

# Trade and poverty in Paraguay: the case of an agribusiness value chain

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UNITED NATIONS



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The authors would like to thank Marcelo LaFleur and José Durán and workshop participants in Santiago who contributed with valuable comments and suggestions on earlier versions of this document.

This document was prepared within the framework of the project "Programa de Cooperación CEPAL-AECID 2008 – Políticas e instrumentos para la promoción del Crecimiento en América Latina y el Caribe – Componente 4) Políticas de Comercio y Pobreza (AEC/08/004) for the Division of International Trade and Integration of the Economic Commission for Latin America and the Caribbean (ECLAC).

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## Abstract

We propose a methodology involving surveys carried out among a group of small producers linked to a cooperative (Capiibary) to analyse the link between trade and poverty via the inclusion of small family farmers in a value chain headed by a large exporter in Paraguay, Frutika, to which they sell their output of passion fruit (mburucuyá) and other fruits. The cooperative and the firm are located in one of Paraguay's poorest regions, with a poverty coefficient of 41.8% and an even higher incidence of 46.3% in the rural part of the region. The main focus is on evaluating the impact of the linkage between small farmers and Frutika, the control being a group of family farmers in the cooperative who have no ties to it. The findings as regards the factors accounting for the different levels of poverty and the income effects of participating in the value chain indicate that belonging to the fruit farming chain has a very large influence in explaining why both the poverty gap and the severity of poverty are lower among producers who are in the chain than among those who are not. Poverty falls by much more in the group of producers within the fruit farming chain than among those outside it. Although belonging to the chain improves the relative position of the farmers concerned, it is not a sufficient condition for poor families (which a proportion of these producers are) to be lifted out of poverty. This can only happen if one or more members of these families are also employed as wage-earning agricultural or non-agricultural workers. The findings of the study yield important recommendations for the way in which a virtuous link can be developed between family farming and global value chains.



## I. Introduction

In Latin America and the world, the face of poverty is predominantly rural. Worldwide, 82% of the poor live in rural areas and the vast majority (86%) of these rural dwellers are farmers (World Bank, 2007). At the same time, according to data from the Corporate Database for Substantive Statistical Data of the Food and Agriculture Organization of the United Nations (FAOSTAT), global trade in agricultural goods grew by over 100% between 1991 and 2006, to US\$ 721 billion. Apparently, there are ample opportunities for alleviating poverty through foreign trade, if trade were based on the industries and activities in which the poorest segments of the population participate heavily, such as in the case of the agriculture and food industries. Although the academic understanding of trade and growth is that trade liberalization can be an important tool in fighting poverty, few studies have been conducted that specifically look at the effects that the integration of small farmers into global production chains has on rural poverty.

This study seeks to evaluate such effects by examining a successful case in which a juice supply chain was created in Paraguay, with the participation of an export firm. The first section of the study reviews the literature on the trade and poverty debate, briefly analyses Paraguay's productive structure and poverty levels, and presents the main hypotheses of the study. The second section provides a brief account of the creation of the agribusiness value chain and the factors that contributed to its successful establishment. The third section discusses the principal findings concerning the effects that value chain participation by small farmers has on their household incomes and poverty levels, and the indirect effects on income levels in the rural community. Lastly, conclusions and policy recommendations are presented.





## II. The debate on trade and poverty

Currently, there is broad consensus that international trade is an important tool for economic growth and poverty reduction in developing countries.

Although some authors highlight the possible risks to which countries are exposed when they pursue trade liberalization, such as a global “levelling down” (Goodman and Pauly, 1993; Edwards, 1999) or a massive loss of jobs without the creation of new sources (cf. Schultze, 2004), the vast majority of authors concur that trade liberalization spurs economic growth and that growth ultimately reduces poverty (Balassa, 1971; Balassa, 1985; Krueger, 1978; Bhagwati, 1978; World Bank, 1987; Feder, 1983; Tyler, 1981; Edwards, 1998; Dollar, 1992). According to these studies, trade barriers distort the relative prices of the basic factors of production, which leads to poor allocation of these factors (capital, labour and land), a situation that is eventually corrected by greater trade liberalization (Reina and Zuluaga, 2008). In addition, some authors believe that trade would have a permanent impact on the ability of countries to boost their productivity (Young, 1991; Helpman and Krugman, 1985; Grossman and Helpman, 1991; Lopez Cordova and Moreira, 2004).

However, these studies provide little evidence on the mechanisms that would actually link export based growth and poverty reduction. In order to develop specific hypotheses regarding the circumstances under which new export activities have a positive effect on poverty reduction, a fuller understanding of who the poor are and what types of links exist between them and export activities is needed.

Given that most of Latin America’s poor are still farmers and that non-farm workers have relatively higher income levels than farmers in rural areas, two known mechanisms for reducing rural poverty can be considered: (1) boost agricultural productivity and growth, thus raising the income levels of households that depend on this source of income; and (2) increase non-agricultural job and income generating opportunities.

These two mechanisms are strongly linked, especially in the initial phases of development, when non-agricultural activity has very little weight in the economy (Haggblade and others, 2007). First, the increase in agricultural productivity can have direct effects in terms of raising the income levels of poor farmers. Second, growth in the farm sector can, in turn, spark growth in the rural non farm sector, creating more opportunities for the poor to capture a larger share of the benefits of this growth (Mellor, 1976). This phenomenon is the result of growth linkages between the agriculture sector and other productive sectors, both of which are labour-intensive and provide goods and services for local consumption.

These observations have generated an extensive body of literature focused primarily on estimating the size of the multiplier effect of agricultural growth. The term “linkage” is understood to be a type of connection established between different productive sectors that brings about economic growth in a specific geographical area.<sup>1</sup>

This means that the expansion of the rural non-farm sector depends on growth among small farmers, which poses two problems. First, the consumption and input linkages are scarce because many large landholders live and consume in urban areas (Haggblade and others, 2007). Second, recent research on agricultural value chains has yielded results that are consistent with a dynamic of exclusion. The commercial actors in value chains increasingly work with a few large suppliers of commodities, seeking economies of scale and attempting to lower the transaction costs associated with ever-higher standards of quality. The concentration produced in one link of the chain, as can occur at the point of sale to the consumer, of processing, or of input supply, is propagated to the rest of the chain. The authors suggest that this has created new barriers that prevent small farmers from increasing their participation in and reaping greater benefits from international agricultural trade. These barriers end up limiting linkages with the rural agricultural economy (Humphrey, 2006).

Therefore, it is imperative to learn, first, how the small-scale farming sector can increase its competitiveness in open economies and, second, how foreign trade can play a relevant role in reducing rural poverty.

## A. Paraguay: Productive structure and rural poverty

In the context of theories on trade and poverty, the case of Paraguay presents an empirical puzzle. Despite having the most open economy in the region, due to its porous borders and low degree of tariff protection (Masi, 2008), Paraguay has a high rate of poverty and has experienced very low growth in recent decades: average GDP growth was 2.2% between 1991 and 2009, and average per capita GDP growth was just 0.1% in the same period. Meanwhile, a full 38% of the population were living in poverty in 2008, compared with 35% in 1998, and 19% were living in extreme poverty. The poverty rate in Paraguay continues to be determined by rural poverty (48.8%) and rural extreme poverty (30.8%).<sup>2</sup> In Paraguay, despite the relative decline in population in the countryside, the rural sector continues to carry real weight within the national demographic distribution (42%).

Since 1990, Paraguay’s economic structure, based on unskilled-labour-intensive activities (cotton), has been rapidly replaced by a different structure based on capital- and land-intensive activities (soybeans, wheat and beef). Although these generate economic growth, they require little labour. Meanwhile, agricultural diversification (especially on family farms) and the agro-industrialization process have been slow to materialize. Global trade openness and regional integration have caught Paraguay without the capacity to immediately increase its supply of exportables, especially alternative agricultural products that are more processed (Masi, 2008).

The economic recovery propelled by soybean and beef exports in recent years (based on active participation in international trade and higher global commodity prices) has not substantially improved the living conditions of Paraguay’s campesinos. On the contrary, the export boom has driven the expansion of a particular type of agriculture that has the effect of locking campesinos out of the land market, due to rising prices and/or the sale of their lots. These changes in the productive

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<sup>1</sup> The concept of linkage has been used in different ways in economic development theory. Most economic linkages are mainly financial transactions involving the purchase and sale of goods, services and production factors. Demand stimulates supply, and vice versa, and as a result the expansion of one production sector or market segment creates a multiplier effect in the economy (Davis and others, 2002).

<sup>2</sup> Statistical data from economic reports issued by the Central Bank of Paraguay and household surveys conducted by the Directorate of Statistics, Surveys and Censuses.

structure, which have occurred as certain regions of Paraguay have entered the new global trade flows, have made a clear mark on the country's economic geography.

The region of Caazapá<sup>3</sup> (home to the producers profiled in this study), which has a poverty rate that is higher than the national average, has recently entered the world of international trade. Vázquez (2006) describes a confrontation of two productive models in this region: the model in the western region, which is less dynamic in terms of production and trade; and the model in the eastern region, restructured by the continuous expansion of the agro-export region. The productive restructuring of Caazapá finds its origins in the shift from campesino agriculture based on production for own consumption (mainly cotton) to corporate agriculture and the arrival of new actors (Vázquez, 2006). This process has led to a sudden increase in output and appreciating land values in the area. This transition threatens to exclude small farmers, who have limited capital, land and expertise.

The characterization of these two territorial economies as dynamic economies (corporate agriculture) and stagnant economies (campesino agriculture) started to change in 2000 when in the aforementioned rural regions, a large segment of the campesino family agriculture sector was revitalized by a model that diverged from the traditional campesino economy based on subsistence and local market-oriented production. This transformation was based on the cultivation of new export crops that were labour-intensive but did not require much land. “This involved (...) the integration of family agriculture into the model of commercial agriculture supported by a dozen small and large companies that buy and process the products, the vast majority of which are marketed”<sup>4</sup> to the Common Market of the South/Mercado Común del Sur (MERCOSUR) and the Asian market. This type of “globalized family agriculture” took root in regions with high poverty rates and sharply declining population bases, such as Caazapá (Vázquez, 2009).

Clearly, the case of Paraguay demonstrates in various ways that trade openness does not immediately bring about growth and poverty reduction. Therefore, it is necessary to look at “successful” cases in which small rural producers have joined value chains, such as the case of the juice industry profiled in this study, that is, cases that indicate the conditions, aside from the elimination of tariff barriers, that are required in order to generate competitive export industries that make beneficial use of land and labour resources and support a process of rural growth and poverty alleviation.

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<sup>3</sup> According to the 1998 Household Survey, the poverty rate in the region of Caazapá was 37%, compared with the nationwide average of 35.8% (DGEEC, 1998).

<sup>4</sup> The new export crops from campesino family farms are sesame, stevia, organic sugar, fruits and vegetables.



### III. Questions, theory and methodology

This brief review of the literature on trade and poverty reduction and considerations in the case of Paraguay suggests that there is much to learn from conducting an in-depth examination of the new trade activities and how the poor are getting involved, directly or indirectly, in international trade networks. By examining the successful formation of a value chain in a Paraguayan juice industry, this study has made the following inquiries:

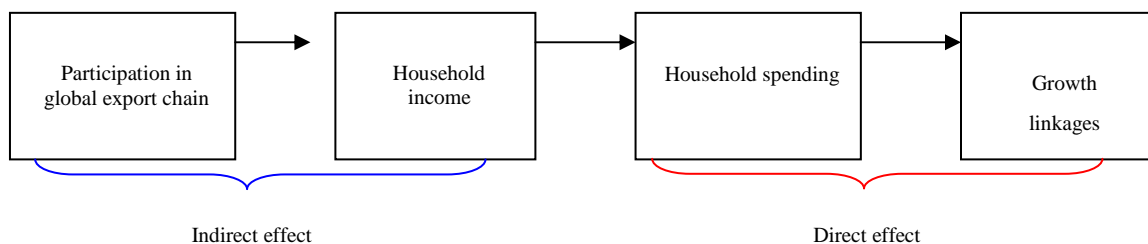
- What conditions contributed to the participation of small farmers in this chain?
- What has been the effect on income generation and poverty levels among the producers involved in this value chain?
- What type of rural growth linkages do these export activities create? Would existing linkages lead to poverty reduction?

Based on the aforementioned literature on agricultural value chains and rural growth linkages, the following hypotheses were formulated:

- In order to successfully supply products to global value chains, small farmers need some type of mechanism to coordinate investment, production and harvesting activities and learning among numerous production units, thus lowering the transaction costs associated with the fragmented production structure. Extension services, in particular, play a crucial role in this coordination effort; these services are typically provided by the government, producer associations and cooperatives or by the export firm itself.
- As a result of their participation in a global value chain, the small farmers should see income gains and experience falling poverty and rising consumption levels.
- The consumption patterns of the small farmers involved in the chain are concentrated in goods and services that are highly likely to generate more growth linkages within the rural economy, especially in the area of labour-intensive activities.

These hypotheses are represented in the figure below. The figure shows the theoretical effects of the formation of a value chain: first, the direct effect of additional household income generated by the integration of small farmers into an export chain, and second, the indirect effect of the rural growth linkages generated by additional spending by these households.

**FIGURE III.1**  
**TRANSMISSION MECHANISM OF THE EFFECTS OF PARTICIPATION**  
**IN GLOBAL VALUE CHAINS**



Source: Prepared by the authors.

To answer these research questions, the study uses a hybrid methodology based on the collection and analysis of qualitative and quantitative data. The purpose of the qualitative component is to identify the principal factors that contributed to the successful integration of the small-scale passion fruit and grapefruit growers into the juice chain. The data come from a series of semi-structured interviews that were conducted between March and July 2009 with the key actors in the chain and the institutions that supported the formation of the chain.<sup>5</sup>

The purpose of the quantitative component is to measure the economic benefits that resulted from the integration of the small farmers from the Capi'ibary Cooperative into the Frutika juice chain. For this component, a model was developed to determine income and estimate the income-expenditure elasticities using original data from a census of the producers from the Capi'ibary Cooperative, for the purpose of determining whether additional household income and spending among the small producers linked to the Frutika chain had the effect of reducing poverty in the local economy and whether labour-intensive agricultural growth linkages were created.

For the work presented here, the principal findings of the qualitative component are summarized, instead of presenting a full description of the component.<sup>6</sup>

## A. Research methodology

To obtain the quantitative data, producers in the Capi'ibary Cooperative were surveyed. The census was conducted in October and November 2009 by individuals from the area who visited the farms to collect the information solicited on the questionnaire.

The Capi'ibary Cooperative provided a list of 574 rural member producers (universe) living in five districts in the region of Caazapá. The total coverage rate of the census was 77.7%. Information was gathered from 73.2% of the producers not participating in the Frutika value chain and from 100% of the producers participating in the chain.

Of the 446 farms that were surveyed, those that did not carry out agricultural activities during the period of study and/or those with more than 53 available hectares of land were excluded, for the purpose of maintaining similar farm sizes and economic activities across both study groups and for ensuring the

<sup>5</sup> Interviews were conducted with groups of small producers, technical and management personnel at the Capi'ibary Cooperative, Frutika managers involved in the project, officials from the Agricultural Extension Directorate of the Ministry of Agriculture in Caazapá, representatives from a non-governmental organization that works with producers in the area and the individuals responsible for the public-private project with the German Agency for Technical Cooperation (GTZ). A total of about 30 interviews were conducted.

<sup>6</sup> A detailed presentation of the quantitative component can be found in the full version of this study: Masi and others, 2010.

representativeness of the survey participants in relation to the universe.<sup>7</sup> The study group ultimately encompassed 425 farms, with each farm corresponding to a producer in the Capi'ibary Cooperative.

The producers linked to Frutika were considered to be those who had grown passion fruit, grapefruit or oranges over the previous 12 months. According to the census data, 22.4% were participating in the Frutika value chain and 77.6% were not.

The data collected were related to the farms, as the production unit, and the members. Data were gathered on income, household spending and assets (human and productive capital) of the farms and the members.

As part of household income, data were collected on income from non-agricultural dependent and independent employment and non employment income related to remittances or transfers, agricultural income from the sale of farm products, income from own consumption<sup>8</sup> (farm products and by-products or processed products), income from the sale of animals, the sale of animal by-products and processed products, and income from commercial activities and the sale or leasing of lots.

In addition, data were collected on human capital and access to or ownership of production related assets. For human capital assets on the farms, typical data such as education, age, work experience, gender and other personal information were gathered. For production-related assets on the farms, data were collected on the total available land and its designation for crops, livestock and other uses, the legal status of landholding (own, with title, without title, with land-use rights), production and social linkages, access to credit and production-related technical assistance.

With these data, it is possible to estimate the direct effect that the participation of small farm producers from Caazapá in the Frutika global production chain has on the well-being of these producers' families. To this end, several linear econometric models were developed that correlate family well-being, as a dependent variable represented by per capita family income, and participation in the Frutika chain, as an independent variable, controlling those variables that show greater correlation with income, specifically those related to variables of human capital and production assets that the household possesses or has access to.

Formally, the general model, estimated using the ordinary least squares method, is as follows:

$$Y = f(X * \beta + \mu) \quad (1)$$

where:

Y represents the logarithmic vector of per capita family income; X represents the matrix of independent and control variables for income, with  $X_1$  specifically representing a dummy variable for the participation of the farmers in the Frutika value chain, in which the variations corresponded to the Frutika crops. In model 1, participation in the value chain is linked to the cultivation of three crops: passion fruit, grapefruit or oranges; in model 2, it is associated with the cultivation of passion fruit and grapefruit; and in model 3, with the cultivation of passion fruit.  $X_2$  to  $X_n$  are the control variables associated with human capital and production assets.  $\beta$  is the vector of marginal effects or the direct effect of the independent and control variables on Y, and  $\mu$  is the vector of errors.

In order to minimize specification biases and isolate the direct effect of the producers' participation in the value chain, control variables were established for access to or possession of productive or physical assets on the farm: the total availability of land, the amount of land used for crops and livestock, the tenure and number of owned lots, the amount of available labour, the members of the farm who are wage earners and who are engaged in agricultural activities, access to credit, the amount of credit and agricultural diversification, in terms of the number of crops grown in the previous crop year.

<sup>7</sup> See annex 2.

<sup>8</sup> By multiplying the quantity of the product destined for own consumption by the price of the same product in the marketplace (price reported by the producers surveyed).

Because investment in personal assets by members of the farm can influence the farm's productivity and thus the generation of family income, variables were included such as the number of people on the farm or in the household, the education and age of the head of household and the average education of the members of the household.

## **B. Brief description of the producers and farms**

The producers who participate in the Frutika value chain (passion fruit, grapefruit and/or orange growers) and those who do not participate in the chain have similar demographic and human capital characteristics. In terms of the amount of available land, the producers linked to Frutika have more hectares in crop and livestock production and have more diversified output than producers not linked to the agribusiness chain. There are no differences between the two groups in terms of ease of access to credit. The distribution of income by source is the same for both groups of producers, although per capita income levels are higher in the case of the producers linked to Frutika.

### **1. Demographic characteristics**

Household size, based on the number of members or residents on the farm, is similar in both groups. There are approximately five people per farm, with the number ranging from 1 to 14 people for the group linked to Frutika and from 1 to 12 people for the unlinked group. Both groups have an average of three people as available family labour, defined as the number of people 15 years and older (see annex 3). However, the number of family labourers working as wage earners or employees is higher in the group of producers linked to Frutika (17%, compared with 9.4%).

### **2. Human capital**

The average age of the heads of farms in both groups is between 45 and 47 years, with 24 years of work experience in their principal occupation. In general, primary school is the highest level completed by most of the heads of farms, i.e. most have between six and seven years of education. However, the households linked to Frutika have more years of education, both on average and in terms of the highest education completed by a member of the household.

### **3. Land availability and use**

The amount of available land is the sum of owned lots, owned lots leased to third parties, lots leased from others, borrowed lots and municipal lots. A total of 80% of the Frutika producers and 95% of the producers not linked to the Frutika chain have up to 20 hectares of land, with an average of 14 and 10 hectares of land available, respectively. The Frutika producers have, on average, more hectares in agricultural production (6.3 hectares) than the producers not participating in the chain (5.5 hectares).

### **4. Crops**

Although a variety of crops are grown by the producers, the most common ones are cotton, cassava, beans, maize, soybeans, sugar cane and maté, which are both for sale and for own consumption. In addition, there are non-traditional crops: passion fruit and grapefruit in the case of the producers in the Frutika chain. For the amount of available land, these producers have more diversified production.

### **5. Financial resources**

Nearly all members of the cooperative have had access to credit: 99% of the producers not linked to Frutika and 97% of the producers linked to the chain. Most loans (70%) are for between 1 million and 3 million guaraníes for both groups.



## 6. Income

Family income and per capita income incorporate income from non agricultural dependent and independent employment and non employment income related to remittances or transfers. Also considered are income from the sale of farm products, income from own consumption (farm products and by-products or processed products), income from the sale of animals, the sale of animal by-products and processed products, and income from commercial activities and the sale or leasing of lots.

The average income of the producers participating in the chain is about 22.4 million guaraníes per year and the average income of the producers not participating in the chain is about 13.4 million guaraníes per year (see annex 4). Analogously, the average annual per capita income of the Frutika producers is 5.4 million guaraníes, compared with 3.3 million guaraníes for the producers not linked to Frutika. Most of the producers not participating in the Frutika chain have annual per capita income somewhere between 1 million and 5 million guaraníes, whereas for the Frutika producers, the upper limit of the range is higher, at 10 million guaraníes.

The two groups of producers are quite comparable inasmuch as their income distribution by source is nearly identical. The sale of agricultural products provides the main source of income for both groups, representing an average of 35% of their total average income, or 5.4 million guaraníes. The second largest source is income from non farm employment and non employment income such as family assistance, remittances, transfers etc., which accounts for up to 25% of their total income (see table 1). The sale of animal by products, own consumption of farm products and income from the sale of animals represent approximately another 30% of income.

**TABLE III.1**  
**DISTRIBUTION OF TOTAL FAMILY INCOME OF PRODUCERS**  
**IN THE CAPIBARY COOPERATIVE**  
*(Millions of guaraníes)*

Description of variable	Non-participants		Participants		Group total	
	Annual average	%	Annual average	%	Annual average	%
Income from personal sources, employment and non-employment	2.83	21	5.63	25	3.45	22
Income from sale of crop products	4.67	35	7.97	36	5.40	35
Income from own consumption of crop products	1.46	11	2.65	12	1.73	11
Income from sale of animals	1.0	7	2.28	10	1.29	8
Income from own consumption of animal by-products or processed products	0.60	5	1.28	6	0.76	5
Income from sale of animal by-products or processed products	2.41	18	2.33	10	2.39	15
Income from commercial activities	0.21	2	0.21	1	0.21	1
Income from sale and/or leasing of lots	0.25	2	0.051	0	0.21	1
Total family income	13.43	100	22.42	100	15.44	100

Source: Censo a Pequeños Productores Agrícolas de Caazapá, 2009.

In terms of the composition of agricultural income, both groups of producers are observed to grow, on average, the same crops for sale (excluding passion fruit, grapefruit and oranges) and for own consumption, although the producers linked to Frutika have higher annual per capita income (5.4 million guaraníes compared with 4.6 million guaraníes) (see table 2). If income from the sale of passion fruit and grapefruit is considered, the gap in annual income between the two groups is even larger, in favour of the Frutika producers.

**TABLE III.2**  
**DISTRIBUTION OF AGRICULTURAL INCOME OF PRODUCERS**  
**IN THE CAPI'IBARY COOPERATIVE**  
*(Millions of guaraníes, per capita and percentage)*

Type of income	Non-participants		Participants		Total	
	Annual average	%	Annual average	%	Annual average	%
Income from passion fruit and grapefruit, related to Frutika	0	0	2.57	32.2	0.58	10.7
Income from other products	4.66	100	5.40	68.0	4.83	89.4
Total crop-related income (from the sale of crop products)	4.66	100	7.97	100	5.40	100

Source: Censo de Pequeños Productores Agrícolas de Caazapá, 2009.

## C. Poverty levels and effects of value chain participation on income

In order to understand the effects of participation by the producers from the Capi'ibary Cooperative in the Frutika juice value chain as well as other effects on these producers' income levels, the producers were first placed in different income groups around the national and regional poverty line. In addition, conclusions were drawn regarding the behaviour of poverty at the regional level and at the level of the producers themselves, regardless of whether they were linked to the Frutika chain.

A high poverty rate (70%) was found for the producers surveyed from the Capi'ibary Cooperative, regardless of whether they were linked to Frutika. The high rate of extreme poverty in the countryside explains the large percentage of poor among the surveyed producers.

A closer look at the poverty measure points to the conclusion that the poverty incidence, intensity (or gap) and severity rates are lower among the Frutika producers than among the producers not linked to the agribusiness company. This observation might be an indication that Frutika is making a significant contribution to poverty reduction among the producers.

### 1. Poverty by geographical area and region

Using data from the 2008 Household Survey, the country's total and extreme poverty rates were studied by geographical area (urban/rural) and by region. In this study, the average annual per capita income equivalent for the total poverty line<sup>9</sup> was determined to be 4.4 million guaraníes, and the corresponding equivalent for the extreme poverty line was determined to be 2.7 million guaraníes.<sup>10</sup> In rural areas, the annual per capita income equivalent for the total poverty line is 3.5 million guaraníes and the income equivalent for the extreme poverty line is 2.4 million guaraníes.

Still at the level of the country and its geographical areas, in 2008, 48.8% of rural dwellers and 31.8% of urban dwellers were living below the poverty line (see table 3). Of the rural poor, 30.8%

<sup>9</sup> The extreme poverty line is the cost of the basic food basket, which is a bundle of products that cover the minimum nutritional needs of the population. The total poverty line reflects the cost of the extreme poverty line plus an additional cost for non-food consumption (clothing, housing etc.). Its composition, in addition to meeting the aforesaid needs, should reflect the prevailing food habits and preferences in the country, along with the supply of food products and relative prices (Robles, 2000).

<sup>10</sup> In the case of the total and extreme poverty lines for the country, the per capita income value that was used is a benchmark average calculated based on the value of the poverty lines constructed at the level of domain (geographical areas).

were extremely poor, compared with just 11.2% of their urban counterparts. It is important to note that half of Paraguay's poor are living in extreme poverty.

**TABLE III.3**  
**PARAGUAY: POVERTY RATE BY AREA OF RESIDENCE**  
(Percentage)

Area	Extreme poverty	Non-extreme poverty	Total poverty	Non-poor
Urban	11.2	20.6	31.8	68.2
Rural	30.8	17.9	48.8	51.2
Total	19.4	19.5	38.8	61.2

Source: Government of Paraguay, Directorate of Statistics, Surveys and Censuses, Household Survey, 2008.

In 2008, the poverty rate in the region of Caazapá, where the cooperative's producers reside, was slightly above the national average (41.8%), and the region's extreme poverty rate was somewhat higher (25%) than the national average. That same year, rural poverty stood at 46% and urban poverty at 23% in Caazapá. Meanwhile, 28.7% of rural dwellers were living in extreme poverty.

The poverty rate in the region of Caazapá, where the cooperative's producers reside, is slightly above the national average (41.8%) but below the rate in other regions such as San Pedro (53.9%), Canindeyú (53.7%), Caaguazú (52%), Itapúa (47.8%) and Misiones (46.1%) (see table 4). The region's extreme poverty rate is somewhat higher (25%) than the national average, although not as high as in Canindeyú (41.7%), San Pedro (35%), Caaguazú (33%) and Concepción (30%).

**TABLE III.4**  
**PARAGUAY: POVERTY RATE BY REGION**

Region	Extreme poverty (Percentage)	Non-extreme poverty (Percentage)	Poor (Percentage)	Population	Population density
Asunción	7.1	15.8	22.9	518 945	8.4
Concepción	30.0	12.3	42.4	207 201	3.4
San Pedro	35.1	18.8	53.9	353 064	5.7
Cordillera	17.2	20.3	37.5	284 256	4.6
Guairá	18.4	18.7	37.1	213 635	3.5
Caaguazú	33.3	18.8	52.0	476 225	7.7
Caazapá	25.0	16.9	41.8	138 365	2.2
Itapúa	28.3	19.5	47.8	523 161	8.5
Misiones	27.1	19.0	46.1	120 848	2.0
Paraguarí	22.0	18.4	40.4	245 097	4.0
Alto Paraná	16.2	13.0	29.1	720 293	11.7
Central	11.6	25.7	37.3	1 929 834	31.3
Ñeembucú	23.2	18.2	41.4	80 130	1.3
Amambay	12.8	17.2	30.0	98 569	1.6
Canindeyú	41.7	12.0	53.7	168 325	2.7
Presidente Hayes	13.9	6.3	20.3	85 965	1.4
Total	19.4	19.5	38.8	6 163 913	100.0

Source: Government of Paraguay, Directorate of Statistics, Surveys and Censuses, Household Survey, 2008.

It is equally important to mention that Paraguay's population is distributed more or less homogeneously among the regions and that concentrations of population occur in regions with poverty rates that are less than or equal to the national poverty rate. Therefore, although Caazapá's poverty

rate is higher than the national average, it refers to less than one half of 2% of the country's total population.

In 2008, rural poverty stood at 46% in Caazapá, which was very near the national average (see table 5). Urban poverty was 23%, below the national average. The extreme poverty rate in Caazapá was 28.7% among rural dwellers (near the national average) and 9.3% among urban dwellers (also near the national average).

**TABLE III.5**  
**CAAZAPÁ: POVERTY RATE BY AREA OF RESIDENCE**  
(Percentage)

	Non-poor	Poor
Urban	76.7	23.3
Rural	53.7	46.3
Total	58.2	41.8

Source: Government of Paraguay, Directorate of Statistics, Surveys and Censuses, Household Survey, 2008.

Note: Benchmark data, not a representative sample.

## 2. Poverty status of producers in the cooperative

Using data obtained from the survey of producers in the Capi'ibary Cooperative, it was observed that the producers not participating in the Frutika production chain have average annual per capita income equal to 3.3 million guaraníes, which is below the annual per capita income equivalent for the national poverty line (4.4 million guaraníes)<sup>11</sup> (see table 6) and even below the annual per capita income equivalent for the rural poverty line (3.5 million guaraníes). In contrast, average annual per capita income among the producers participating in the Frutika chain is equal to 5.4 million guaraníes, which is above the total poverty line for the country and the rural poverty line in particular.

**TABLE III.6**  
**AVERAGE PER CAPITA INCOME BY POVERTY STATUS AND VALUE CHAIN PARTICIPATION**  
(Millions of guaraníes per year)

	Non-poor	Poor	Total
Non-participants	9.61	1.22	3.38
Participants	10.37	1.61	5.40
Total	9.86	1.29	3.83

Source: Censo a Pequeños Productores Agrícolas de Caazapá, 2009.

Based on the rural poverty lines and corresponding annual per capita income equivalents that were calculated for this study, the percentage of producers living below and above this poverty line could be determined.<sup>12</sup> In the case of the producers participating in the production chain, 56.8% were

<sup>11</sup> Benchmark value in the case of the national poverty line (not calculated using official statistics).

<sup>12</sup> Method used to obtain the poverty rate of the surveyed producers: The questionnaire design and construction of the income levels of the producers made it possible to compare producer income against the official rural poverty line to obtain the poverty levels and indicators for the study group. The questionnaire administered to the producers in Caazapá was modelled after the questionnaire used by the Directorate of Statistics, Surveys and Censuses for its household surveys. As in those surveys, there were sections that gathered information on different sources of income, a section on employment among the members of the farm or household and other sections or questions at the farm level on income from crop and livestock activities, commercial activities and income from own consumption of farm products.

found to live below the poverty line, compared with 74% of the producers not linked to the chain. For all producers combined, the average poverty rate was 70%, which was significantly high (table 7).

Another way of measuring the poverty of these producers is through what is known as the poverty intensity or poverty gap: the difference between the average income level of the poor and the poverty line. The producers not linked to Frutika were found to have average incomes that were 48% lower than the income level equivalent to the poverty line, whereas the incomes of the producers linked to Frutika were just 31% lower. In other words, the Frutika producers are closer to rising above the poverty line than their non-Frutika counterparts. Lastly, the poverty severity indicator measures the degree of distribution of the poor across population segments, i.e. the level of concentration of the poor in these segments. In the case of the producers in Caazapá, poverty levels were found to be more concentrated among the producers not linked to Frutika.

**TABLE III.7**  
**POVERTY INDICATORS OF AGRICULTURAL PRODUCERS BY PARTICIPATION**  
**IN THE JUICE VALUE CHAIN**  
(Percentage)

	Total number of producers	Incidence of poverty			Non-poverty	Poverty gap <sup>a</sup>	Poverty severity <sup>b</sup>
		Extreme poverty	Non-extreme poverty	Total poverty			
Non-participants	330	64.85	9.39	74.24	25.76	48.0	36.0
Participants	95	43.16	13.68	56.84	43.16	31.0	20.0
Total	425	60.00	10.35	70.35	29.65	44.0	33.0

Source: Censo a Pequeños Productores Agrícolas de Caazapá, 2009.

<sup>a</sup> The poverty gap is the monetary difference between the poverty line and per capita income, i.e. the per capita monetary amount that the poor need to reach the poverty line. In this case, the producers classified as poor need 2,220,000 guaraníes to make up the difference. Those not participating in the chain need 2,290,000 guaraníes, and those participating in the chain need 1,890,000 guaraníes.

<sup>b</sup> Poverty severity measures the degree of distribution of the poor across population segments.

## D. Direct effects on income and poverty

Following the analysis of poverty levels among the producers in the cooperative, the findings of the quantitative component are presented. This component estimates the direct effect that participation by the small farmers in the value chain has on income. The analytical method proposed at the beginning of this chapter is used, with the data considered as a representative sample of the producers.

The results show that the income levels of the producers in the Capi'ibary Cooperative are positively and significantly associated with the amount of available land, the amount of land in agricultural production, the number of crops grown (only in model 1), the amount of land in livestock production, the number of people in the household who are wage earners or employees, and the level of access to financial resources and participation in the Frutika chain through cultivation of passion fruit and grapefruit (see table 8, models 3 and 4).

**TABLE III.8**  
**ESTIMATE OF THE DIRECT EFFECT OF PARTICIPATION IN THE JUICE EXPORT CHAIN**

Dependent variable: lyfper (Ln per capita family income)								
Independent control variables (IV)	Model 1		Model 2		Model 3		Model 4	
Household and human capital characteristics								
Total number of household members	-0.152	***	-0.151	***	-0.149	***	-0.149	***
Average years of education of head of household	-0.013		-0.014		-0.013		-0.011	
Age of head of household	-0.005		-0.005		-0.005		-0.005	
Average years of education of the household members	0.051		0.049		0.047		0.045	
Productive assets: land and family labour								
Natural logarithm of the amount of available land	0.342	**	0.341	**	0.359	***	0.350	**
Amount of land available for crops (hectares)	0.05	***	0.051	***	0.052	***	0.052	***
Number of crops grown in the previous crop year	0.066	**	0.042		0.043		0.029	
Number of owned lots (hectares)	-0.013		-0.013		-0.013		-0.012	
Amount of land for livestock or pasture (hectares)	0.039	**	0.034	*	0.033	*	0.032	*
Availability of labour <sup>a</sup>	0.013		0.013		0.014		0.012	
Number of persons dependently employed	0.661	***	0.65	***	0.646	***	0.629	***
Number of persons engaged in agricultural activities	-0.057		-0.058		-0.061		-0.059	
Access to financial resources								
Range of loan amounts	0.107	**	0.106	**	0.106	**	0.109	***
Participation in the chain (IV)								
Frutika 1: passion fruit, grapefruit or oranges			0.186					
Frutika 2: passion fruit and grapefruit					0.270	*		
Frutika 3: passion fruit							0.434	***
_cons	13 778	***	13.86	***	13 820	***	13 860	***
Number of observations	403		403		403		403	
	F (13.389)=18.07		F (14.388)=16.89		F (14.388)=16.89		F (14.388)=17.46	
	Prob > F=0.000		Prob > F=0.000		Prob > F= 0.0000		Prob > F=0.000	
	R-squared =0.3741		R-squared =0.3771		R-squared =0.3795		R-squared=0.3862	

Source: Censo a Pequeños Productores Agrícolas de Caazapá, 2009.

Note: \*\*\* = significance 1%; \*\* = significance 5%; \* = significance 10%.

<sup>a</sup> Total number of household members 15 years or older.

By analysing the coefficients, the independent effects of each determining variable of per capita income can be observed. In general, a 1% increase in the amount of available land raises per capita income by only 0.34%. One additional hectare of land in crop production means a 5% increase in per capita income. One additional crop has a similar effect on income (6%) but is insignificant when producer participation in the juice chain is considered. One additional hectare of land for livestock production boosts per capita income by 3%. Increasing the total number of wage earners in

the family by one person is associated with a significant increase—over 60%—in per capita income. In terms of financial resources, for every additional 2 million guaraníes in credit, per capita income rises by 10%.

Lastly, when the three crops (passion fruit, grapefruit and oranges) with which the producers can participate in the Frutika chain are considered, a positive but insignificant effect is observed on per capita income (model 2). However, the results improve in the subsequent models when oranges and then grapefruit are excluded, because these crops were not at peak productivity when the producer survey was administered. Consequently, income from passion fruit represented a larger share of the farm-related income of the producers linked to Frutika when the data were collected. When the producers are participating in the juice chain with passion fruit and grapefruit (model 3) or with passion fruit only (model 4), the positive effect of their participation is significant, with an increase in per capita income of 27% in model 3 (sig=10%) and of 43% in model 4 (sig=1%). In short, participation in the Frutika chain has a significant positive effect on producer income, above all when the producers are participating with passion fruit.

The large effect of wage-earning labour on the income levels of the Capi'ibary producer farms suggests that family agriculture in this zone is not the main lever of poverty reduction and would therefore not necessarily become a source of income gains for the producers. However, the presence of the Frutika production chain contributes an interesting percentage to the income that campesino families earn from cash crops. Moreover, the magnitude of the effect of wage-earning family members on farm income levels could shrink over time as the grapefruit and orange crops reach their maximum productivity and require more labour, in which case family members might be the first to be recruited.

Model 4 predicts (see table 9) average annual per capita income of 2.8 million guaraníes for the producers linked to Frutika and 1.9 million guaraníes for the producers not linked to Frutika. Both levels are below the rural poverty line, with a poverty gap of 20% for the Frutika producers and of 47% for the producers not participating in the chain. These percentages are equivalent to the income that each group would need to earn in order to reach or surpass the rural poverty line.

**TABLE III.9**  
**INCOME LEVEL ESTIMATES AND RURAL POVERTY LINE SCENARIOS FOR PRODUCERS**  
**IN THE CAPI'IBARY COOPERATIVE**

	Per capita income (Millions of guaraníes per year)		Per capita income gap (%)	
	Participants	Non-participants	Participants	Non-participants
Overall average	2.8	1.9	20	47
Scenario 1	2.5	1.6	29	54
Scenario 2	2.9	1.9	18	46
Scenario 3	4.6	3.2	-33	8
Scenario 4	5.4	3.6	-54	-3
Rural poverty line (guaraníes per year)				3 503 372

Source: Censo a Pequeños Productores Agrícolas de Caazapá, 2009.

Note: Exercise performed using the model 4 coefficients.

In order to analyse the weight of the variables on the capacity and potential for reducing poverty gaps among the producers in the cooperative, scenarios have been constructed to approximate the different combinations of factors having greater or lesser possibilities of reducing and even overcoming poverty. The various scenarios make it possible to estimate different per capita income levels, which —when compared with the rural poverty line— reveal variations in the poverty gaps.

In the first scenario, the farms are assumed to have no wage-earning members, five hectares of crop land and four crops. With these characteristics, the poverty gap observed for the producers participating in the chain is 29%, whereas the gap for the producers not linked to the chain is 54%.

In the second scenario, the same conditions as in the first scenario are maintained, but, in addition, the households are assumed to have an average of seven years of education and access to between 3 million and 5 million guaraníes in credit. For this scenario, the poverty gap falls to 18% for the producers in the chain and to 46% for the producers not linked to the chain. This is a significant reduction that is most likely explained by ease of access to credit, due to the specific weight of that variable, already observed, as an income determinant.

The third scenario was constructed with the same conditions as the first scenario, with the addition of one wage-earning member. In this case, a substantial variation is observed in the poverty reduction effect, with the income levels of the Frutika producers surpassing the poverty line by 33%; and although the producers not linked to Frutika remain below the poverty line, they would only need an additional 8% of income to rise above the line.

In the fourth scenario, the farms also have wage-earning members, as well as the full complement of the other variables mentioned in the second scenario. In this case, the income levels of the Frutika producers easily surpass the poverty line (54%); the income levels of their non Frutika counterparts are also above the poverty line, though only by 3%.

In terms of increasing income and reducing the poverty gap, belonging or being linked to the Frutika production chain is a significant determinant for family agriculture in the Capi'ibary Cooperative. The assertion could be made that participation in the chain is a condition for reducing poverty levels, although not for rising above the poverty line.

Furthermore, the existence of a wage earner among the family members on the farms is a key factor in substantially raising income levels and rising above the poverty line, mainly in the case of the Frutika producers. The income brought in by these wage earners may come from agricultural activities or services but is earned off the farm.

If participation in the Frutika chain is understood to largely explain the increase in income, it could be assumed that this increase would enable the Frutika farms to hire more agricultural and non-agricultural paid labour. In this case, participation in the Frutika chain could be having an indirect effect through the hiring of paid labour, which has a high relative weight in terms of enabling rural families to increase their income and eventually rise out of poverty.

## **E. Effects of spending and creation of growth linkages**

In accordance with the aforementioned literature on the participation of small agricultural producers in production chains, the effects consist not only of the direct effects resulting from income gains, but also of what are known as linkage effects. These are the effects linking agricultural growth to the factor market, production and consumption. Each of these linkages generates, respectively, greater demand for labour in agricultural and rural non-agricultural activities (primarily), greater development of activities related to the supply of inputs and increases in family spending on goods and services.

This section will attempt to demonstrate the consumption patterns of the small producers involved in the Frutika chain and their counterparts who are not involved in the chain. An attempt will also be made to demonstrate the relative extent to which these consumption patterns promote the creation of linkages at the local rural level, i.e. the relative likelihood of these patterns to generate labour intensive goods and services and, consequently, income gains in the community.

First, the family spending structure of the producers participating and not participating in the chain is presented, by type of rural linkage.



Total annual family spending among the farmers surveyed consists of production spending and consumer spending on goods and services. Production spending includes spending on farm labour, spending on inputs for crops and livestock, as well as the purchase of equipment, machinery and implements for crops and livestock production and other expenses. Consumer spending on goods and services includes spending on food, non food items and services. Spending on non food items includes household items, clothing, school supplies and other expenses (home maintenance and health-care goods). Spending on services includes education, health care, entertainment, transportation, fuel and communications.

Table 10 shows the family spending structure of the producers in the Capi'ibary Cooperative. Of total family spending, 60.9% corresponds to consumer spending on goods and services and 38.8% is production spending. The concentration of spending on the consumption of goods and services is primarily explained by spending on food (43.1%), which is consistent with a typical family spending structure in the country.<sup>13</sup> It is important to note that the production spending percentage is not small, especially in terms of spending on agricultural inputs (24%). However, spending on these types of products does not necessarily generate new or higher income for rural communities,<sup>14</sup> unlike spending on agricultural labour (11%).

**TABLE III.10**  
**DISTRIBUTION OF TOTAL FAMILY SPENDING AMONG PRODUCERS**  
**IN THE CAPI'IBARY COOPERATIVE**  
(Percentage)

Type of spending/linkage	Non-participants	Participants	Total
A. Production spending	38.1	40.5	38.8
a. Agricultural labour	11.4	11.9	11.5
b. Inputs for crops and livestock	24.3	24.7	24.4
c. Other production expenses	2.4	4.0	2.8
B. Consumer spending on goods and services	61.5	59.3	60.9
a. Food	43.9	41.3	43.2
b. Non-food items	12.9	12.9	12.9
c. Services (non-agricultural)	4.7	5.1	4.8
C. Total	100.0	100.0	100.0
Average total family spending (thousands of 2008 guaraníes)	9 485	12 812	10 229

Source: Censo a Pequeños Productores Agrícolas de Caazapá, 2009.

It is important to note that between the two types of spending (production spending and consumer spending on goods and services), the two categories that generate the linkages with the most intensive use of labour are agricultural labour (production spending) and education, health-care, transportation and communications services (non-agricultural labour). Consumer spending on food and non food items also creates employment but to a lesser extent because it is limited to the area of sales and marketing.

However, the categories that generate the most employment in the spending structure of producers participating and producers not participating in the production chain account on average for only 16.3% of total spending, with agricultural labour being the larger spending category (11.5%). In other words, the indirect effect of these spending categories with higher employment generation rates has a smaller relative weight than the categories with lower employment generation rates. To put it another way, the income levels of both types of producers do not have much weight in terms of the (indirect)

<sup>13</sup> In Paraguay, 40% of family spending nationwide and 54.2% of family spending in rural areas is on food (DGEEC, 2000).

<sup>14</sup> Medium-sized sellers are generally from middle-income groups and do not necessarily live in the area of production.

generation of income in the rural communities where they operate. Nevertheless, considering only the spending categories that create agricultural and non-agricultural labour, it is the Frutika producers who have greater purchasing power to hire these two types of labour. Therefore, these are the producers who could potentially become indirect promoters of poverty reduction, when further consolidation of the production and marketing chain translates into higher income levels for them.

In addition, these findings are substantiated by an exercise to estimate spending elasticities and determine the sensitivity of the linkages to changes in income levels among the small agricultural producers. This exercise attempts to demonstrate how spending on labour-intensive goods and services is affected by income fluctuations in the two groups of small producers.

Table 11 presents the estimates of spending elasticities to changes in income. In general, production spending and spending on services are highly elastic. In terms of elasticities by participation in the chain, spending on labour and on services is more elastic among the producers linked to Frutika than among the group of producers not linked to the chain. By contrast, spending on crop and livestock inputs is more elastic among the producers not linked to Frutika than among the producers linked to Frutika.

**TABLE III.11**  
**ESTIMATE OF INCOME ELASTICITY FOR SPENDING CATEGORIES AMONG PRODUCERS**  
**IN THE CAPI'IBARY COOPERATIVE**

Type of spending/linkage	Non-participants	Participants	Total producers
A. Production spending	1.71	1.20	1.50
a. Agricultural labour	1.62	1.75	1.66
b. Inputs for crops and livestock	1.23	1.02	1.11
B. Consumer spending on goods and services	0.54	0.86	0.66
a. Food	0.41	0.69	0.54
b. Non-food items	0.92	0.83	0.84
c. Services <sup>a</sup>	0.71	2.27	1.27

Source: "Censo a Pequeños Productores Agrícolas de Caazapá", 2009.

Note: A variable is said to be inelastic at zero, as unitary when it is at one, and as elastic when it is greater than one.

<sup>a</sup> Includes spending on education, health care, entertainment, transportation, fuel and communications.

By analysing the income elasticities for the spending categories with the highest employment generation rates, it can be observed that for both types of producers, income gains have a very strong effect on spending on agricultural labour, and the effect is strongest for the group of producers linked to Frutika. The elasticities are likewise very positive in the case of non-agricultural labour (services) but only for the producers participating in the chain.

This exercise also shows that the elasticities are large in the case of spending on production inputs and spending on non-food items, although not as large as in the case of spending on labour.

This elasticity exercise demonstrates that in the event of a possible increase in income among the small producers in the Capi'ibary Cooperative, the effect on spending will be greater in those categories that are more labour-intensive, and that the effect produced in this regard will be stronger in the case of income gains among the small producers participating in the Frutika chain.

This conclusion confirms the earlier results obtained from studying the participation and distribution of family spending among the Capi'ibary Cooperative producers and by comparing the amounts of money used by each group of producers (participants and non-participants in the chain). In other words, it is the Frutika producers, as opposed to the other producers, who are potentially positioned to trigger or generate more employment and thus contribute to rural poverty reduction.

## IV. Conclusions and recommendations

The most resounding finding yielded by the study of this group of small producers (linked and unlinked) is that 70% of them were living below the poverty line at the time of the survey (2009), with a larger number of poor families concentrated among the producers who were not linked to the Frutika chain. The fact that there were fewer poor families among the producers linked to Frutika may point to the favourable effects of having initiated fruit cultivation at an early point in time, and thus of the income earned from that production. However, the phenomenon could also be interpreted to indicate that the cooperative may have selected producers for the fruit supply chain whose families were in a better economic position.

The model used to measure the effects on income in the two groups indicates that participation in the fruit chain must have a very significant specific weight given the fact that both the gap and severity of poverty are less among the linked producers than among their unlinked counterparts. In other words, based on the findings with respect to income levels for the two groups, poverty levels fall by much larger margins for the group of producers participating in the fruit chain than for the group of non participating producers. That is the second main conclusion: participation in the fruit chain is an important factor in reducing poverty levels.

However, participation in the chain and the income generated as a result (which is added to the income generated by other cash crops grown by these producers) are not sufficient on their own for poor families, which include a percentage of these producers, to rise above the poverty line or, otherwise said, to escape from poverty. That is only possible if, additionally, one or more members of the family are employed as agricultural or non-agricultural wage earners.

In any case, it has also been possible to confirm that income generated through participation in the fruit chain has rural growth linkage effects, i.e. the income is spent to hire agricultural and non agricultural labour in the community. Although this spending is observed for both groups of producers, spending levels are higher in the case of the linked producers.

The percentage of this spending in relation to other production and consumption spending is relatively large. However, a potential significant increase in the income levels of the fruit producers has a very strong impact on spending categories that make intensive use of labour in the community. Accordingly, the indirect or linkage effects of the production chain become complementary forces for reducing household poverty levels in the community of producers.

In conclusion, the following assertions can be made: the percentage of poor among the producers in the fruit chain is smaller than among the other producers; the income generated by the

linked producers allows for a steeper reduction in poverty levels than in the case of the unlinked producers; and spending trends among the linked producers suggest that they have greater potential to contribute indirectly to reducing poverty levels in the rural community by hiring labour.

Among the factors that drove the success of this public-private project, none originated in the public sector, despite the project's explicit focus on strengthening public institutions and despite the relationship between these institutions and the private actors, such as Frutika and the cooperative. Both the Ministry of Agriculture and the local government have been scarcely more than mere spectators in this process. Moreover, in areas where the Ministry of Agriculture has had a direct presence through its agriculture extension service (in the case of oranges), without the involvement of a cooperative, the value chains did not prosper as they did in the case of the passion fruit and grapefruit growers.

For a decade, proposals have been presented in the country to establish agribusiness value chains (mainly for the foreign market) as an engine of competitiveness. These production chains, as defined, were oriented toward traditional and non-traditional crops, as well as large-scale agriculture and family agriculture.<sup>15</sup>

Several public-sector initiatives were translated into programmes and projects that attempted to advance the implementation of these production chains, using new and existing instruments. However, the efforts of the government's line ministries (Industry, Agriculture, and Planning) have never been coordinated to establish plans, prioritize sectors and pursue tasks to effectively establish these chains. Nevertheless, international cooperation projects in this area have been implemented, although with uneven results and uneven support capacity by the public sector.

Private initiatives and the market have primarily been responsible for driving the creation of competitive production chains, with the participation of medium-sized producers, but increasingly with family farms or small scale producers.<sup>16</sup>

State involvement in supporting, guiding and forming production chains is important for three basic reasons. First, these production chains should be part of governmental programmes aimed at promoting inclusive economic growth, i.e. growth coupled with job creation and poverty reduction. Second, it is up to the State to establish guidelines for the formation of these chains and corresponding incentives based on the development priorities, in order to facilitate and steer private investment towards the sectors and regions with the greatest potential for success. Third, although market impetus is important for investments, there are market failures that should be addressed by the State.

Clearly, a deeper industrialization process is a fundamental condition for inclusive growth in Paraguay, but this process must be primarily based on agriculture. There are three reasons for this. First, Paraguay's identified comparative advantages lie in agribusiness. Second, a large percentage of the population still lives in the countryside, where poverty levels are higher. Third and last, agribusiness is the country's largest job engine, particularly when based on production chains.

Enhancing the performance of the government institutions involved in boosting competitiveness remains an important objective for the consideration of public policies. It is very unlikely that value chains that incorporate family farms can be created on a large scale without the active participation of public institutions.

This study has proposed a theoretical framework for evaluating the extent to which value chain formation in the agriculture sector has a pro-poor effect. Evidence was found linking the participation of small farmers in the juice export chain with lower levels of poverty and higher levels of spending on labour. The study also suggests that the way in which farmers organize is a key

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<sup>15</sup> The most complete study on competitiveness in Paraguay was carried out with support from the Japan International Cooperation Agency ("Estudio sobre el desarrollo económico de la República del Paraguay"). The study identified six production chains: (i) soybean-oil-feed; (ii) beef and beef processing; (iii) cotton-textiles; (iv) leather and leather goods; (v) lumber and lumber products; and (vi) metalworking.

<sup>16</sup> The dairy chain and the pork chain established by medium-sized producers or family farms; the fruit and juice, organic sugar, stevia, medicinal herbs, cassava-starch chains, with high levels of participation from family farms.

variable in determining whether they have the capacity to carry out the investments and cooperation needed to form an export chain. Because pro-poor trade depends on the direct participation of small farmers as suppliers in a global value chain, capturing trade gains (in countries like Paraguay) requires a major investment in the types of organization that bring together small farmers, so these organizations can effectively represent the farmers' interests and so they have the capacity to forge production-based partnerships with agribusiness export firms and the government.



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## **Annexes**

## Annex 1

### Census coverage and representativeness of the respondents

The census conducted in October and November 2009 of the producers in the Capi'ibary Cooperative had a total coverage rate of 77.7% (446 of a universe of 574 producers were surveyed), a coverage rate of 73.2% for the group of producers not linked to the Frutika chain and a coverage rate of 100% for the group of producers linked to Frutika. For reasons related primarily to adverse weather conditions, data could not be collected from all of the producers not linked to Frutika.

However, since data were collected from 446 producers, a decision was made to conduct the analysis of the quantitative component based on a total of 425 producers, a number equivalent to 95% of the survey respondents and 74% of the universe of producers, ensuring the representativeness of the respondents (the sample) with respect to the universe. In all, 21 cases were excluded because either the respondents were not engaged in agricultural activities during the census period (8 cases) or the producers were atypical in size, in terms of the amount of available land, for the purposes of this study (12 cases). In addition, an analysis was done of the mean differences in the amount of available land of the producers in the sample and in the universe, and it was concluded with a significance level of 5% that the producers surveyed and screened for the quantitative analysis are representative of the universe of producers. This can be observed in the following results of the test of mean differences:

**TABLE A1.1**  
**TEST OF MEAN DIFFERENCES IN THE AMOUNT OF AVAILABLE LAND (HECTARES)**  
**BETWEEN THE UNIVERSE OF PRODUCERS IN THE CAPI'IBARY COOPERATIVE**  
**AND THE RESPONDENTS**

Group of producers	Number of observations	Average hectares of available land	Confidence intervals (95%)	
Universe	553	10.75949	10.31823	11.20076
Respondents	425	11.14353	10.39771	11.88935
Total	978	10.92638	10.51798	11.33478
Mean difference		-0.3840357	-1.208	0.4399285
Null hypothesis: mean difference = 0				
Alternate hypothesis: mean difference $\neq$ 0				
Result of the test of mean differences: $\Pr( T  >  t ) = 0.3606$				

Source: Prepared by the authors using data provided by the Capi'ibary Cooperative and "Censo a Pequeños Productores Agrícolas de Caazapá", 2009.

With a significance level of 5%, the null hypothesis that the average hectares of available land for the universe and for the respondents are equal is not rejected, so it can be assumed that the respondents are representative of the universe.

**TABLE A1.2**  
**TEST OF MEAN DIFFERENCES IN THE AMOUNT OF AVAILABLE LAND (HECTARES)**  
**BETWEEN THE UNIVERSE OF PRODUCERS LINKED TO FRUTIKA**  
**AND THE RESPONDENTS**

Group of producers	Number of observations	Average hectares of available land	Confidence intervals (95%)	
Universe	93	11.87097	10.50142	13.24052
Respondents	95	14.01053	12.06487	15.95618
Total	188	12.95213	11.75906	14.14519
Mean difference		-2.139559	-4.512215	0.2330981
Null hypothesis: mean difference = 0				
Alternate hypothesis: mean difference $\neq$ 0				
Result of the test of mean differences: $\Pr( T  >  t ) = 0.0769$				

Source: Prepared by the authors using data provided by the Capi'ibary Cooperative and "Censo a Pequeños Productores Agrícolas de Caazapá", 2009.

Even though the census coverage rate for the producers linked to Frutika is 100%, the corresponding filter and test of mean differences of the amount of available land were applied. With a significance level of 5%, the null hypothesis that the average hectares of available land for the universe linked to Frutika and for the respondents linked to Frutika are equal is not rejected, so it can be assumed that the respondents linked to Frutika are representative of the universe of producers linked to Frutika.

**TABLE A1.3**  
**TEST OF MEAN DIFFERENCES IN THE AMOUNT OF AVAILABLE LAND (HECTARES)**  
**BETWEEN THE UNIVERSE OF PRODUCERS NOT LINKED TO FRUTIKA**  
**AND THE RESPONDENTS**

Group of producers	Number of observations	Average hectares of available land	Confidence intervals (95%)	
Universe	460	10.53478	10.08221	10.98736
Respondents	330	10.31818	9.554464	11.0819
Total	790	10.4443	10.03146	10.85715
Mean difference		0.2166008	-0.6209012	1.054103
Null hypothesis: mean difference = 0				
Alternate hypothesis: mean difference $\neq$ 0				
Result of the test of mean differences: $\Pr( T  >  t ) = 0.6118$				

Source: Prepared by the authors using data provided by the Capi'ibary Cooperative and "Censo a Pequeños Productores Agrícolas de Caazapá", 2009.

With a significance level of 5%, the null hypothesis that the average hectares of available land for the universe of producers not linked to Frutika and for the respondents not linked to Frutika are equal is not rejected, so it can be assumed that the respondents not linked to Frutika are representative of the universe of producers not linked to Frutika.

## Annex 2

**TABLE A2.1**  
**DESCRIPTIVE STATISTICS OF THE VARIABLES BY PARTICIPATION**  
**IN THE FRUTIKA JUICE CHAIN**

Variables	Non-participants					Participants				
	Obs	Average/%	Std. Dev.	Min	Max	Obs	Average/%	Std. Dev.	Min	Max
Total annual family income (Current guaraníes)	330	13 400 000	27 700 000	0	398 000 000	95	22 400 000	27 800 000	500 000	202 000 000
Annual per capita income (Current guaraníes)	330	3 379 276	5 629 888	0	66 400 000	95	5 393 782	11 000 000	100 000	101 000 000
Annual agricultural income from sales (Current guaraníes)	330	4 664 506	7 643 121	0	66 000 000	95	7 972 220	8 335 501	0	52 900 000
Annual income from passion fruit (Current guaraníes)	330	0	0	0	0	95	2 339 074	3 673 954	0	19 000 000
Annual income from grapefruit (Current guaraníes)	330	0	0	0	0	95	77 095	447 138	0	4 160 000
Annual income from oranges (Current guaraníes)	330	0	0	0	0	95	157 790	561 166	0	3 500 000
Total annual income from Frutika products (Current guaraníes)	330	0	0	0	0	95	2 573 958	3 756 945	0	19 000 000
Annual agricultural income excluding Frutika products (Current guaraníes)	330	4 581 036	7 645 347	0	66 000 000	95	4 740 605	6 082 460	0	33 900 000
Amount of available land (hectares)	330	10	7	2	52	95	14	10	1	53
Number of hectares available for crops	330	5	4	0	40	95	6	5	1	33
Number of hectares available for livestock	330	1	3	0	35	95	3	5	0	25
Number of crops grown	330	4	1	0	8	95	5	2	1	10
Access to credit ( <i>Dummy</i> )	330	99%				95	97%			
Amount of credit (ranges)	325	2	1	1	7	92	2	1	1	7
Number of members on the farm (persons)	330	5	2	1	12	95	5	2	1	14
Available family labour (persons)	330	3	1	1	9	95	3	2	1	8

(continued)

Table A2.1 (concluded)

Variables	Non-participants					Participants				
	Obs	Average/%	Std. Dev.	Min	Max	Obs	Average/%	Std. Dev.	Min	Max
Female head of households ( <i>Dummy</i> )	300	9,3%		0	1	91	11%		0	1
Years of education among heads of household	330	6	3	0	17	95	7	4	0	17
Age of head of household	330	45	13	21	105	95	47	11	25	73
Years of work experience of head of household	324	25	13	1	65	92	24	11	5	52
Years of education of spouse	283	6	3	0	16	84	7	4	0	16
Amount of dependent family labour (persons)	330	9,4%		0	2	95	17%		0	6
Number of agricultural workers	330	3	2	0	11	95	3	2	0	8
Average years of education of members of the farm	330	6	2	1	16	95	7	3	2	14
Maximum years of education on the farm	330	9	3	1	17	95	10	3	2	18

Source: Censo a Pequeños Productores Agrícolas de Caazapá, 2009.

## Annex 3

**TABLE A3.1**  
**ANNUAL FAMILY INCOME OF THE PRODUCERS IN CURRENT GUARANÍES**

Quintile	Non-participants				Participants			
	Obs	Average	Minimum	Maximum	Obs	Average	Minimum	Maximum
1	66	1 597 309	0	7 100 000	19	3 672 421	500 000	6 150 000
2	66	4 627 303	1 380 000	10 040 000	19	8 644 600	3 000 000	19 142 500
3	67	7 787 082	1 200 000	23 076 004	19	17 692 716	6 640 000	44 804 000
4	65	13 422 506	2 300 000	35 624 000	19	27 352 045	8 284 000	48 740 000
5	66	39 806 118	6 500 000	398 144 000	19	54 717 973	7 900 000	202 200 000
Total	330	13 430 987	0	398 144 000	95	22 415 951	500 000	202 200 000

Source: Censo a Pequeños Productores Agrícolas de Caazapá, 2009.

## Annex 4

### Methodological annex on the estimate of the indirect effect of participation in the juice value chain

Based on a per capita consumer spending model that was converted to a model representing total household consumer spending and including the variable of farm participation in the Frutika value chain, the equation as modified for the purposes of this study is as follows:

$$C_{ij} = a_i Y_j + b_{1i} Y_j \ln(y_j) + b_{2i} N_j + b_{3i} \ln(S_j) + b_{4i} frutika + \sum_{h=1}^5 g_{hi} D_{jh} + \mu_{ij} \quad (2)$$

where  $C_{ij}$  represents consumer spending on good type  $i$  (production, labour, input, goods and services, food, non-food items etc.) by household or farm  $j$ ;  $Y_j$  is total consumer spending by the household  $j$  (proxy of total income);  $y_j$  is per capita consumer spending by household  $j$ ;  $N_j$  is the number of household members;  $S_j$  is the subsistence ratio in reference to the goods produced by the household. To incorporate the effect of the Frutika value chain on spending, the equation includes a dummy for participation (*frutika*) and other binary variables of districts that attempt to reflect differences in preferences, availability of goods and services and price differences between the regions. Based on this model, estimated using the ordinary least squares method, the elasticities were calculated of the different types of spending linked to the types of agricultural growth linkages, generalized as:

$$\frac{\partial C}{\partial Y} \frac{Y}{C} = (a_i + b_{1i} + b_{1i} \ln(y)) \frac{Y}{C} \quad (3)$$