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Abstract: Common wisdom indicates that in rural societies, producers' organizations are one of the factors that allow small scale producers to achieve insertion in formal spaces and access economically attractive scales in the supplies and services markets. A probabilistic participation model was used to analyze seven case studies of experiences of farmers' associations in Latin America that showed that the characteristics of the rural producers who seek out opportunities to work together are very different in each of the countries studied and their decision to join such organization is linked to the context and specificity of the locations analyzed. In a second stage of the study, an income model was used to evaluate the impact of participation on the income levels of small-scale farmers, which does not always have a positive impact on income. Thus, producers who join organizations might seek out other benefits, though they may still be interested in market access and marketing services that they can obtain through their participation in a certain type of organization.

Key words: market access, producers' association, rural development, agricultural income

Introduction[1]

Most rural development programs and projects in Latin America have a market access or insertion component in the agro-nutritional value chains to allow the rural population to increase their ability to access more stable markets, and generate more income. Many producers and producers' associations, some with greater success than others, have been working for years to find a secure market, which can include external and national markets, organic markets and fair trade organizations.

Durstewitz and Escobar (2006) identified three factors that condition or contribute to success regardless of the type of market being targeted by producers: 1) the creation of a producers' organization in order to access more attractive scales; 2) the ability to introduce technological changes that respond to fluctuations in demand, increase productivity and/or reduce costs; 3) the producers' capacity to operate production processes and manage innovations in the business sense. In regard to the first factor, the World Bank (2008) suggests that producers' organizations, whether they are cooperative, associative companies, associations and communities, are essential for small-scale producers to be competitive, understand that there are economies of scale in market transactions and attain power in the market. If no one organizational model ensures success, some are better than others under specific circumstances. General analyses on access to markets include other socio-economic and environmental variables such as technical improvements, hybrid organizational developments, better educational and training levels, solidification and expansion of internal markets in order for producers to enjoy greater income levels, and explicit public-private cooperation policies (Santacoloma *et al.,* 2005). Some works that have focused on small-scale producers who are members of cooperatives, associations and rural organizations (Hellin and Higman, 2002; Canigiani, 2004; Carletto, *et al.,* 2007, Nilsson and Matsson, 2009; FIDAMERICA, 2006) indicate that producers take for granted their organizations as the mean to access formal or specialized markets.

This document presents an analysis of the determinants involved in producers' decision to join organizations that facilitate marketing using a participation model. The second stage of the analysis considers the impact of the organizations on agricultural producers' income. The general purpose is to report on the characteristics of the producers that join the organizations and how this impacts income. Their experiences are compared to those of producers with similar products and conditions that do not belong to the associations.

Methodological framework

Seven case studies developed for the IMI project were selected for this analysis. The information was compiled between December 2008 and May 2009 through in-depth interviews and focus groups as well as surveys of producers and other key stakeholders in each experience. The interviews gathered information related to production systems with quantitative and qualitative variables (human and social capital, use of resources, physical and financial capital, income, costs and access to other capital, form, destination and marketing strategies). In general, 30 producer members of organizations/cooperatives were analyzed and 30 others who were not members (control) were interviewed in each case. Both samples were taken at random.

The experiences analyzed are: 1) Asociación de Productores de Cacao- APROCANE in Esmeraldas, Ecuador; 2) Asociación de Productores el Sembrador, AGRISEM in the area of Quiché, Guatemala; 3) Cooperativa ACOPANELA in the area of Valle del Jiboa, El Salvador; 4) Cooperativa COPRAUL in Ocotepeue, Honduras; 5) Cooperativa San José- CASANJO in Matagalpa, Nicaragua; 6) Huancaro Market in Cusco, Peru; 6) Wine producers in the area of Portezuelo, Biobío Region, Chile.

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Participation model

Initially, we planned to use all of the observations to evaluate an aggregate model but a wide range of differences in the levels, signs and meanings of the variables was found among the countries. There were differences in products, characteristics of each association, idiosyncratic variables and difficulties separating the effects of location. As such, it was not possible to extrapolate generalizations and the model was estimated by case.

The analysis of each case begins with the concept that the probability *P* that a producer *i* chooses to join an organization can be expressed as a function of a set of variables *z* that includes socio-economic characteristics of the producer and aspects unique to his or her line of work. The estimation is made using a Probit model:

$$P(c_i = 1 \mid \mathbf{z}_i) = \Phi(\mathbf{z}_i \boldsymbol{\gamma})$$

Where $c_i = 1$ indicates that the producer joined an organization, $\mathbf{z}_i$ is a vector of exogenous determinants of participation including the producer's age, sex, years of schooling, family size, distance from market place, proportion of time dedicated to the main production activity and access to telephone and/or Internet service. $\boldsymbol{\gamma}$ is a vector of coefficients corresponding to $\mathbf{z}_i$ and Φ is the normal standard accumulated distribution.

Income model

The second stage of this work was directed to analyzing the agricultural income determinants. This analysis is based on the assumption that associations make a difference in the composition of the income of small-scale producers given that there is a direct relationship between characteristics of organizations and producers' income levels, at least partially, when revenue generated through agricultural production is important in the formation of said income.

In order to correctly estimate the relationships between the income related variables (production factors, human capital, location, some production infrastructure services and membership in a group related to the sale of products), unobserved factors that could affect both the producer's decision to join an organization and his income level must be considered. To correct for this effect, a model of treatment effects is used under the following specification of the producers' income level y_i:

$$y_i = \boldsymbol{\beta}\mathbf{x}_i + \varphi c_i + \rho\lambda_i(\mathbf{z}_i\boldsymbol{\gamma}) + e_i \quad ,$$

Where $\mathbf{x}_i$ and $\boldsymbol{\beta}$ represent a set of exogenous variables with their respective associated coefficients ($\mathbf{x}_i$ can include some or all variables $\mathbf{z}_i$ defined in the previous stage and association models). The effect of joining an organization is given by coefficient φ associated with the artificial variable (dummy) c_i for participation. It can be expected that the term of error associated with the model that analyzes the likelihood of joining an organization will be correlated with the income model, introducing a selection bias equivalent to an omitted variable with unobservable effects. In order to capture this bias, an additional variable corresponding to *hazard ratio* λ_i is included in the income models or treatment effects. This variable is obtained for each observation based on the Probit model of participation in the first stage, which is defined as:

$$\lambda_i = \begin{cases} \phi(\mathbf{z}_i\hat{\boldsymbol{\gamma}}) / \Phi(\mathbf{z}_i\hat{\boldsymbol{\gamma}}), & c_i = 1 \\ -\phi(\mathbf{z}_i\hat{\boldsymbol{\gamma}}) / [1 - \Phi(\mathbf{z}_i\hat{\boldsymbol{\gamma}})], & c_i = 0 \end{cases}$$

Where ϕ is a function of standard normal density. The null hypothesis $\rho = 0$ of the parameter associated with λ can be used to evaluate the existence of a selection bias. If ρ is significant, the bias is present.

The evaluation of the two stages of this model was conducted for only three cases corresponding to the market typology developed by Escobar and Díaz (2010): 1) Type I (Producer-Final Consumer), Peru; 2) Type II (Producer- Intermediary), El Salvador; 3) and Type III (Producer- Transformation- Intermediary), Chile. The idea is to illustrate the influence of the organization and other variables that characterize the productive function for each selected case.

Results

Table 1 **General results: Participation model**

Variable	Effect on likelihood of joining
Demographics	
Sex	Tendency to neutral effect, varies by country
Age	Tendency to positive effect
Years of schooling	Positive effect but levels vary by country
Family size	Varies by country
Assets/ productive activity	
Scale effect (plot size)	Varies by country
Dedication to main activity	Tendency to positive effect, varies by country
Capital (equipment/infrastructure/tools)	Tendency to positive effect
Connectivity/ infrastructure	
Distance to market places	Varies by country
Access to telephone/ internet	Varies by country
Production Infrastructure	
Access to credit	Varies by country
Off farm income	Varies by country
Training/ technical assistance	Positive effect (*)

Note: (*) Technical assistance/ training in some countries are conditioned on joining an organization. As a result, this aspect was not evaluated in all cases. Where there was a lack of clarity regarding the exogenous nature of this effect, these variables were not considered.

As one can deduce from the information presented in Table 1, there is a wide range of situations that correspond to specific conditions within each country beginning with the fact that the nature and function of the organizations themselves vary. Due to these differences, the availability of data and the behavior of the variables, not all of them were included in the models that were estimated for each case. It is worth mentioning that gender tends not to have an effect on joining an organization in spite of reports regarding the importance of women's participation in the sale of agricultural products (García, 2006; IFAD, 1998; Grupo Chorlaví, 2009). It is possible that there are differences between men and women when it comes to joining organizations and selling products, but if association includes sale, the results obtained for this study do not necessarily endorse widely accepted data.

Table 2 **Summary of the Participation Model Results**

Variable	**Chile**	**Ecuador**	**Salvador**	**Guatemala**	**Honduras**	**Nicaragua**	**Peru**
Sex (1=male)	-	-0.9902		1.2413		0.2694	0.6215

Age	0.0034	0.0441*	-0.1383	0.0560*	0.177*	0.368*	-0.220*
Age 2		-	0.0017		-0.0011	-0.003*	0.003*
Min/Max Age			40			53	39
Education	-0.7817*	-0.2410	-0.551*	0.0599	0.589*	0.605*	-0.568*
Education 2	0.0515*	0.0249*	0.047*		-0.041*	-0.033*	0.038*
Min/Max Education	8		6		7	9	7
Time devoted to main activity (% time)	0.0162	0.0385*	-0.0412	-0.0279*	0.600*	-0.099*	-0.1440
Time devoted to main activity 2			0.0002		-0.003*	0.001*	0.0012*
Min/Max dedication					90	58	
Distance to market (km2)		0.0058	0.175*	0.4000*	-0.107*	0.728*	-0.0130
Distance 2			-0.0031	-0.0196*	0.000*	-0.024*	0.0041
Min/Max Distance					124	15	
Livestock (value in US$)		-0.0002	-0.0004*	0.0014		0.000	0.0003*
External income (1=yes)		-1.1370*			0.4695	-0.5080	-0.2063
Size 2	-2.1971*	1.1491	1.341*	0.4790	-5.012*	-0.7838	-0.6398
Size 3	-3.2802*	-0.4124	1.867*	1.7342	-6.364*	0.4756	0.2983
Size 4	-2.1211*	1.4768*	1.972*	1.9028	-5.904*	-0.7325	0.4752
Family size		-0.0348		0.2263	-0.448*	-0.0761	0.304*
Landline and/or mobile phone	-1.3497*	2.8817*	-0.2640	0.6885	2.099*	0.776	0.1263
Internet access	-2.9747*			-1.2046			
Access to credit (dummy)	-2.8485*			0.3521	1.535*	-0.8415	0.7894
Capital (US$)	0.0001*		0.0000	0.0010*		0.0001	
Receives training (1=yes)	1.3490*	2.8065*		1.0203			
Receives individual assistance (1=yes)		-0.4548					
Constant	4.3771*	-8.3177*	2.4948	-5.2891*	-26.994*	-10.935	5.3620

Note: The significant coefficients at a level of significance less than 15% are marked with an asterisk in order to facilitate reading of this chart. (*)

Table 2 summarizes the results of the evaluation of the participation models with a large statistical significance allow for fact comparisons among countries. Some of the variables in which quadratic effects are significant (curves that present marginal negative yields) show interesting results and confirm the variability noted in table 1. In El Salvador and Peru, the producer's age has a positive result for younger producers while in Ecuador, Guatemala, Honduras and Nicaragua, it has a positive effect when the producers are older, though that influence has limits in terms of the ages in all cases. Producers from Chile, El Salvador and Peru with lower levels of education are more attracted to the idea of joining an organization, while this is true of those with higher levels of formal education in Honduras and Nicaragua in spite of the

fact that the limits on years of education are low. Similar results were observed in regard to the proportion of time that the producer dedicates to the main production activity. The less time dedicated, the more significant the variable in Guatemala and Nicaragua while results show an inverse effect in Ecuador, Honduras and Peru. This illustrates the difficulty in generalizing results and the need to link individual variables to other factors that very probable covariate but represent idiosyncratic conditions that rule out any generalization.

Production variables, including the principal crop used for sampling, form another group of variables influencing farmers' decision to join an organization. An initial result is that the productive activities (represented in Table 2 as Size 2, Size 3 and Size 4) do not determine decisions to joint associations in all cases. In fact, production activities are not only insignificant in the cases of Guatemala, Nicaragua and Peru, but the cases in which they are (Chile, Ecuador, El Salvador and Honduras) do not show the same level of relation. While larger producers in El Salvador tend to join organizations, associativity in Chile and Honduras decreased as the size grew. Value of the capital or other income is only significant in few cases. Most variables in that group follow the same idiosyncratic characteristic that makes it impossible to define a trend. In that case, the idiosyncratic factors of each case seem to have a significant weight.

Infrastructure service variables (credit, technical assistance and training) were estimated for cases in which researchers were certain that they were not endogenous variables that appeared as a result of belonging to a producers' association. These variables are not always significant when it comes to explaining associativity and, as is true in the previous cases, they can have a direct or inverse effect on the decision to join. For example, access to credit is important in the cases of Chile and Honduras. However, while Chilean producers who qualify for such support tend to join less frequently, in Honduras the reverse is true. It is quite likely that variables of scale, capacity to absorb risks and activities in which the producers engage influence how their decisions are motivated by access to credit. Training is statistically relevant in Chile and Ecuador with positive signs that indicate a directly proportional relationship between receiving training and belonging to associations.

Finally, characteristics related to the availability of family members to work, the physical location of the land in relation to the market and access to communication technology (telephone, Internet) do not have an influence in all cases, but are related to associativity in some ways. For example, there is a direct relation between associability and distance to the most frequently used place of sale in El Salvador, Honduras and Nicaragua and access to communication was important in Chile, Ecuador and Honduras. However, in Chile, the inverse is true and in the other two countries the relationship is inversely proportional, which indicates a certain tendency to replace association with direct communication with actors in the market in the case of Chile.

Determining producers' income

This section will present some aspects of the behavior of producers' income that belong to associations and those who do not. Selected group members produce the same goods and, in some cases, have similar buyers. This makes it easy to compare median levels of income between the two groups, as seen in Table 3.

Table 3. **Comparison of income of associated and other producers (US$)**

	Assoc. producers	**Not assoc. producers**	**P> / t /**
CHILE			
Gross income/ha.	1499.6	1828.2	0.454
ECUADOR			
Agriculture gross income	234.3	206.5	0.639

Net income (main crop)	61.5	91.6	0.932
Total agricultural net income	336.4	434.3	0.606
EL SALVADOR			
Agriculture gross income	14077.7***	7549.0	0.016
Net income (main crop)	6758.1***	3153.1	0.013
Total agricultural net income	9932.2***	3903.5	0.006
GUATEMALA			
Agriculture gross income	2086.3	3353.3	0.275
Net income (main crop)	1027.1	1529.0	0.551
Total agricultural net income	2035.7	2030.4	0.997
HONDURAS			
Agriculture gross income	16903.2	23386.9	0.408
Net income (main crop)	10295.1	12561.5	0.695
NICARAGUA			
Agriculture gross income	9633.8***	6264.5	0.032
Net income (main crop)	9370.5**	4976.8	0.074
Total agricultural net income	8145.3	6477.9	0.239
PERU			
Agriculture gross income	2506.1***	1626.3	0.024
Net income (main crop)	2162.3***	1343.1	0.051
Total agricultural net income	2278.0***	1558.9	0.046

Note: (***) corresponds to a level of significance of 1%, (**) corresponds to a level of significance of 5% and (*) corresponds to a level of significance of 10%.

The first observation is that the income –measured in three different ways- is not significantly different in all cases between associated farmers and the control groups. While this result is not conclusive because three out of seven cases show significant differences, it could be claimed that results do not line up with the underlying hypothesis on the role of farmer associations. On the contrary, results partially contradict these assumptions.

It is very difficult to combine the level of the values of the income with the level of those variables that together establish a certain standard that is idiosyncratic for the various countries. However, the relative values of the median income show important differences among the countries, with surprising averages for Honduras and El Salvador, particularly compared to those of other countries with higher average income such as Chile and Peru.

The major results presented in Table 3 show that the decisive role that associations play in achieving insertion in the markets is changing and that, on the contrary, producers find alternatives for participating in same or similar markets without a substantial detriment to their income.

As a complement to the analysis of the relationships of groups of variables with the decision to participate in a group seeking out channels and/or assistance for marketing main products, the second stage of this project analyzes the determinants of the agricultural income. As mentioned, this model is estimated for one case for each of the three market models.

Market Type I: Producer- Final Consumer

Market Type I refers to the case of the Huancaro Market in Peru in which producers sell a large portion of their production, mainly vegetables, directly to the final consumer. Since farmers sell a wide range of products, it is difficult to estimate net income. On the other hand, the production scale of each specific vegetable makes the surface results extremely sensitive, ruling out estimates by productive unit (hectare) to make comparisons easy. The model was then evaluated utilizing gross income values.

Table 4 presents results for Market Type 1. Figures show few statistically significant variables. While the model does not generate a statistic of adjustment, the value of χ^2 and its level of significance suggest that a reasonable adjustment can be made in order to derive an explanation.

Table 4 **Peru: Results of the income model**

Variable	Coeff.	Std. Err.	Z	P > |z|
Producer's age	-12.74	17.19	-0.740	0.459
Producer's sex (1=male)	840.20**	457.67	1.840	0.066
Years of schooling	11.51	66.42	0.170	0.862
Family size	88.81	141.10	0.630	0.529
Production training	-533.98	453.64	-1.180	0.239
Administrative training	-97.69	440.21	-0.220	0.824
Organic products	562.25	663.43	0.850	0.397
Livestock (US$)	0.27***	0.11	2.380	0.017
Receives individual assistance	-198.81	620.38	-0.320	0.749
Organization receives assistance	388.42	421.89	0.920	0.357
Size 2	423.63	503.79	0.840	0.400
Size 3	1877.87***	456.79	4.110	0.000
Size 4	2036.38***	425.68	4.780	0.000
Distance to market	35.94	44.69	0.800	0.421
Has telephone service	-138.31	323.10	-0.430	0.669
Dedication to line of work (% time)	-7.66	14.32	-0.530	0.593
Access to credit	-348.88	389.41	-0.900	0.370
External income	211.84	348.95	0.610	0.544
Cusco	44.96	566.24	0.080	0.937
San Sebastián	0.19	731.42	0.000	1.000
Associated producer	307.72	776.58	0.400	0.692
Constant	578.05	1657.16	0.350	0.727
Lambda	-489.54	460.51	-1.060	0.288
N = 49; Wald Chi2 = 106.13; Prob > Chi2 = 0.000				

Note: (***) corresponds to a level of significance of 1%, (**) corresponds to a level of significance of 5% and (*) corresponds to a level of significance of 10%.

The comparison of the median income among the associated and unassociated producers in the Huancaro Market case favors the former. The explanation is a result of the production scale, particularly where the dependent variable is gross income. If we control for scale, the participation in the association that offers access to the market loses significance and shows a low coefficient that could contribute to income if that participation were relevant. At the same time, the results indicate that controlling for participation and scale

are key factors because most variables lose significance, the exception being the producer's sex, as males receive greater levels of income than females, and the value of the livestock that small-scale vegetable farmers may have. Though it has a low level of impact on income, this consideration can be taken as a proxy of diversification measures towards other activities.

The *hazard ratio* (λ) is not significant suggesting the absence of a selection bias in the samples analyzed.

Market Type II: Producer- Intermediary

This market type is probably the most common among small-scale producers in Latin America, given that intermediary includes agents such as processors, exporters and, in general, all types of intermediaries that handle one or more of the steps that take place after the producer submit the product and prior to its delivery to the final consumer.

Table 5 **Nicaragua: Results of model of income**

Variable	Coeff.	Std. Err.	Z	P > |z|
Producer's sex (1=male)	218.061***	106.877	2.040	0.041
Producer's age	-2.945**	1.618	-1.820	0.069
Years of schooling	-30.707***	13.057	-2.350	0.019
Years of schooling ^2	1.750**	0.925	1.890	0.058
Family size	10.849	9.844	1.100	0.270
Administrative training	14.375	30.565	0.470	0.638
Productive training	21.923	58.086	0.380	0.706
Hires salaried staff	-84.008	51.058	-1.650	0.100
Size 2	-106.426***	42.179	-2.520	0.012
Size 3	-136.997***	52.162	-2.630	0.009
Size 4	-196.208***	66.742	-2.940	0.003
Distance to market	1.604	2.751	0.580	0.560
Has telephone service	-30.368	35.213	-0.860	0.388
Dedication to type of work (% time)	1.402	0.929	1.510	0.131
Access to credit	-59.953	47.408	-1.260	0.206
Livestock (US$)	0.001	0.002	0.380	0.703
External income	-31.934	37.071	-0.860	0.389
Capital (US$)	0.003	0.003	0.90	0.375
Municipality of Matiguas	-15.819	37.262	-0.420	0.671
Associated producer	132.811***	58.821	2.260	0.024
Constant	150.304	148.630	1.010	0.312
Lambda	-78.563**	42.374	-1.850	0.064
N = 59; Wald Chi2 = 62.35; Prob > Chi2 = 0.0042				

Note: (***) corresponds to a level of significance of 1%, (**) corresponds to a level of significance of 5% and (*) corresponds to a level of significance of 10%.

As Table 5 shows, various factors influence net income among small-scale milk producers in Nicaragua. Variables such as age, years of schooling, scale of production and membership in a producers' organization, are of great importance even when members and non-members mainly sell to the same buyer.

It is important to underscore the significant value of λ, which suggests that there would be a selection bias. When the model corrects for this criterion, the highest coefficient in the model shows that associated male producers generally have a higher level of net income than those who do not belong to an organization. However, this relationship seems to be concentrated among male producers, as they have significantly higher incomes. Similarly, there is an inversely proportional significant relationship between the producer's age and net income; this was explored in the form of the function and a maximum relative to the producer's age was found.[2]

On the other hand, greater levels of education are linked to higher income but only after approximately nine years of formal schooling. This means that producers with less formal education lose potential income. It also indicates that the profitability of primary education for small-scale agricultural producers in Nicaragua is significantly lower in relation to higher educational levels.

Results indicate an increasingly and inversely proportional relationship between the scale of operation on farm and net income. The immediate suggestion is that greater productive scales are not associated with an achievement of economy in costs or efficient allocation of production factors. However, keeping in mind that a high proportion of rural income in Nicaragua comes from non-agricultural rural activity and that income for those activities is much higher than agriculture and livestock income (Reardon, 2001), it is possible that as the producer moves away from non-agricultural activities, his or her net income will tend to decrease. This idea is not in line with the suggestion that greater dedication to the milk production field is positively correlated with income.

Market Type III. Producer – Transformation - Intermediary

With this type of market, producers have the option of bringing a transformed product to market that, in most cases, have a higher value, different buyers and may even belong to a different chain of distribution.

Table 6 **Chile: Results of model of income**

Variable	Coeff.	Robust Std. Error	Z	P > |z|
Producer's sex (1=male)	469.92	770.70	0.610	0.542
Producer's age	-318.93***	139.03	-2.290	0.022
Age ^2	3.09***	1.28	2.410	0.016
Years of schooling	-54.51	67.92	-0.800	0.422
Distance to market	15.33	13.77	1.110	0.265
Dedication to line of work (% producer's time)	86.00**	50.53	1.700	0.089
Dedication ^2	-0.66**	0.37	-1.790	0.074
Has access to credit (1=yes)	316.29	719.30	0.440	0.660
Total capital	0.05***	0.02	2.360	0.018
Internet connection	-201.17	853.78	-0.240	0.814
Landline	-519.01	523.18	-0.990	0.321
Receives training (1=yes)	-228.81	436.68	-0.520	0.600
External income (1=yes)	-51.02	531.54	-0.100	0.924
Size 2	-362.69	750.09	-0.480	0.629
Size 3	-1,260.89	944.17	-1.340	0.182
Size 4	-1,056.03*	678.38	-1.560	0.120

[2] In iterations in which the quadratic effect of age was included, maximum income was produced starting at approximately 28 years of age and then began to diminish.

Member of an organization (1=yes)	-535.22	1132.52	-0.470	0.637
Constant	7,445.17**	3801.49	1.960	0.050
Lambda	-86.87	706.77	-0.120	0.902
N = 49. Wald chi2(29) = 69.15 Prob > chi2 = 0.0000				

Note: In iterations in which the quadratic effect of age was included, maximum income was produced starting at approximately 28 years of age and then began to diminish.
(***) corresponds to a level of significance of 1%, (**) corresponds to a level of significance of 5% and (*) corresponds to a level of significance of 10%.

This case deals with grape and wine producers in the area of Portezuelo, Chile. Gross income per hectare is estimated in Table 6 due to the fact that there were some doubts regarding the cost of processing the grape. In general, results are similar to the ones observed in previous cases, but signs for several coefficients are difficult to interpret.

Like in previous cases, the producer's age is significant in the formation of gross income. Its functional form indicates that greater income is obtained by older producers (around 50 years old) as suggested by the values of the parameters. This result is consistent with the average age of the small-scale Chilean producers and the decision-making processes at the small farm level (Dirven, 2002). Another variable that shows consistency among the cases is the level of capital, which has a positive and significant effect on gross income, though in the case of wine producers its contribution to gross income per hectare is small.

Production scale variables are not significant with the exception of larger properties, which show an inversely proportional relationship with income per hectare. It is likely that working capital limitations affect levels of inputs and hired labor for several hectares; generate inefficiencies that increase the average cost of production. This would be consistent with the fact that greater dedication of time to the main production activity is positively correlated with income per hectare, though not throughout the domain of the variable (starting at around 65% of time dedicated the effect begins to become negative). Other interesting results include the fact that the decision to join an organization does not lead to greater per hectare average income for the producer. The observed value of λ suggests that there is no selection bias.

Discussion

This section will highlight some of the results that tend to be common to the three cases in order to analyze the configuration of agricultural and livestock income of small-scale producers according to the types of market defined.

Results confirm that belonging to an association that connects producers to a market in some way is not significant in the majority of cases. Though these results are not conclusive, they clearly indicate that the hypothesis regarding the role and preponderance of rural organizations should be questioned, particularly considering their ability to help small-scale producers gain access to markets. This is particularly true when markets and participation are relatively stable. Two facts are related to this signal: the personal experience that some producers are accumulating as they must compete in relatively open and competitive markets, and access to other means of information and contacts for negotiations, as shown by Berríos *et al*. (2002), in Nicaragua. Communications (mobile telephone and Internet) were found to be important for participation in three of seven cases, and one of the three income analyses suggests that telephone service is important. Various studies have highlighted the role of the cell phone in access to market information and improved income related to the use of mobile communication instruments (Khalil *et al.*, 2009).

Results could thus be interpreted as suggesting that producers are seeking out benefits and services other than income increase when they join rural organizations. Some organizations not only maintain a positive price differential for members but provide other services, including direct purchase of products, access to

credit, technical assistance, market information, training on productive and management aspects, legal and commercial representation, information on product quality, assistance with processing and, in some cases, access to physical markets. This does not lessen the importance of market access services farmers can access to as members of some organization.

The above results provide support for questioning traditional hypothesis regarding the role of small-scale producers' organizations, and offer two new hypotheses regarding the role of organizations and the actual conditions of market access for such producers. In terms of the former, services to access markets may be complemented by a set of benefits that include production infrastructure and management assistance that have been privatized or do not receive the government support producers require to compete in markets. In relation with access to markets, the role of media and connectivity seems to replace other means of information and even direct access to buyers. It seems worth to generate knowledge on the use of these instruments and experiment transferring of information on prices and marketing channels, technology, communities of learning and training of networks of producers seeking out alternatives for the sale/processing of their products.

Results on the level of formal education, which persistently had a neutral or even negative effect on income, differ from the traditional hypothesis regarding the social and economic mobility attributable to education in rural areas. This result, which may be due to the low variability of the years of schooling in rural areas, coincides with results for other Latin American countries. Valdés and Mistiaen (2001) report that the influence of education on small farmer income is as low as US $20 increment for each additional year of schooling.

Family size does not contribute significantly to the structure of farming and livestock income in any of the study cases. This is also reported by Valdes and Mistien (2001). One possible explanation is that farm income does not capture changes attributable to total net income, which includes revenues generated by rural non-agricultural activities, remittances from abroad and transfers.

Behavioral variables related to technical assistance (i.e., individual assistance, collective assistance, and training) do not have a significant effect on changes in agricultural income. Undoubtedly, information on frequency and quality of technical assistance would improve explanation power of the model; however, the literature reports that participating in the rural extension program produced no significant effect on increasing net family income small farmers in Chile, despite a positive relation between the extension program and small agricultural production (López, 2000).

Results on the scale of production are hard to analyze. They are positively associated to income in Peru and negatively in Nicaragua and Chile, where only smaller production scales contribute to income. Interpretation is difficult due to the fact that the operation of the vegetables production in Peru takes place on such a small scale that size range has little repercussion on production. Of course, production and resource allocation efficiency should be analyzed in the first place, keeping in mind that the increase in scale for small producers could lead to inefficiencies in the production.

Above and beyond those limitations, it is important to keep in mind that the contribution of the land to the total per capita family income is small in most Latin American countries; the marginal product of the land is greater among small-scale farmers who tend to obtain constant returns to scale. In Honduras and Paraguay, farm size was nor significantly different to estimate total productivity (Valdes and Mistiaen, 2001).

Works Cited

Berríos, L. N., J. Ayca, V. Umaña and F. Leguizamón. 2002. **Barreras a la competitividad, y respuestas de pequeños productores rurales en Nicaragua**. CEN 1407. INCAE. Managua, Nicaragua. http://conocimiento.incae.edu/ES/clacds/nuestras-investigaciones/pdf/cen1407.pdf

Canigiani, Eleonora. 2004. **Taking Stock on IFAD Experience in Market Access. Innovation and Opportunities to Favour Market Access for the Rural Poor**. IMI Initiative for Mainstreaming Innovation. Rome, Italy. http://www.ifad.org/english/market/stock.pdf

Carletto, C., A. Kirk, P. Winters and B. Davis. 2007. **Non-Traditional Exports, Traditional Constraints: the Adoption and Diffusion of Cash Crops among Smallholders in Guatemala**. ESA Working Paper No. 07-03. FAO. Agricultural Development Economics Division.

Dirven, Martine. 2002. **Las prácticas de herencias de tierras agrícolas: Una razón para el éxodo de la juventud?** CEPAL. Serie Desarrollo Productivo nº 135. Santiago, Chile

Durstewitz, P. and G. Escobar. 2006. **La vinculación de los pequeños productores a los mercados**. Grupo Chorlaví. Rimisp. Santiago, Chile. http://www.grupochorlavi.org/Mercados/Doc/earte.pdf

FIDAMERICA. 2006. **Extracto de las lecciones aprendidas por áreas temáticas. Fase III 2002-2005**. Rimisp. Santiago, Chile. http://www.fidamerica.org/admin/docdescargas/centrodoc/centrodoc_115.pdf

García, Zoraida. 2006. **Agriculture, Trade Negotiations and Gender**. FAO Gender and Population Division. Sustainable Development Department. Rome, Italy.

Grupo Chorlaví. 2009. **Segundo Diálogo Electrónico 2009 "Variación de precios y estrategias de los pequeños productores Rurales"**. Pregunta 4: *¿**Cómo** se han alterado los **roles de las mujeres** en relación a los cambios en los procesos productivos? ¿Cuál es su papel en los **procesos de comercialización**? ¿Cómo han afectado estos cambios el peso de las mujeres en las **familias campesinas y en las organizaciones sociales**, así como en las estrategias de reproducción familiar*?
http://www.grupochorlavi.org/blog/index.php?/archives/42-Segundo-Dialogo-Electronico-Pregunta-4.html

Hellin, J. and S. Higman. 2002. **Los pequeños agricultores y los mercados especializados: Lecciones aprendidas en la región andina**. AgRen, documento 118. ODI Red de Extensión e Investigación Agrícola.

IFAD. 1998. **Guatemala: PROZACHI: Proyecto de Desarrollo Agrícola para Pequeños Productores en Zacapa y Chiquimula (PROZACHI). Evaluación preterminal resumen ejecutivo**. http://www.ifad.org/evaluation/public_html/eksyst/doc/prj/region/pl/guatemala/r251gmbs.htm#B. EVALUACIÓN

Khalil, M., P. Dongier and C. Zhen-Wei Qiang. 2009. **Information and Communications for Development 2009. Extending Reach and Increasing Impact**. World Bank. Washington, D.C.

López, R. 2000. **Determinants of rural poverty in Chile: evaluating the role of public extension/credit programs and other factors**. In López R. & A. Valdés (eds.). *Rural poverty in Latin America*. London. Macmillan Press.

Nilsson, L. and N. Matsson. 2009. **Truths and myths about the openness of EU trade policy and the use of EU trade preferences**. European Commission Directorate General for Trade, B-1049 Brussels, Belgium.

Reardon, T., J. Berdegue, and G. Escobar. 2001. **Rural Nonfarm Employment and Incomes in Latin America: overview of issues, patterns, and determinants**. *World Development*, 29(3), March.

Reardon, T. and J. Berdegué. 2003. **La rápida expansión de los supermercados en América Latina: Desafíos y oportunidades para el desarrollo**. World Bank: Washington, D.C. http://www.rimisp.org/getdoc.php?docid=2049

Santacoloma, P., R. Suárez and H. Riveros. 2005. **Strengthening agribusiness linkages with small-scale farmers Case studies in Latin America and the Caribbean**. AGSF Occasional Paper 2005; 4. http://www.fao.org/ag/agS/subjects/en/agribusiness/OP4_en.pdf

Valdés, A. and J. Mistiaen. 2001. **Pobreza rural en América Latina: tendencias recientes y nuevos desafíos**. In Kostas G. Stamoulis (editor) *Alimentación, Agricultura y Desarrollo Rural***.** *Temas Actuales y Emergentes para el Análisis Económico y la Investigación de Políticas.*FAO. Roma, Italia. http://www.fao.org/DOCREP/003/X9808S/X9808S00.HTM

World Bank. 2008. **La agricultura y la reducción de la pobreza.** Reseñas de política. Informe sobre el desarrollo mundial 2008, Agricultura para el Desarrollo. http://siteresources.worldbank.org/INTWDR2008/Resources/2795087-1191440805557/4249101-1191957549239/07_La_Reduccion.pdf