increasing opportunities for the coffee households is to increase human capital (e.g. skill and education), improve the infrastructure to open up opportunities for investment and for the provision of better communications (Davis, 1999).



The Mexican government has developed several programmes to support the coffee sector since 1989, but unfortunately, little improvement has been registered in some of the most important national indicators during the last two decades. Therefore, some questions that remain without answer are: who has been the main beneficiary of the money that federal and state governments have devoted to coffee? Why have policymakers not found a more effective way to apply subsidies in order to attain a greater impact in the coffee sector? Answering these questions require a full evaluation of the real impact of the money transferred to the coffee sector.

The current coffee policy has allowed the survival of the small-scale coffee growers, but it has not been able to trigger the recovery of this supply chain. It is unclear how the main bottlenecks of the coffee sector should be attended to; here, more comprehensive and wider studies need to be done to shed further light in terms of the policy impact and the effect on the coffee sector. These kinds of studies have been done, but they mostly focused on a particular programme, not on an evaluation of the entire coffee policy and its effects on the main partners of this sector. To be able to conduct a full-fledged evaluation of the coffee policy, an updated National Coffee Census database has to become available.

Another potential pathway to improve the Mexican coffee sector is to invest in improving the productivity, quality and efficiency in marketing coffee. In that case, academic and government institutions have much to do in research, the transference of technology, the training of skills and the creation of the required institutional environment to become more competitive in the international sphere.

Other important fields for the government to work on are the generation and provision of market information. Timely informing, with enough market details, can help investors, including coffee growers, to engage in better planning with regard to the maintenance and improvement of coffee orchards. The government and other instances can also promote the development of microfinance programmes, to give producers access to capital and the opportunity to invest in non-agricultural activities in rural areas.

Our findings suggest that the government's aims and intention to increase cooperation might increase farmers' economic benefits. Even though the government, state and non-governmental agencies that support coffee cooperatives do not always directly benefit the very poor coffee producers, we maintain that those poor and non-organized growers actually can benefit from a cooperative by enjoying the spillover effects.

By diversifying the livelihood of coffee households, coffee growers are trying to change their orientation from being pure, raw coffee producers towards a more integrated approach aimed at meeting the demands of the final consumer. In doing so, they try to meet the changing market demands and adapt to the current economic situation. In this context, public concerns should shift from simply providing the necessary support for traditional coffee producers to attaining the new skills and services that a diversified household demands. Consequently, accurate and updated information about the actual and future coffee prices is vitally important. That type of information

is also needed for the selection of possible crops to be farmed by coffee growers. Research and technology – not only regarding coffee but also regarding other crops – are essential to help coffee households in the decision making with respect to resource allocation.

Findings from Chapter 2 and 3 show that there is a need for a better organization in the coffee sector to bring higher economic benefits to all agents participating in the coffee supply chain. Not all the partners in the coffee sector have a similar opportunity to do business. The biggest investors are the ones who have more room for higher earnings because they have more capital and information at their disposal. On the other hand, having clear ways to enforce contracts between intermediaries may help to reduce transaction costs and to control opportunistic behaviour.

The empirical evidence of Chapter 5 shows that coffee growers are responding to a low coffee price scenario. The findings regarding diversification provide evidence that if there is information and other support to adopt new agricultural and non-agricultural activities in the coffee-producing regions, more resources will be re-allocated to reach a wider-based livelihood. Then coffee households will become more resilient.

#### **7.4. Main limitations and future research agenda**

Most of the earlier studies on the Mexican coffee sector have been done by using cross-sectional data. As such, those studies have not been able to control for causality and for possibly unobservable variables. We have the opportunity to carry out some more detailed studies with regard to the institutional environmental, cooperation and diversification because we can make use of already existing databases and complement them with new interviews with the same actors. In addition we will be able to apply many other statistics and econometric techniques to get better results.

Given the available field data used in this thesis, we can only draw conclusions about relevant coffee activities and are unable to infer full household income effects. In terms of cooperation, we will need to compare the total income for organized and non-organized coffee producers under the same circumstances. Cooperative affiliation may lead to an improved input efficiency and lower average input costs, which positively affect the net farm income, but these effects are not fully included in the data set. Thus, information regarding the benefits a cooperative brings to members and the spillover effect needs to be taken into account when we proceed to evaluate the total effect of cooperation. In addition, we need to obtain detailed information with regard to public services, total investment, skill and technology, to deliver further on the role that cooperatives are playing in coffee-producing areas.

The analysis we conducted in Chapter 3 requires a wider range of locations and a higher number of intermediaries to be interviewed. By doing so at two or three points in time, we will be able to apply panel data to get a clearer result with regard to contracts, competition, the effect of the institutional environment on the margin, and the influence of coffee policy in the whole supply

chain. Furthermore, by having a wide range of intermediaries contributing to the database, it will be possible to calculate the price margin between each of the stages of the supply chain.

In Chapters 4 and 5, we faced the limitation of not having panel data, too. As a result of that, we could not fully control for the possible causality effect of some farm household characteristics on the likelihood of diversification. Nor could we control for the causality effect the cooperation has on the coffee growers' welfare. Including panel data will enable us to get better results from the application of random effect regressions as well. Having data on more than one point in time will allow us to conduct a much clearer evaluation of the effect of cooperation on the instability of the coffee price and vice versa.

Regarding Chapter 6, we faced the limitation of not having the information about the cost-benefit that each of the diversification option produce; we had information about the total coffee income but not about the total annual income of households. Therefore, it was impossible to carry out an evaluation of the effect of the strategies of diversification on coffee growers' welfare. Specific information about the characteristics of non-diversified coffee producers was very much limited. In the future, it will be helpful to design a survey to evaluate the diversification from a wider perspective and to control for the institutional and structural differences among coffee-producing regions. In this vein, other factors such as industrialization, distance to the market and land quality, that may influence diversification, can be included as part of the analysis.

To be able to give better advice to policymakers and to the various government and governmental instances involved in the coffee sector, an evaluation is needed on the effects of differences in the institutional environment between states and between similar producing countries on the performance of the coffee sector. In the same vein, setting up an international team for the investigation of the institutional settings will enable us to make comparisons and investigate contrasts amongst countries and states and, at the same time, apply the actual and updated theory regarding the role of institutional variables.

In any case, this research produces valuable results for the policymaking regarding the institutional environment created to assist the Mexican coffee sector. Information included in the contractual arrangements and trader performances are considered very useful for designing policies related to the institutional environment. The cooperation issues discussed are highly important and the results we obtained can be taken up by the cooperatives' leaders and grassroots farmers' organizations in order to improve the cooperatives' performance. The findings on diversification shed light on the factors playing a role in the households' decision-making process and the likely effect diversification will have in the long run; although limited, those results are useful when considering the public policies related to resource allocation and service provision in rural areas.

After analysing the theoretical models and theories we applied in this research, we conclude that we faced several limitations in our work. When we checked the main findings we obtained in this thesis, we understood that there is the need for further research related to the topics included. Such topics are, for instance the institutional environment and the causes and effects for changes

to happen; intermediaries' performance; contract arrangements and their effect on a reduction of transaction costs; cooperation and the benefits for organized and non-organized coffee producers located in the same surroundings; diversification and its effect on the total income of households and so on. Together, those challenges make a good agenda for future research.

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Appendices



Appendix 1. Coffee-producing states in Mexico.

Appendix 2. Panel regression of the local price against the international coffee price.

Random-effects GLS regression	Number of obs	=	2879
Group variable: edo_mpio	Number of groups	=	432
R-sq: within = 0.4685	Obs per group: min	=	1
between = 0.1409	avg	=	6.7
overall = 0.3504	max	=	8
Random effects u_i ~ Gaussian	Wald chi2(1)	=	2193.40
corr(u_i, X) = 0 (assumed)	Prob > chi2	=	0.0000

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copricdo	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
omlldpri	.4740242	.0101214	46.83	0.000	.4541865	.4938618
_cons	5.251773	1.164859	4.51	0.000	2.968692	7.534855
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sigma_u	10.051253					
sigma_e	15.287837					
rho	.30180435	(fraction of variance due to u_i)				
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Appendix 3. Factors explaining the individual coffee price (OLS regression)

Source	SS	df	MS			
Model	3777881.47	15	251858.765	Number of obs = 1246		
Residual	25577368.8	1230	20794.6088	F( 15, 1230) = 12.11		
				Prob > F = 0.0000		
				R-squared = 0.1287		
				Adj R-squared = 0.1181		
				Root MSE = 144.2		
Total	29355250.3	1245	23578.5143			

coffeepr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
predcoop	115.3077	32.21821	3.58	0.000	52.09894	178.5164
orgmunl	-43.44129	11.37164	-3.82	0.000	-65.75126	-21.13132
electric	3.970518	11.36432	0.35	0.727	-18.32508	26.26612
altitude	.0157161	.05343	0.29	0.769	-.0891079	.1205402
altitu2d	-.0162489	.0274336	-0.59	0.554	-.0700708	.037573
processe	41.6868	10.88371	3.83	0.000	20.33411	63.03949
farmsize	1.236846	.578294	2.14	0.033	.1022939	2.371397
intefarm	12.79151	2.326256	5.50	0.000	8.227642	17.35538
farm1000	-4.707509	1.968846	-2.39	0.017	-8.570177	-.8448419
mean14mx	.1068672	.0519545	2.06	0.040	.0049379	.2087965
chiapas	-7.49885	20.70021	-0.36	0.717	-48.11049	33.11279
veracruz	-15.19435	14.57168	-1.04	0.297	-43.78245	13.39374
oaxaca	2.342882	22.01251	0.11	0.915	-40.84334	45.5291
puebla	-103.8572	19.21376	-5.41	0.000	-141.5526	-66.16186
nayarit	-58.38327	20.05033	-2.91	0.004	-97.7199	-19.04664
_cons	426.612	34.17955	12.48	0.000	359.5554	493.6687



## Summary

Mexico made a change from a controlled economy to a free market during the nineteen eighties and nineties. The country joined the General Agreement on Tariffs and Trade in 1986 and signed the North American Free Trade Agreement with Canada and the United States of America in 1992. By doing so, the Mexican government broke radically with previous import substitution policies and embarked on trade liberalization. As part of these changes in the economy, participation of the state in credit, marketing and other agricultural services was hugely reduced, starting at the beginning of the nineteen nineties. This particularly affected the coffee sector.

Coffee was first introduced into Mexico in the late nineteenth century. In this country, coffee is important, as it provides employment and income to almost half a million households, while some one million workers are hired each year for the harvest. There are around 500,000 coffee growers, who together own more than 760,000 hectares. Mexico produces more than 5.5 million quintals per harvesting season.<sup>37</sup> The involvement of indigenous peoples and poor public services available in coffee-producing regions give this sector a special characteristic in terms of technology and culture. Around 98% of the coffee orchards in Mexico is farmed under shade trees, which provide a very important wood mass that favours environmental preservation.

As a consequence of the disappearance of the economic clauses of the International Coffee Agreement in 1989, a dismantling of coffee boards and other governmental bodies operating in producer countries began. In the Mexican coffee sector, after the demise of the Mexican Coffee Institute in 1993, the function of the industry's representative organization has been covered first by the Mexican Coffee Council and then by the Coffee Product System and the Mexican Coffee Association. The former was operating from 1993 to 2004 and the latter have been in place since 2004.

Consequently, in this thesis the main aims are to investigate the institutional setting prevailing in the Mexican coffee sector and its structural changes over time. The specific topics we examine are the contract arrangements and trade performance, the factors influencing the growers' willingness to join a cooperative, the effects of cooperation on price variability, the influence of cooperation on the growers' welfare, and coffee producers' response to the falling coffee price through their engagement in diversification activities.

To accomplish the main objectives of this thesis, we have used primary and secondary data. We did fieldwork in two periods: one from May to July 2008, during which we conducted interviews with the main stakeholders in the Mexican coffee supply chain, and another from November 2009 to February 2010, when we conducted a survey among coffee intermediaries in four coffee-producing regions. Secondary data were collected from research institutes and other organizations participating in the agricultural and coffee sectors. Additional information was obtained from representatives of governmental and non-governmental instances. As benchmark information we

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<sup>37</sup> One hundred pounds of green coffee is a quintal.

used two coffee grower surveys: the 2004 survey, which included 1,396 coffee producers, and the 2005 survey, which included 2,294 coffee producers from the eight and five largest coffee-producing states, respectively.

In Chapter 2 we shed light on the structure of the coffee sector and its changes over time. Our results suggest that there have been many causes for the institutional change, but the most important one is the alignment of the Mexican economy with world policies. Small-scale coffee growers have been harmed by the coffee price variability and the lack of opportunities for participation in the domestic and international market. This situation asks for government intervention in establishing an institutional environment, including the provision of market information and services, to assist coffee growers in increasing their income. Public policies developed in the last two decades have been preventing more producers from exiting the coffee sector; but they did little for the improvement of the yield, production, coffee quality and reliability of the coffee sector.

International coffee prices have shown a fluctuation of around 50% annually in recent years, whereas during the regulated era prices fluctuated 15% around their average defined price. This situation made it difficult for growers and other partners in the coffee supply chain to carry out investment and planning activities. Statistics shows that producer prices as share of the international price were lower under the controlled system than under the free market regime. However, in Chapter 2 we argue that farmers could still be better off under the quota system than they are under the free market regime because back then the government met almost all the requirements producers had.

Even though there has been a considerable adjustment to the current institutional environment, some actors are at a disadvantage while others gain from this new competitive environment. To mitigate the effect of the quick withdrawal of the Mexican state, during the nineteen nineties the federal government started some subsidy and compensation programmes. However, government participation in the coffee sector is much smaller than it was under quota system. Nowadays, the state is a kind of mediator between the larger private processor and exporting companies on the one hand, and the social sector of coffee growers and small-scale processors on the other.

Now that we have an overall picture of the changes in the institutional setting and structure of the Mexican coffee sector, we deal in Chapter 3 with the main objectives of the study. The objectives in this chapter are to identify the factors explaining the contractual choices of traders engaged in the coffee supply chain, and to assess the performance of coffee traders in four coffee-producing regions.

The data used in our analysis were obtained by conducting face-to-face interviews with 53 intermediaries in 4 coffee-producing regions of the states of Oaxaca and Veracruz. We used the gross marketing margins (the difference between selling and buying prices) as an indicator of traders' performance, since they can give an indication of how traders perform given the minimization of their variable costs. A logit regression was performed to find variables affecting the

intermediaries' decision to have a contract (or not) with their buyer. To assess the performance of traders in the Mexican coffee sector, we performed an ordinary least squares regression.

Major results indicate that being a roaster and selling cherry coffee negatively affects traders' use of contracts, whereas being vertically integrated has a positive effect on contracting. The findings also suggest that selling cherry coffee, participating in a competitive environment and having contracts positively influence intermediaries' performance, while being a roaster has a positive effect on the gross margin. We found that marketing margins diminish as competition increases between intermediaries, as was expected. Based on this result, we can say that if liberalization increased competition, this also brought benefits to coffee growers in the form of higher farm gate prices.

Some of our results, also included in Chapter 3, show that coffee agents have engaged in different activities in response to the transition from a state-led commodity chain to a liberalized environment. Some of them decided to vertically integrate in order to reduce transaction costs and achieve more efficiency in the market, relying on a larger volume of product to increase their profits; others invested in assets that allowed them to add value to their product and to have larger margins per units of product sold.

Credit constraints and uncertainty have made most traders neglect investing in new technologies and machinery. Therefore, we can conclude from the results of this chapter that there has been liberalization but no real modernization in the Mexican coffee sector. Consequently, we argue that for the Mexican supply chain to become competitive, huge investments and improvements have to be made both in technology and the institutional environment at all stages of the coffee supply chain.

In order to assess the effect of the institutional environment on the coffee growers/households' behaviour in Chapter 4, we identify the variables that contribute to the coffee growers' willingness to become a member of a cooperative and examine the significance, relative importance and direction of variables influencing the per capita coffee income.

The study done in this chapter relies on information from the Coffee Census database and from a large-scale coffee field survey conducted in 2004. In the survey, 1,396 coffee farmers from the eight coffee-producing states of Mexico were included. To address the research questions, we relied on three different procedures. First, a probit model analysis was performed that identified the individual, family, farm and regional factors influencing the likelihood of cooperative participation. Secondly, we performed a multinomial logistic regression to identify the variables that play a role in defining the type of coffee delivered by producers. Thirdly, we performed three ordinary least square regressions. In these we used pooled and non-pooled samples of organized and non-organized producers to identify the factors influencing the per capita coffee income and the possible differences between cooperative and individual coffee farmers.

Results show that some individual, family, farm and regional factors favour cooperative affiliation; whereas housing conditions, the proportion of farmers in the municipality and selling to intermediaries negatively affect cooperative membership. Regional differences regarding coffee production conditions also show a significant result in influencing the likelihood of a farmer joining a cooperative.

Overall, in several respects our results are broadly in line with findings from earlier studies that address similar questions regarding cooperative affiliation. We did find some additional factors, however, that positively or negatively influence the coffee growers' willingness to join a cooperative. In addition, we discovered that being a cooperative member not always helps coffee growers to receive a higher coffee price. Our results show a negative effect of cooperative participation on the average price for delivering natural dry coffee. This implies that cooperatives' members enjoy a comparative advantage in coffee marketing only if a number of processing activities can be included in the work done by the cooperative.

As part of the results obtained in Chapter 4, we discovered overall positive effects of cooperative participation on household income. This tends to be mediated by their improved access to external infrastructure – roads, but mainly electricity – that makes further progress in coffee processing possible. In this chapter, we argue that cooperatives have to be as efficient as other intermediaries working in the same market to bring economic benefits to their members and their neighbouring growers, otherwise they bring losses to all of them. If coffee cooperatives work efficiently, they can push up the coffee price. Thus, the welfare of organized (and some non-organized) growers might increase as well.

Following the analysis of the coffee growers' cooperatives, in Chapter 5 we evaluate cooperation as a response to market uncertainty and the cooperation effect on the coffee market instability. Main data used in this chapter were collected in a survey of the eight main producer states in Mexico in 2004 and complemented with information included in the Coffee Census database. Both, the 2004 survey and the Census, include individual, family, farm, market, and regional characteristics. In addition, we used municipal data on prices for eight years, constructing a panel with data coming from a government instance databases. As part of the analysis, several ordinary least square and probit model regressions were executed.

The results indicate that there is no clear link between cooperative participation and the predictability of local coffee prices. However, when controlling for individual, family, farm, market and regional factors, we found clear evidence that the variability of the coffee prices positively affects a farmer's likelihood of being a member of an organization. Also, the results indicate that membership of a farmer organization helps producers to increase their coffee price and income.

The higher variance in the coffee price from 2001 to 2004 induced more cooperation, whereas the higher the mean of the coffee price was from 2001 to 2004, the lower the willingness was to cooperate. It seems that selling coffee as an individual grower gives a better chance to earn from the temporary high coffee prices than selling by a cooperative does.

The investigation done in this chapter shows that while farmers appear to opt more often for cooperative membership when faced with a higher price variability – and lower prices –, this does not seem to affect the price variance itself. Cooperative membership does lead to higher incomes from coffee, however. Even though the participation in coffee cooperatives is not translated into reduced price instability, the increase in the individual coffee price and coffee income that organized coffee farmers experience is big enough to motivate producers to join an organization.

Apart from the above similarities and differences between our results and what other scholars have found, in Chapter 5 we furthermore shed light on the analysis of information we gathered from different sources and at different points in time. In this way, we were able to build a panel database, using the prices at international, national and village levels. To this we added the prices over a period of eight years that we subsequently related with the households' characteristics of coffee growers included in the 2004 survey. Moreover, the research done in this chapter is rather unique, in that it addressed the effect of the variability of coffee prices on cooperation as well as the reverse effect.

Continuing with the coffee growers' response to changes in the institutional environment, in chapter 6 we evaluate the farmers' willingness to diversify into coffee-extra, agricultural and non-agricultural activities as a response to the low coffee price or to structural differences at the village level. The analysis in this chapter is based on data from a representative survey conducted in 2005, which provides information on 2,294 coffee-producing households of 5 main coffee-producing states of México. The survey information was complemented with data from the Mexican Coffee Census. Additionally, we obtained the number of coffee intermediaries who were registered at the municipal level in 2005 from the Mexican Coffee Council. From the Informatics Agricultural and Livestock System, we obtained the coffee price at the municipal level in the 2001–2004 period, and we included information regarding the total population at the municipal level obtained from the National Institute for Statistics, Geography and Informatics.

The data were analysed using two distinct econometric models. The first model analysed the specific choice that households make regarding the three diversification groups. To the three options we added the default choice of non-diversification so as to avoid a potential selection bias. Since we considered four options at the same time as dependent variables, with three of these not being mutually exclusive, we ran a multivariate probit. The second model evaluated the effect of internal and external factors on the annual coffee income. As the dependent variable was a continuous one, we used OLS regressions.

Probably, the fall in the coffee price during the 2001–2004 period made farmers take further steps with diversification. In the multi-variate probit regressions, we found correlations between the various options of diversification. This correlation might come from the competition for resources within the coffee households and from the complementarity of various diversification groups. In the latter case, this results in a positive correlation.

Our results in Chapter 6 indicate that a better institutional environment for coffee production, like the number of coffee farmers and the coffee-price margin at the municipal level, is positively correlated with the coffee farmers' decision to engage in coffee-extra activities. Our results suggest that the worse the conditions for pure coffee production are, the greater the chances are that coffee-producing households will decide to diversify their agricultural activities, and at the same time, there will be less willingness to vertically integrate with coffee.

By introducing a number of variables at the municipal level, we were able to test the effect of the institutional environment on the households' livelihood; and by introducing the coffee price margin between municipal and export prices, it was also possible to capture the effect of structural differences with regard to diversification among municipalities. The overall results derived from our investigation indicate that an improved institutional environment for coffee induces more diversification within coffee-extra activities and reduces the chance that coffee-producing households engage in agricultural and non-agricultural activities.

Beside those results and their coincidence with the theory, we shed light on the introduction of lagged variables in the analysis. By including lagged variables, we could find the long-term effect of diversification on households' livelihood and coffee income. We found consistent evidence that a general diversification and coffee-extra activities in 2001 had a significant, positive effect on the annual coffee income in 2005.

With the overall results presented in this thesis, we contribute to the existing literature by providing theoretical and empirical evidence on the institutional environment and policy changes and their effect on the coffee traders and coffee growers/households' behaviour. The main findings show that the institutional environment creates differential opportunities among partners in the coffee sector; they differ substantially in the way they do business in coffee. Cooperative involvement does not always help growers to increase their welfare, neither does it help in reducing the instability of the coffee price. That households responded to the low coffee price periods with an increase in diversification was evident.

This research produces valuable results to be taken into account in the policymaking aimed at assisting the Mexican coffee sector. Information included in the contractual arrangements and trader performances can prove very useful for designing policies related to the institutional environment. The issue of cooperatives is of great importance; the results we obtained can be taken up by the cooperative leaders and grassroots farmers' organizations in order to improve their cooperative's performance. The findings on diversification shed light on the factors playing a role in the households' decision-making process and the likely effect of diversification in the long run; when considering public policies related to resource allocation and service provision in rural areas, those results are limited but useful at the same time.

## Samenvatting

In de jaren tachtig en negentig van de vorige eeuw is de Mexicaanse economie van een gestuurde economie veranderd in een vrije markt economie. Het land sloot zich in 1986 aan bij de Algemene handelsovereenkomst inzake tarieven en handel en ondertekende in 1992 de Noord-Amerikaanse Vrijhandelsovereenkomst met de Verenigde Staten en Canada. Door deze acties brak de Mexicaanse regering radicaal met het voorheen gebruikelijke beleid over importsubsstitutie en startte het met een liberalisering van de handel. Deel van deze veranderingen in de economie was een enorme vermindering van de deelname van de staat aan de kredietverlening, marketing en andere dienstverlening ten behoeve van de landbouw, die werd ingezet aan het begin van de jaren negentig. In het bijzonder de koffiesector werd hierdoor getroffen.

Koffie werd voor het eerst in Mexico geïntroduceerd aan het eind van de 19<sup>e</sup> eeuw. Koffie is belangrijk in dit land; het voorziet in de werkgelegenheid en het inkomen van bijna een half miljoen huishoudens; ongeveer een miljoen arbeiders worden jaarlijks ingehuurd om de oogst binnen te halen. Er zijn ongeveer 500.000 koffieboeren, die gezamenlijk meer dan 760.000 hectare land bezitten. Mexico produceert per oogstseizoen meer dan 5,5 miljoen quintals.<sup>38</sup> De betrokkenheid van inheemse volkeren en de zwakke openbare dienstverlening in koffieproducerende regio's verlenen aan deze sector een specifiek karakter in termen van technologie en cultuur. Ongeveer 98% van de koffieplantages wordt gecultiveerd onder schaduwbomen, die een voor het natuurbehoud zeer belangrijke houtmassa vormen.

Als gevolg van het verdwijnen van de economische clausules van het Internationale Koffieakkoord in 1989 kwam er een ontmanteling op gang van de toezichthoudende organen en andere overheidsinstellingen voor koffie die in de producerende landen functioneerden. Na het ter ziele gaan van het "Instituto Mexicano del Café" in 1993 werd in de Mexicaanse koffiesector de functie vertegenwoordigende organisatie voor de bedrijfstak eerst overgenomen door de "Consejo Mexicano del Café", en vervolgens door het "Sistema Producto Café" en de "Asociación Mexicana del Café". De Koffieraad vervulde deze functie van 1993 tot 2004, en sindsdien wordt dit werk verricht door de laatstgenoemde organisaties.

Bijgevolg zijn de voornaamste doelen in deze dissertatie om de heersende institutionele setting in de Mexicaanse koffiesector te onderzoeken en de structurele veranderingen die daarbinnen in de loop der jaren hebben plaatsgevonden. De specifieke onderwerpen waar we ons op gericht hebben zijn: de contractovereenkomsten en handelsprestaties, de factoren die van invloed zijn op de bereidheid van boeren om zich bij een coöperatie aan te sluiten, de effecten van coöperatie op de prijsbestendigheid, de invloed van coöperatie op de welvaart van de boeren, en de reactie van koffieproducenten op de dalende koffieprijs door middel van activiteiten om te diversifiëren.

Om de hoofddoelen van dit proefschrift te bereiken hebben we gebruik gemaakt van zowel primaire als secundaire gegevens. We hebben in twee periodes veldwerk verricht. De eerste periode liep van

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<sup>38</sup> Honderd pond groene koffie staat gelijk aan een quintal.

mei tot juli 2008, waarin we de belangrijkste stakeholders in de Mexicaanse koffietoeleveringsketen hebben geïnterviewd. De andere periode liep van november 2009 tot februari 2010, waarin we een enquête hebben gehouden onder tussenhandelaren in vier koffieproducerende regio's. We verzamelden secundaire gegevens van onderzoeksinstituten en andere organisaties die deel uitmaken van de landbouw- en koffiesectoren. We verkregen aanvullende informatie van vertegenwoordigers van zowel overheidsinstellingen als non-gouvernementele instellingen. Als informatiestandaard gebruikten we twee enquêtes onder koffieboeren: de enquête van 2004, waaraan 1.396 koffieboeren uit de 8 grootste koffieproducerende staten meededen, en de enquête van 2005, waaraan 2.294 koffieboeren uit de 5 grootste koffieproducerende staten deelnamen.

In Hoofdstuk 2 hebben we licht geworpen op de structuur van de koffiesector en de veranderingen die zich daarin in de loop van de tijd hebben voltrokken. Onze resultaten suggereren dat er vele oorzaken zijn aan te wijzen voor de institutionele verandering, maar de meest belangrijke is het op één lijn brengen van de Mexicaanse economie met het wereldwijde beleid. Kleinschalige koffieboeren hebben schade ondervonden van de veranderlijke koffieprijs en het gebrek aan kansen om deel te nemen aan de interne en internationale markt. Deze situatie vraagt om overheidsingrijpen, in de vorm van de inrichting van een institutionele omgeving die koffieboeren moet helpen bij het vergroten van hun inkomen, de levering van marktinformatie en diensten daarbij inbegrepen. Het overheidsbeleid van de afgelopen twee decennia heeft weliswaar meer producenten ervan weerhouden om de koffiesector de rug toe te keren, maar het heeft weinig bijgedragen aan het verbeteren van de opbrengst, de productie, de kwaliteit van de koffie of de betrouwbaarheid van de koffiesector.

De laatste jaren hebben de internationale koffiepiezen een fluctuatie laten zien van ongeveer 50% per jaar, terwijl de prijzen in de periode van regulatie 15% rondom hun gemiddelde vastgestelde prijs fluctueerden. Deze situatie maakte het moeilijk voor boeren en andere partners in de koffietoeleveringsketen om investeringen te doen en activiteiten te plannen. De statistieken laten een kleiner aandeel van koffieboeren in de internationale prijs zien onder het gecontroleerde systeem dan het nu is onder de vrije markt. Niettemin hebben we in Hoofdstuk 2 beargumenteerd dat boeren het beter hadden ten tijde van het quotasysteem dan ze het nu hebben op de vrije markt, omdat de overheid destijds tegemoet kwam aan alle behoeften die producenten hadden.

Hoewel men zich in aanzienlijke mate heeft aangepast aan de huidige institutionele omgeving, zijn sommige actoren in het nadeel terwijl anderen van deze nieuwe, competitieve omgeving profiteren. Om het effect van de snelle teruggang in de directe interventies van de Mexicaanse staat te temperen, heeft de federale overheid in de jaren negentig een aantal subsidies en compensatieprogramma's in het leven geroepen. Toch is de overheidsinmenging in de koffiesector een stuk minder dan het was ten tijde van het quotasysteem. De staat is tegenwoordig een soort bemiddelaar tussen enerzijds de grotere private verwerkings- en exportondernemingen en anderzijds de en anderzijds het kleinschaliger en vaak armere deel van de sector, bestaande uit koffieboeren en kleinschalige verwerkers van koffieboeren en kleinschalige verwerkers.



Nu we een totaalbeeld hadden verkregen van de veranderingen in de institutionele setting en structuur van de Mexicaanse koffiesector, behandelden we in Hoofdstuk 3 de voornaamste doelstellingen van deze studie. Deze doelstellingen zijn het identificeren van de factoren die de contractuele keuzes kunnen verklaren die handelaren in de koffietoeleveringsketen maken, en het beoordelen van de prestaties van koffiehandelaren in de vier koffieproducerende regio's.

De data die we in onze analyse hebben gebruikt hebben we verkregen door face-to-face interviews af te nemen bij 53 tussenhandelaren in 4 koffieproducerende regio's in de staten Oaxaca en Veracruz. We gebruikten bruto marketing winstmarges (het verschil tussen verkoop- en inkooprijzen) als een indicator van de prestaties van handelaren, omdat die een aanwijzing kunnen geven over de prestaties van handelaren bij een minimalisering van hun variabele kosten. We voerden een logistische regressie uit om variabelen te vinden die van invloed waren op het besluit van tussenhandelaren om al of niet een contract af te sluiten met hun koper. Om te prestaties te kunnen beoordelen van handelaren in de Mexicaanse koffiesector voerden we een kleinste kwadraten regressie uit.

De belangrijkste resultaten geven aan dat een roosteraar zijn en het verkopen van koffiebonen beide van negatieve invloed zijn op het gebruik van contracten door handelaren, terwijl verticaal geïntegreerd zijn een positieve invloed heeft op het sluiten van contracten. Deze bevindingen suggereren ook dat het verkopen van koffiebonen, deelname aan een competitieve omgeving en werken met behulp van contracten een positieve invloed hebben op de prestaties van tussenpersonen, terwijl roosteraar zijn een positief effect heeft op de brutowinst. We vonden dat de marketingmarges kleiner worden als de concurrentie tussen tussenpersonen toeneemt, zoals we ook verwachtten. Op basis van dit resultaat kunnen we zeggen dat als de liberalisering een grotere concurrentie veroorzaakte, dit ook profijt voor de koffieboeren met zich meebracht in de vorm van hogere basisrijzen.

Sommige van de resultaten die we presenteerden in Hoofdstuk 3 laten zien dat koffiehandelaren verschillende activiteiten hebben ondernomen als reactie op de overgang van een staatsgeleide goederenketen naar een geliberaliseerde omgeving. Sommigen van hen hebben besloten om verticaal te integreren om in de markt de transactiekosten te verminderen en een grotere efficiëntie te bereiken, rekenend op een groter productvolume om hun winst te kunnen vergroten. Anderen hebben geïnvesteerd in bedrijfsmiddelen die hen ertoe in staat stelden om waarde aan hun product toe te voegen en grotere marges te verkrijgen per verkochte producteenheid.

Kredietbeperkingen en onzekerheid hebben ervoor gezorgd dat de meeste handelaren het investeren in nieuwe technologieën en machines hebben verwaarloosd. We kunnen daarom uit de resultaten van dit hoofdstuk concluderen dat er weliswaar een liberalisering in de Mexicaanse koffiesector heeft plaatsgevonden, maar geen echte modernisering. Derhalve bepleiten we dat als de Mexicaanse toeleveringsketen concurrerend wil worden dit enorme investeringen en verbeteringen vergt, zowel op technologisch gebied als op dat van de institutionele omgeving in alle stadia van de koffietoeleveringsketen.

Om in Hoofdstuk 4 het effect te beoordelen van de institutionele omgeving op het gedrag van koffieboeren of koffiehuishoudens, hebben we de variabelen geïdentificeerd die bijdragen aan de bereidheid van koffieboeren om lid te worden van een coöperatie. Ook hebben we de betekenis, het relatieve belang en de richting onderzocht van variabelen die het hoofdelijk inkomen uit koffie beïnvloeden.

De studie die we in dit hoofdstuk hebben uitgevoerd is gebaseerd op informatie afkomstig uit de database van de Koffiecensus en van een grootschalige veldenquête over koffie, gehouden in 2004. De enquête ging over 1396 koffieboeren uit de acht koffieproducerende staten van Mexico. We gebruikten drie verschillende procedures om de onderzoeksvragen te beantwoorden. Allereerst werd een probit modelanalyse uitgevoerd die de individuele, familiegebonden, boerderijgebonden en regionale factoren identificeerde die van invloed zijn op de waarschijnlijkheid van participatie in een coöperatie. Ten tweede voerden we een multinomiale logistische regressie uit om de variabelen vast te stellen die een rol spelen in de bepaling van het type koffie dat producenten aanleveren. Ten derde voerden we drie kleinste kwadraten regressies uit. Hierin gebruikten we samengevoegde en niet samengevoegde steekproeven van georganiseerde en niet-georganiseerde producenten om de factoren vast te stellen die van invloed zijn op het per capita inkomen uit koffie en de mogelijke verschillen tussen coöperatieve en individuele koffieboeren.

De resultaten laten zien dat sommige individuele, familiegebonden-, boerderijgebonden- en regionale factoren lidmaatschap van een coöperatie bevorderen, terwijl de woonomstandigheden, het aandeel van boeren in een gemeente en de verkoop aan tussenhandelaren de vooruitzichten van zo'n lidmaatschap negatief beïnvloeden. Regionale verschillen met betrekking tot de voorwaarden voor koffieproductie laten ook een significant resultaat zien als het gaat om invloed op de kansen dat een koffieboer zich zal aansluiten bij een coöperatie.

Over het geheel genomen zijn onze resultaten globaal in meerdere opzichten in overeenstemming met bevindingen uit eerdere studies die soortgelijke vragen over coöperatieve affiliatie beantwoorden. Wel vonden we echter aantal aanvullende factoren, die de bereidheid van koffieboeren om zich bij een coöperatie aan te sluiten negatief of positief beïnvloeden. Verder hebben we ontdekt dat het boeren niet altijd helpt om lid van een coöperatie te zijn als het gaat om het ontvangen van een hogere koffieprijs. Onze resultaten laten een negatief effect zien van deelname aan een coöperatie op de gemiddelde prijs voor de levering van droge koffie. Dit impliceert dat coöperatieleden op het gebied van marketing een relatief voordeel genieten, maar alleen als een aantal verwerkingsactiviteiten opgenomen kunnen worden in het werk dat door de coöperatie wordt uitgevoerd.

Als onderdeel van de resultaten die we in Hoofdstuk 4 hebben verkregen, ontdekten we over het algemeen positieve effecten van deelname aan een coöperatie op het inkomen van huishoudens. Vaak is hierop hun verbeterde toegang tot de externe infrastructuur van invloed, – toegang tot een wegennet maar vooral tot elektriciteit –, dat verdere vooruitgang in de verwerking van koffie mogelijk maakt. In dit hoofdstuk beargumenteerden we dat coöperaties net zo efficiënt dienen te zijn als andere tussenschakels die werkzaam zijn in dezelfde markt, willen ze hun leden en

naburige boeren economisch profijt brengen. Zo niet, dan bezorgen ze hen allemaal verlies. Als koffiëcoöperaties efficiënt werken, dan kunnen ze de koffieprijs omhoog stuwen. Op deze manier zou ook de welvaart van georganiseerde (en sommige niet-georganiseerde) boeren kunnen stijgen.

Na deze analyse van de coöperaties van koffieboeren hebben we in Hoofdstuk 5 de coöperatie beoordeeld als antwoord op de onzekerheid in de markt; ook hebben we het effect van coöperatie op de instabiliteit van de koffiemarkt bekeken. De belangrijkste data die we in dit hoofdstuk hebben gebruikt zijn verzameld in een enquête die werd afgenomen in de acht voornaamste producerende staten van Mexico in 2004, aangevuld met informatie afkomstig uit de database van de Koffieensus. In beide, zowel in de enquête van 2004 als in de Census, waren eigenschappen opgenomen met betrekking tot het individu, de familie, het boerenbedrijf, de markt en de regio. In aanvulling daarop gebruikten we verder de gegevens van gemeenten over de prijzen gedurende acht jaar, door een panel samen te stellen op basis van gegevens van databases van overheidsinstanties. Als deel van de analyse voerden we diverse kleinste kwadraten regressies en probit modelregressies uit.

De resultaten geven aan dat er geen duidelijk verband bestaat tussen coöperatieve deelname en de voorspelbaarheid van de lokale koffieprijsen. Niettemin hebben we, toen we controleerden op individuele, familie- en boerderijgebonden factoren en markt- en regionale factoren, wel duidelijk bewijs gevonden dat de onbestendigheid van de koffieprijsen een positieve invloed heeft op de waarschijnlijkheid dat een boer lid is van een organisatie. De resultaten geven ook aan dat het lidmaatschap van een boerenorganisatie producenten helpt om hun koffieprijs en inkomen te verhogen.

De grotere verschillen in de koffieprijs van 2001 tot 2004 heeft meer coöperatie teweeg gebracht, terwijl de bereidheid tot coöperatie in deze periode afnam naarmate de gemiddelde koffieprijs hoger was. Het lijkt erop dat het verkopen van koffie als ongebonden boer een betere kans oplevert om te verdienen aan de tijdelijk hoge koffieprijsen dan verkoop door een coöperatie doet.

Het onderzoek dat we in dit hoofdstuk deden laat zien dat, hoewel boeren vaker lijken te opteren voor lidmaatschap van een coöperatie als ze te maken krijgen met een grotere fluctuatie in de prijs en met lagere prijzen, dit geen invloed lijkt te hebben op die prijsfluctuatie. Niettemin resulteert lidmaatschap van een coöperatie wel degelijk in een hoger inkomen. Zelfs wanneer de deelname aan een koffiëcoöperatie zich niet vertaalt in een afname van de marktinstabiliteit, is de stijging van de individuele koffieprijs en het inkomen dat georganiseerde koffieboeren uit koffie ontvangen groot genoeg om producenten te motiveren lid te worden van een coöperatie.

Behalve de voornoemde overeenkomsten en verschillen tussen onze resultaten en wat andere onderzoekers hebben gevonden, werpen we verder in Hoofdstuk 5 licht op de analyse van informatie die we op diverse tijdstippen uit verschillende bronnen hebben verzameld. Op deze manier waren we in staat om een panel database op te bouwen, door gebruik te maken van prijzen op internationaal-, nationaal- en dorpsniveau. Hier voegden we de prijzen aan toe over een periode van acht jaar, die we vervolgens relateerden aan de eigenschappen van de huishoudens van

koffieboeren die deel hadden genomen aan de enquête van 2004. Het onderzoek dat in dit hoofdstuk is gedaan is bovendien tamelijk uniek omdat het zich zowel richt op het effect van de veranderlijkheid van de koffieprijs op coöperatie als op het omgekeerde effect.

Als vervolg op ons onderzoek naar de reactie van koffieboeren op veranderingen in hun institutionele omgeving hebben we in Hoofdstuk 6 de bereidheid van de boeren geëvalueerd om te diversifiëren door middel van aanvullende koffie-, landbouw- en niet-landbouwactiviteiten, als antwoord op de lage koffieprijs of structurele verschillen op dorpsniveau. De analyse in dit hoofdstuk is gebaseerd op gegevens afkomstig van een representatieve enquête die is uitgevoerd in 2005, en die informatie geeft over 2294 koffieproducerende huishoudens in 5 van de belangrijkste koffieproducerende staten van Mexico. De informatie uit de enquête werd aangevuld met gegevens afkomstig van de Mexicaanse Koffiecensus. Bovendien kregen we het aantal tussenhandelaren in koffie die in 2005 op dorpsniveau geregistreerd stonden van de Mexicaanse Koffieraad. Van het Informatica, Landbouw en Veestapel Systeem kregen we de koffieprijs op dorpsniveau gedurende de periode van 2001 tot 2004. We voegden ook informatie toe over de totale bevolking op gemeentelijk niveau, verkregen van het Nationaal Instituut voor Statistiek, Geografie en Informatica.

We analyseerden de data met behulp van twee afzonderlijke econometrische modellen. Het eerste model analyseerde de specifieke keuze gemaakt door huishoudens met betrekking tot de drie diversificatiegroepen. We vulden de drie opties aan met de keuze bij gebrek aan beter van non-diversificatie, om een mogelijke selectievertekening te vermijden. Omdat we tegelijkertijd vier opties in beschouwing namen als afhankelijke variabelen, waarvan er drie elkaar niet wederzijds uitsloten, brachten we een multivariate probit analyse ten uitvoer. Het tweede model evalueerde het effect van interne en externe factoren op het jaarlijkse inkomen uit koffie. Omdat de afhankelijke variabele doorlopend was, maakten we gebruik van standaard lineaire regressies.

Het is aannemelijk dat de neergang van de koffieprijs van 2001 tot en met 2004 boeren ertoe heeft aangezet om verdere stappen te zetten met hun diversificatie. We vonden in de multivariate probit regressies correlaties tussen de verschillende opties om te diversifiëren. Deze correlaties kunnen zijn voortgekomen uit de concurrentie om hulpbronnen binnen de koffiehuishoudens en uit de complementariteit van verschillende diversificatiegroepen. In het laatste geval heeft dit geresulteerd in een positieve correlatie.

Onze resultaten in Hoofdstuk 6 geven aan dat een gunstiger institutionele omgeving voor koffieproductie, zoals het aantal koffieboeren en de koffieprijsmarge op gemeentelijk niveau, positief correleert met het besluit van koffieboeren om zich met aanvullende koffieactiviteiten bezig te gaan houden. Onze bevindingen suggereren dat hoe slechter de voorwaarden voor pure koffieproductie zijn, des te groter de kans is dat koffieproducerende huishoudens zullen besluiten om hun landbouwactiviteiten te diversifiëren. Tegelijkertijd zal men minder bereid zijn om verticaal in de koffieproductieketen te integreren.

Door een aantal variabelen in te voeren op gemeentelijk niveau waren we in staat om het effect te testen van de institutionele omgeving op de bestaansmiddelen van huishoudens. En door de marge in de koffieprijs in te voeren tussen gemeentelijke- en exportprijzen, was het ook mogelijk om het effect te vangen van structurele verschillen ten aanzien van de diversificatie tussen gemeentes onderling. De eindresultaten van ons onderzoek geven aan dat een verbeterde institutionele omgeving voor koffieproductie leidt tot meer diversificatie binnen aanvullende koffieactiviteiten en de kans vermindert dat koffieproducerende huishoudens zich bezighouden met landbouw- en niet-landbouwactiviteiten.

Naast deze resultaten en hun overeenstemming met de theorie, hebben we licht geworpen op de invoering van lagged variabelen in de analyse. Door lagged variabelen op te nemen konden we een lange termijneffect vinden van diversificatie op de bestaansmiddelen en het inkomen uit koffie van huishoudens. We vonden consistent bewijs dat een algemene diversificatie en aanvullende koffieactiviteiten in 2001 een significant, positief effect hadden op het jaarlijks inkomen uit koffie in 2005.

Met het totaal aan resultaten dat we in dit proefschrift hebben gepresenteerd dragen we bij aan de bestaande literatuur middels de aanlevering van theoretisch en empirisch bewijs over de institutionele omgeving en beleidsmatige veranderingen, en over het effect daarvan op het gedrag van koffiehandelaren en koffieboeren/huishoudens. De belangrijkste bevindingen laten zien dat de institutionele omgeving onderscheidende kansen schept onder de verschillende partners in de koffiesector; ze verschillen substantieel van elkaar in hun manier van zaken doen in koffie. De betrokkenheid van coöperaties helpt de boeren niet altijd om hun welvaart te vergroten, en helpt ook niet om de instabiliteit van de koffieprijs te verminderen. Het is duidelijk dat huishoudens op de periodes met lage koffieprijsen hebben gereageerd door meer te diversifiëren.

Dit onderzoek heeft waardevolle resultaten opgeleverd, die kunnen worden meegenomen in het beleid dat wordt ontworpen om de Mexicaanse koffiesector te ondersteunen. De informatie die besloten ligt in contractuele overeenkomsten en de prestaties van handelaren kan van groot nut blijken te zijn bij het ontwerpen van beleid dat gericht is op de institutionele omgeving. De kwestie rond coöperaties is van groot belang; de door ons verkregen resultaten kunnen worden opgepakt door leiders van coöperaties en boerenorganisaties aan de basis om de prestaties van hun coöperaties te verbeteren. Onze bevindingen met betrekking tot diversificatie hebben licht geworpen op de factoren die een rol spelen in de besluitvorming binnen huishoudens en het aannemelijke effect van diversificatie op de lange termijn. Wanneer we het beleid in verband met de toewijzing van hulpbronnen en de levering van diensten op het platteland in ogenschouw nemen, zijn die resultaten weliswaar beperkt maar ook nuttig.



## Resumen

México cambió de una economía controlada a una de mercado libre durante los años ochentas y noventas. Este país se adhirió al Acuerdo General sobre Aranceles y Comercio en 1986 y firmó el Tratado de Libre Comercio de América del Norte con Canadá y los Estados Unidos de América en 1992. Con lo anterior, el Gobierno mexicano rompió radicalmente con las políticas de sustitución de importaciones y se embarcó en la liberalización del comercio. Como parte de esos cambios en la política económica, también se inició con una fuerte reducción en la participación del Estado en la provisión de crédito, comercialización y otros servicios agrícolas a partir de los noventas. Esto afectó particularmente al sector cafetalero.

El cultivo del café fue primeramente introducido a México a finales del siglo diecinueve. En este país, el café es importante ya que proporciona empleo e ingresos a casi medio millón de hogares, mientras que cerca de un millón de trabajadores son contratados cada año para la cosecha. Hay alrededor de 500,000 productores de café, que juntos poseen más de 760,000 hectáreas con este cultivo. México produce más de 5.5 millones de quintales por año<sup>39</sup>. El involucramiento de productores indígenas y la baja disponibilidad de servicios públicos le dan a este sector características especiales en términos de tecnología y cultura. Alrededor del 98% de las plantaciones de café en México se mantienen bajo árboles de sombra, lo cual constituye una importante cubierta forestal que favorece la conservación del medio ambiente.

Como consecuencia de la desaparición de las cláusulas económicas del acuerdo internacional del café en 1989, se inicia el retiro de la participación gubernamental de la comercialización del café y el cierre de otras instancias gubernamentales que operan en apoyo al sector rural. En el sector cafetalero mexicano, después de la desaparición del Instituto Mexicano del Café en 1993, la representación de la industria del café ha estado siendo cubierta primero por el Consejo Mexicano del Café y luego por el Sistema Producto Café y la Asociación Mexicana del Café. El primero estuvo operando de 1993 a 2004 y los últimos han estado en funcionamiento desde 2004.

En consecuencia, en esta tesis el énfasis fue el investigar la institucionalidad existente en el sector cafetalero mexicano y los cambios estructurales presentes a través del tiempo. Los temas específicos que examinamos son: las condiciones de contratación y desempeño de los comercializadores, los factores que influyen en la decisión de los productores a formar parte de las cooperativas, los efectos de las cooperativas en la variabilidad de precios, la influencia de la organización de productores en el ingreso por café de las unidades familiares y la respuesta de éstas a la reducción del precio del producto por medio de la diversificación de sus actividades económicas.

Para lograr los principales objetivos de esta tesis, hemos utilizado información primaria y secundaria. El trabajo de campo fue realizado en dos periodos: uno de mayo a julio de 2008, durante éste se entrevistaron a los principales actores de la cadena productiva del café de México,

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<sup>39</sup> Cien libras de café verde es un quintal de café.

y otra de noviembre de 2009 a febrero de 2010, en la que se hicieron entrevistas a intermediarios del café localizados en cuatro regiones productoras. Se recolectaron datos secundarios de institutos de investigación y otras instituciones relacionadas con el sector agrícola y del café. Adicionalmente se obtuvo información de representantes de instancias gubernamentales y no gubernamentales. Como información básica se usaron dos encuestas realizada a productores cafetaleros: una realizada en el 2004, la cual comprende información de 1,396 productores, y una realizada en el 2005, la cual comprende información de 2,294 productores, de ocho y cinco de los mayores estados productores de café, respectivamente.

En el Capítulo 2 se proporciona información sobre la estructura del sector cafetalero y sus cambios a través del tiempo. Los resultados sugieren que hubo muchas causas para que los cambios institucionales se presentaran, pero la más importante fue la alineación de la política económica de México con las políticas mundiales. Los pequeños caficultores se han visto perjudicados por la variabilidad de los precios del producto y la falta de oportunidades para su participación directa en el mercado nacional e internacional. Esta situación indica que se requiere la intervención del Gobierno para el establecimiento de un entorno institucional apropiado, incluyendo la provisión de información de mercado y servicios en apoyo a los productores de café en el aumento de sus ingresos. Las políticas públicas desarrolladas en las últimas dos décadas han impedido que un mayor número de productores salgan del sector de cafetalero; pero poco han incidido en la mejora del rendimiento, producción, calidad del producto y viabilidad del sector cafetalero.

Los precios internacionales del café han mostrado una fluctuación de alrededor del 50% anualmente en los últimos años, mientras que durante la época regulada, los mismos fluctuaron 15% alrededor de su precio medio definido. Esta situación dificulta que los productores y otros agentes participantes en la cadena productiva del café lleven a cabo inversiones y la planificación de sus actividades. Las estadísticas indican una menor participación de los cafetaleros en el precio internacional durante el periodo regulado comparado con el régimen no controlado. Sin embargo, en el Capítulo 2, argumentamos que los productores de café mexicanos eran mejor remunerados bajo el sistema de cuotas que bajo el libre mercado, porque en ese entonces el Gobierno cubría buena parte de los requerimientos que tenían los caficultores.

A pesar de que ha habido un ajuste considerable al entorno institucional, algunos actores están en desventaja, mientras que otros han logrado beneficiarse de este nuevo entorno. Para reducir el efecto de la rápida disminución de la intervención directa del estado mexicano, durante los noventas el gobierno federal comenzó a operar algunos subsidios y programas de apoyos. Sin embargo, la participación del Gobierno en el sector cafetalero es mucho menor de lo que era bajo el sistema de cuotas. En la actualidad, el Estado es una especie de mediador entre los grandes intermediarios privados y las empresas exportadoras por un lado, y entre el sector social de productores de café y los pequeños procesadores.

Una vez que hemos tenido un panorama general de los cambios que se han presentado en el entorno institucional y en la estructura del sector cafetalero mexicano, en el Capítulo 3 se plantearon como objetivos principales en este estudio el de identificar los factores que explican las



decisiones contractuales de los comerciantes que participan en la cadena productiva del café y evaluar el desempeño de los comerciantes de café en cuatro regiones productoras de México.

Los datos utilizados en nuestro análisis se obtuvieron mediante la realización de entrevistas directas a 53 intermediarios en 4 regiones productoras de café de los estados de Oaxaca y Veracruz. Se utilizó el margen bruto de comercialización (la diferencia entre los precios de compra y venta) como un indicador de desempeño de los comercializadores, ya que éste da una indicación de cómo los agentes de comercialización se desempeñan buscando una reducción de sus costos variables. Se realizó una regresión logit para encontrar las variables que afectan la decisión de los intermediarios de contar con un contrato (o no) con su comprador. Para evaluar el desempeño de los comerciantes en el sector de café de México, se realizó una regresión de mínimos cuadrados ordinarios.

Los principales resultados indican que siendo un tostador y vendiendo café cereza negativamente afecta la decisión de contar con contratos, mientras que el estar integrados verticalmente tiene un efecto positivo sobre el uso de contratos. Los resultados también sugieren que el vender café cereza, participando en un entorno competitivo y el tener contratos positivamente influye el desempeño de los intermediarios, mientras que el ser un tostador tiene un efecto positivo sobre el margen bruto de comercialización. Como se esperaba, se encontró que los márgenes de comercialización disminuyen conforme aumenta la competencia entre intermediarios. De acuerdo con este resultado, podemos decir que si la liberalización de la economía aumenta la competencia ésta también trae beneficios a los productores por medio de un mayor precio de venta en el área de producción.

Algunos de nuestros resultados, también incluidos en el Capítulo 3, muestran que los agentes comercializadores de café se han involucrado en diferentes actividades en respuesta a la transición de un escenario controlado por el Estado a uno de libre mercado. Algunos de ellos decidieron integrarse verticalmente con el fin de reducir los costos de transacción y de lograr una mayor eficiencia en el mercado, basándose en un mayor volumen de producto para aumentar sus ganancias; otros invierten en activos que les permiten agregar valor al café y tener mayores márgenes por unidad producto.

Las restricciones para obtener crédito y la incertidumbre han hecho que la mayoría de los comerciantes descuiden la inversión en maquinaria y la adopción de nuevas tecnologías. Por lo tanto, de los resultados de este capítulo podemos concluir que ha habido liberalización pero no una real modernización en el sector cafetalero mexicano. En consecuencia, consideramos que para que la cadena productiva del café sea competitiva, se requiere de enormes inversiones y mejoras tanto en la tecnología como en el entorno institucional en todas las etapas de la cadena productiva del café.

Con el fin de evaluar el efecto del entorno institucional sobre el comportamiento de los productores/unidades de producción cafetaleras, en el Capítulo 4 identificamos las variables que influyen en el interés de los productores cafetaleros para formar parte de las cooperativas y

examinamos la relación, la importancia relativa y la dirección en la que algunos factores influyen el ingreso per cápita de café.

El estudio realizado en este capítulo se basa en información de la base de datos del censo nacional del café y en una amplia encuesta realizada a productores cafetaleros en el 2004. En la encuesta, se incluyeron 1,396 productores de café de los ocho principales estados productores en México. Para responder a las interrogantes de esta investigación, nos basamos en tres diferentes procedimientos. En primer lugar, se realizó un análisis con un modelo probit para identificar los factores individuales, familiares, de la producción y regionales que influyen en la probabilidad de participación en cooperativa. En segundo lugar, se realizó una regresión logística multinomial para identificar las variables que son importantes en la definición del tipo de café que los productores venden. En tercer lugar, se realizaron tres regresiones mínimos cuadrados ordinarios. En estas utilizamos muestras agrupadas y no agrupadas de productores organizados y no organizados para identificar los factores que influyen en el ingreso per cápita de café y las posibles diferencias entre los agricultores individuales y en cooperativas.

Los resultados muestran que algunos factores individuales, familiares, de la producción y regionales favorecen la inserción en cooperativa; mientras que las condiciones de la vivienda, el número de cafetaleros en el municipio y la proporción de ventas a intermediarios en el municipio afectan negativamente la decisión de adhesión a cooperativa. Las diferencias regionales en cuanto a las condiciones de producción de café también muestran una influencia significativa en la decisión de los productores de unirse a las cooperativas.

En general, en varios aspectos nuestros resultados concuerdan ampliamente con los hallazgos de estudios anteriores que se ocupan de cuestiones similares en cuanto a la participación en cooperativa. Sin embargo, en esta investigación encontramos algunos factores adicionales, que positiva o negativamente, influyen la decisión de los productores cafetaleros de unirse a las cooperativas. Además, descubrimos que el ser miembro de cooperativa no siempre ayuda a los productores de café en recibir un mayor precio del producto; nuestros resultados muestran un efecto negativo de la participación en cooperativa en el precio promedio cuando se vende café seco natural. Esto implica que los miembros de las cooperativas disfrutan de una ventaja comparativa en la comercialización de café sólo si la cooperativa realiza varias de las actividades de procesamiento.

Como parte de los resultados obtenidos en el Capítulo 4, encontramos en general un positivo efecto de la participación en cooperativa en el ingreso de las unidades de producción. Esto tiende a ser mediado por un mejor acceso a infraestructura – carreteras, pero principalmente electricidad – que también puede ser un factor positivo en el procesamiento de café. Con los resultados de este capítulo, podemos sostener que las cooperativas tienen que ser tan eficientes como otros intermediarios que trabajan en la misma región a fin de traer beneficios económicos a sus miembros y a los productores cafetaleros de la región, de lo contrario traen pérdidas económicas a todos ellos. Si las cooperativas de café trabajan de manera eficientemente, pueden hacer que los

precios del café aumenten en la región. Así, el beneficio para los productores organizados (y algunos no organizados) podría también aumentar.

Continuando con el análisis de las cooperativas de productores de café, en el Capítulo 5 evaluamos la participación en cooperativas como respuesta a la variabilidad de los precios y el efecto de las cooperativas en la estabilidad de los precios del café. Los principales datos utilizados en este capítulo fueron obtenidos de una encuesta realizada en el 2004 a productores cafetaleros de los ocho principales estados productores de café en México, dicha información fue complementada con datos incluidos en la base del censo nacional del café. Ambos, la encuesta de 2004 y el censo, incluyen información individual, familiar, de producción, de mercado y características regionales. Además, utilizamos precios de café a nivel municipal registrados durante ocho años y que fueron obtenidos de una instancia gubernamental; así se construyó un panel de datos. Como parte del análisis, se ejecutaron varias regresiones de modelo probit y mínimos cuadrados ordinarios.

Los resultados indican que no existe una relación clara entre la participación en cooperativa y la predicción de los precios locales del café. Sin embargo, cuando se controla por los factores individuales, familiares, características de las plantaciones, mercado y regionales, encontramos claras evidencias de que la variabilidad de los precios del café afecta positivamente la probabilidad de que un productor decida ser miembro de una organización. Además, los resultados indican que el pertenecer a una cooperativa ayuda a aumentar el precio y el ingreso de café.

Una mayor variación en el precio del café registrada de 2001 a 2004 indujo más participación en cooperativa, mientras que cuanto mayor fue la media del precio del café de 2001 a 2004, más baja fue la decisión del productor de incorporarse a las cooperativas. Aparentemente el vender café como productor individual proporciona mayores oportunidades de obtener ganancias extraordinarias como resultado de aprovechar los precios altos comparado con vender por medio de cooperativas.

La investigación realizada en este capítulo muestra que los agricultores optan más frecuentemente por pertenecer a las cooperativas cuando se enfrentan con una mayor variabilidad de precios (y cuando hay precios menores), esto no parece afectar la variación de precios; sin embargo, el pertenecer a las cooperativas conduce a mayores ingresos de café. Aun cuando la participación en cooperativas no se traduce en una reducción de la inestabilidad de los precios, el aumento en el precio y el ingreso de café para los cafetaleros organizados es lo suficientemente grande como para motivarlos a formar parte de las cooperativas.

Aparte de las similitudes y diferencias entre nuestros resultados y los que otros investigadores han encontrado, en el Capítulo 5 además proporcionamos un procedimiento diferente en el análisis de la información; misma que fue obtenida de diferentes fuentes y en diferentes tiempos. Así, construimos una base de datos en panel utilizando los precios internacionales, nacionales y municipales. En la base de datos se añadió información de precios correspondientes a un período de ocho años, mismos que relacionamos con las características de las unidades de producción cafetaleras incluidas en la encuesta del 2004. Por otra parte, la investigación realizada en este

capítulo es única en el estudio del efecto de la variabilidad de los precios en la formación de cooperativas y viceversa.

Continuando con la respuesta de los productores de café a los cambios en el entorno institucional, en el Capítulo 6 evaluamos la decisión de los productores en diversificarse con actividades económicas en el sector café, agrícola y no agrícola; ello como respuesta a los precios bajos del café o a las diferencias estructurales a nivel municipal. El análisis en este capítulo se basa en los datos de una encuesta representativa realizada en 2005, ésta encuesta incluye información de 2,294 familias productoras de café de los cinco principales estados productores en México. La información de la encuesta se complementó con datos del censo nacional de café. Además, también fue incluida información en relación al número de intermediarios de café que estaban registrados a nivel municipal en el 2005 misma que fue emitida por el Consejo Mexicano del café. Del Sistema de Información Agrícola y Pecuarias se obtuvo el precio del café a nivel municipal en el período 2001-2004, además de que también se incluyó información poblacional a nivel municipal obtenida del Instituto Nacional de Estadística, Geografía e Informática.

Los datos se analizaron mediante dos distintos modelos econométricos. El primer modelo analiza las decisiones específicas que hacen las unidades de producción en a los tres grupos de diversificación definidos en este capítulo. A las tres opciones se le añadió la opción de no diversificado con la finalidad de evitar sesgo de selección. Así, como variables dependientes fueron consideradas cuatro opciones al mismo tiempo, tres de las cuales no son mutuamente excluyentes; por lo anterior, se realizó una regresión de probit multivariado. El segundo modelo evalúa el efecto de factores internos y externos en el ingreso anual de café; debido a que la variable dependiente es continua se hicieron regresiones de mínimos cuadrados ordinarios.

Probablemente la caída en el precio del café durante el período 2001-2004 hizo que los cafecultores adoptaran una mayor diversificación. En las regresiones de probit multivariado encontramos correlaciones entre las diversas opciones de diversificación. Esta correlación podría venir de la competencia en la asignación de recursos dentro de las unidades de producción de café y de la complementariedad existente entre los diversos grupos de diversificación utilizados en este trabajo. En este último caso, se expresa como una correlación positiva.

Nuestros resultados en el Capítulo 6 indican que un mejor entorno institucional para la producción de café, como el número de agricultores de café y el margen de precios de café a nivel municipal, se correlacionó positivamente con la decisión de las unidades de producción en tener actividades extra en el sector cafetalero. Nuestros resultados sugieren que mientras peores son las condiciones institucionales para la producción de café mayores son las probabilidades de que las unidades de producción cafetaleras se diversifiquen con actividades agrícolas, y al mismo tiempo, habrá menos disposición a integrarse verticalmente con el café.

Introduciendo varios factores a nivel municipal, hemos podido probar el efecto del entorno institucional en las estrategias de las unidades familiares, y al introducir el margen del precio del café a nivel municipal y el margen de exportación, también fue posible capturar el efecto de las

diferencias estructurales en cuanto a diversificación en los municipios. Los resultados globales derivados de nuestra investigación indican que un mejor ambiente institucional en el sector cafetalero induce mayor diversificación dentro de las actividades relacionadas con el café y reduce la probabilidad de que las unidades de producción cafetaleras participen en actividades agrícolas y no agrícolas.

Adicionalmente a los resultados anteriores y su coincidencia con la teoría, en este capítulo generamos un procedimiento de análisis utilizando variables correspondientes a un período anterior. Incluyendo este tipo de variables fue posible encontrar el efecto a largo plazo de la diversificación en las estrategias de diversificación económica y el ingreso de café generado en las unidades familiares cafetaleras. Se encontraron consistentes evidencias de que la diversificación en general y la diversificación con actividades extra en el café en 2001 tuvieron un efecto significativo y positivo en los ingresos anuales provenientes del café en el 2005.

Con los resultados presentados en esta tesis, contribuimos a la literatura existente proporcionando evidencias teóricas y empíricas en relación al entorno institucional y los cambios en la política y su efecto sobre los comercializadores del aromático y el comportamiento de los productores y las unidades de producción cafetaleras. Los principales resultados muestran que el entorno institucional crea oportunidades diferenciales entre los múltiples participantes en el sector de cafetalero; ello imprime diferencias sustanciales en la forma en que hacen negocio con el café. La participación en cooperativa no siempre ayuda a los productores a aumentar su bienestar, ni ayuda en la reducción de la inestabilidad de los precios de este producto. Es claro que las unidades de producción respondieron a los períodos de precio bajos del café con un aumento en la diversificación de sus actividades económicas.

Esta investigación produce resultados valiosos para ser tomado en cuenta en la formulación de políticas dirigidas a mejorar el sector cafetalero mexicano. La información incluida en los acuerdos contractuales y el comportamiento de los comerciantes pueden resultar muy útiles para el diseño de políticas relacionadas con el entorno institucional. El aspecto relacionado con las cooperativas es de gran importancia; los resultados obtenidos pueden tomarse como base por los dirigentes de las cooperativas y las organizaciones de productores con el fin de mejorar el desempeño de sus cooperativas. Las conclusiones sobre diversificación proporcionan información valiosa en relación a los factores que tienen importancia en el proceso de toma de decisiones de las unidades de producción y el probable efecto de la diversificación en el largo plazo. Los resultados son útiles, pero limitados al mismo tiempo, al ser considerados en las políticas públicas relacionadas con la asignación de recursos y la prestación de servicios en las zonas rurales.



**Funding**

This PhD student was supported by the Programme Alβan, the European Union Programme of High Level Scholarships to Latin America, scholarship number E06D100933MX, and by the Ministry of Science and Technology (CONACYT) of Mexico.





**Training and supervision plan**

Name of the course	Department/institute	Year	1 ECTS (=28 hrs)
<b>I. General part</b>			
Research Methodology: From topic to proposal	Mansholt Graduate School (MG3S)	2007	4,0
Information Literacy PhD Including EndNote Introduction	WUR Library	2008	1,5
Techniques for Writing and Presenting Scientific Papers	Language Centre	2008	1,2
Effective Behaviour in your Professional Surroundings	MG3S	2008	0,7
<b>II. Mansholt-specific part</b>			
Introductory Course Mansholt Graduate School	MG3S	2007	1,5
'Influence of the New Economic Policy and Market Liberalization on the Mexican Coffee Sector'	México (53° ICA)	009	1,0
'The Structure of the Mexican Coffee Sector and Change Over Time'	PhD-day, MG3S	2010	1,0
'Farmer's Cooperatives to Counteract Risky Market Conditions: Empirical Findings from the Mexican Coffee Sector'	Europe (EAAE)	2010	1,0
'Contractual Choices and Performance of Mexican Coffee Traders: The Role of Market Institutions in Commodity Chains'	Europe (WICaNeM)	2012	1,0
<b>III. Discipline-specific part</b>			
Farm, Firms and Rural Networks (DEC52306)	WUR	2007	6,0
New Institutional Economics: Governance of Transactions, Incomplete Contracts, and Bargaining	MG3S	2007	4,0
Macroeconomic and International Development Policy (DEC52806)	WUR	2007	6,0
Economic Models (AEP30806)	WUR	2007	
Advanced Econometrics	MG3S	2007	6,0
<b>IV. Teaching and supervising activities</b>			
MSc Student	DEC	2010	1,0
<b>Total ECTS</b>			<b>35,9</b>



## **Curriculum vitae**

Benigno Rodríguez Padrón was born on 13 February 1967 in Playa Vicente, Veracruz, Mexico. He went to high school from 1985 to 1987 at the Science and Humanities College of the National Autonomous University of Mexico, in Mexico, DF. He studied at Chapingo Autonomous University from 1987 to 1992 and obtained his bachelor as an Agricultural Engineer, with a specialization on Agricultural Economics. From 1995 to 1997, Benigno got his Master Degree in Economics at Postgraduate College in Texcoco, Mexico, with a scholarship from the Mexican Ministry of Science and Technology. In the middle of 2005, he went to Canada to follow English as a Second Language courses at Regina University.

He was employed as a researcher and teacher from 1993 to 1994 at the Regional Centre of Chapingo Autonomous University in Huatusco, Veracruz. Since 1997, he has been a researcher and teacher in the same Regional Centre. During his professional career, he has taught Enterprise Management, Agricultural Marketing and Development of a Productive Project in the bachelor programme of Tropical Agriculture at the same university. During the 1999-2004 period, he was appointed director of the Regional Centre of Chapingo Autonomous University. Benigno has been participating as an advisor and promotor of some bachelor's students at the same university. As part of his career, he has been responsible for the development of some projects related to the National Coffee Census, working with the federal government of México. As a result of his work, he has published some short edition writings, chapters in books and co-edited a book, all of them related to coffee and diversification in coffee-producing regions. He has attended several national and international conferences and made several presentations.

Benigno joined the Development Economics Group of Wageningen University in January 2007 as a guest PhD student. During the period as a PhD student, he successfully completed the training of the Wageningen School of Social Sciences and has been involved in teaching and research activities in Chapingo Autonomous University in Huatusco, Veracruz, Mexico.



