Access to Dynamic Markets for Small Commercial Farmers: The case of Potato Production in the Peruvian Andes

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Abstract

The study has evaluated which are the most relevant factors that determine that a small farmer switch marketing channels in order to enter into a "dynamic" market; that is, into a market signed by more complex contractual relationships that can absorb increasing amounts of its output. The results show that there are a number of producers that currently are not selling to those markets but they may well do so. Restrictions associated to the degree of organization of the producers, their perception of risk and credit market restrictions may prevent these farmers to gain access to the additional benefits that these new market opportunities have to offer.

Keywords: Market participation; Contractual arrangements, Potato Farmers; Peru.
JEL Codes: Q13, Q16

[1] The Survey on which the study is based was carry-over by GRADE within the framework of a study on Transaction Costs in Peruvian Small Scale Agriculture financed by FAO.

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1. Introduction

Supply chain management in the domestic markets of developing countries is a significant recent institutional change affecting smallholder agriculture. For poor farmers, the benefit of new supply chain management is that it can provide information on new products, input, credit and extension services, and marketing services. These can ease the resource constraint that farmers face otherwise, and reduce production and marketing risks for farmers, helping them engage into more complex contract arrangements typically associated with "dynamic markets". For purpose of this study "dynamic market" refers to those markets able to absorb increasing levels of farm output due to its size or its rapidly increasing demand.

The purpose of this paper is to understand which may be the critical factors that determine that small farmers enter these institutional arrangements. We analyze a stratified sample of over 300 small potato farmers (less than 5 hectares) living in the Mantaro Valley in the central highlands of Peru. Around 100 of these farmers have adopted key farming and/or marketing innovations that allow them to enter into two more dynamic markets: (a) producing high quality seeds or (b) producing high quality potatoes for the chips industry. The rest of the sample covers relatively similar producers (same ecological setting, similar land holding) which have opt to sell their potato through traditional marketing channels and can be used as a control group to evaluate the impact and determinants of accessing dynamic markets.

2. New Marketing Channels for small commercial Potato Farmers Peru.

Potato is a product of high importance in the Peruvian food system. It is harvested in almost every region of the country, although its production is concentrated in the Andean region, given the lower temperatures of this region favor the growth of the crop. The production of potato is basically oriented to domestic consumption.

According to the 1994 Peruvian Agriculture Census, there were around 800.000 potato producers in the entire country, of which near 60% worked on agricultural plots smaller than 5 hectares. The most important zones of production are located on the central Andes, in the Mantaro Valley. The data used in this paper includes potato producers along this valley. Within this valley, traditional areas mainly associated with self-consumption coexist with areas with strong linkages to the market. The purpose of this study was shaped on the comparison between small potato farmers that have been articulated to dynamic markets from their experience with technical assistance, and those that have not made that transition and remain articulated with traditional marketing channels. In the Mantaro Valley we can encounter two different ways used by potato producers to articulate themselves to dynamic markets: (a) a group of producers that are linked to the dynamic markets through the production and sales of certified potato seeds; and (b) a group of producers linked through the production and sales of potato of industrial quality to be used on the chips industry.

Two companies that provided the technical assistance necessary to develop the articulation with dynamic markets were identified. One of the companies is called FOVIDA and the other is ECOSER These technical assistance companies have been working on the central Andes of Peru in the context of a technical assistance fund (INCAGRO) launch by the government of Peru to develop a private market for these services. FOVIDA is an NGO that has been working in the Mantaro Valley since 1997; it has commercial links with Snacks America Latina Peru SRL (Frito Lay, main producer of potato chips in Peruvian market). Since 1998 FOVIDA has become one of the major suppliers of a specific potato variety (*diacol capiro)* that complies with the quality standards needed for the production of potato chips. As it is indicated in FOVIDA (2002), the NGO provides technical assistance around three areas: organization skills, techno-agro ecologic capabilities, and management and marketing skills. ECOSER on the other hand is an NGO devoted to the improvement of potato seed varieties. As mentioned in ECOSER Jauja (2001), the assistance services provided are based on an efficient process of obtaining in vitro “seedlings”, pre basic seeds from the company greenhouse, and finally getting seeds to farmers. ECOSER activities include extension and capacity

building activities including quality control, certification, prevention of plagues and diseases thru an integrated management strategy, post-harvest and in-store management techniques. ECOSER also provides technical assistance to improve organizational capabilities of producers.

The Relationship between Small Farming and the Potato Processing Agro industry

In 1998 the processing firm, Snacks America Latina Peru SRL reduced from 30 to 7 the number of farmers they had contracts with. However this was done at a high storage cost. Because of the characteristics of the Peruvian potato farm system, in order to have all year round supply of potato, the industry needs to combine potato coming from the southern Costa (from December to March), the Sierra (from end of March till July), and the central Costa region (from August to November).

However, consolidated land holdings with the scale needed for the industry are only secured in the Costa region. Thus, a reduced number of potato growers imply the need for buying potato and storing it throughout the period when there is not available harvest in the Costa. Under this condition, there was a "window of opportunity" for an intermediary that can bear the monitoring cost associated with coordinating small potato farmers in the sierra region. If the monitor costs were lower than the storage costs, such a contracting scheme is possible. This is how FOVIDA, an NGO that worked with potato farmers in both the Costa and Sierra regions, found itself with the opportunity of filling this gap. In turn, the need for proper seeds opened the opportunity for ECOSER.

The contract that is subscribed between the industry and the individual farmers, or with FOVIDA in the case of small producers, is essentially the same. The contract is signed two or three months prior two the sowing season. The contract establishes a fixed price that is always substantially above the price of potato going to the traditional channel. However, the contract establishes specific objectives in terms of increasing yields production costs, proper management of the crop, etc. The industry has very strict quality standards that farmers must comply. For example, the dry content of the potato

should be in the 22%-to 24% range to be accepted. Sugar content should be in the 0.02% to 0.03% range for proper frying. FOVIDA does this monitoring work for the firm.

The role of FOVIDA as a successful intermediary between the firm and small producers is evident in a number of activities performed by the NGO, which can be summarized under three headings: a) usage of Information networks; b) building trust; and c) building capacity for collective action (Johnson et al. 2002). First, FOVIDA has been able to use its network of potato producers in the Costa Region (that was built prior to its work in the Sierra region) to identify seed suppliers of the variety Capiro for the Sierra (ECOSER). In addition, it has taken advantage of its knowledge of the input and output markets to benefit small farms through the reduction of key transactions costs. It has also provided technical advice. Second, FOVIDA has been able to build "social capital" in the form of trust. This has occurred, first, by reducing Frito Lay's cost of monitoring contract compliance and by managing emergencies that occur along the cropping season. Quick response to the latter affects positively the quality of the potato that reaches the processing plant. The ability of the firm to verify that quality always meets required standard has allowed for trust to emerge and consolidate. In turn, this increasing trust has affected the marketing behavior of the firm increasing the share of the market that is supplied by FOVIDA, strengthening the bonds between firm and the intermediary. Finally, FOVIDA has organized small farmers to take advantage of their collective action and has obtained economies of scale in the input and output markets. In particular, collective marketing, collective provision of inputs, financing, and purchase of complementary services like technical assistance are key elements that render tangible benefits in terms of lower input costs and higher output margins, when negotiating with the industry.

3. The Data

As both of the NGO's worked under a technical assistance program that co-financed around 50% of the provision of the service, it was possible to access the register book and therefore identify the producers that were having access to this support mechanism. In addition, from a list of farmers provided by both companies, producers that had received

assistance for a year or less were excluded from the sample. The latter allowed to ensure that those farmers that were sampled as "connected to dynamic markets" had effectively enough time to incorporate the practices taught through the technical assistance programs.

The study focuses on a sample of about 289 potato producers. The sample is quite heterogeneous, comprising a wide diversity of production scales and market insertion mechanisms so as to generate an in-depth assessment of the restrictions as well as potentialities that dynamic markets exhibit in the context of small farm producers. The sample design is such that it comprises 89 small producers that have accessed some market niche (considered as dynamic markets) through technical assistance, compared to 206 producers that have not requested technical assistance and keep selling their output to traditional markets. For the crop under analysis (i.e. potato), market niches that can be considered as dynamic are two: a) market for processed potato (chips) and b) seed market[4].

As it can be seen on the Table 1, the potato producers that have access to dynamic markets have a higher educational level (an average of almost 2 more years of formal schooling for the head of the family, and more than 2 on the number of years of schooling of the most educated family member), better life conditions (associated to the characteristics of dwelling), and more household assets (almost three times more productive assets, and almost two times the size of the land property) than farmers still on traditional markets. Additionally, farmers with access to dynamic markets participate in more organizational activities. Farmers related to dynamic markets also have the perception that access and levels of credit they could have are significantly higher than those available to farmers with no access to this markets. Finally, the results also show that these farmers are willing to take bigger risks.

[4] Given the sample design, there are no producers that have access to dynamic markets without any technical assistance. As a result of this, the analysis can not distinguish between the pure effects of the technical assistance from the impact that the technical assistance generates by allowing farmers' access to new market opportunities. This being the case, the results of this research must be read as the joint impact of both processes.

Table 1
Characteristics of the Potato Producers

Variable Description	*Dynamic Mkts.*	*Traditional Mkts.*
Number of Household Members	4.5	4.9
Sex of Head of Household	0.93	0.94
Age of Head of Household	48.3	48.6
Years of Education of Head of Household	11.7	9.9***
Maximum Years of Education within the Household	13.5	12.1***
Dwelling has a Quatity Roof (yes=1)	0.19	0.09**
Appropriate Access to Water on dwelling (yes=1)	0.9	0.70***
Dwelling has a Quatity floor (yes=1)	0.64	0.39***
Dwelling has a Quatity walls (yes=1)	0.31	0.17***
Appropriate Access to toilet services on dwelling (yes=1)	0.34	0.25*
Appropriate Access to power supply on dwelling (yes=1)	0.96	0.94
Household Assets Value	3,100	2,105**
Productive Assets Value	14,117	5,179***
Land Holding (Has.)	5.7	2.3***
Risk Attitude - (1=more averse, 5=less averse)	3	2.5**
Maximum Credit access	20,859	7,476***
Number of Organization Memberships	2.2	1.2***

Note:***99% significance, ** 95% significance, * 90% significance.

The differences between the farmers with access to dynamic markets through specialized technical assistance, and those without access to any technical assistance and still relying on traditional consumption market evidence that ECOSER and FOVIDA have accomplished to enroll in their program a group of farmers that could be called an "elite".

4. Estimation of the "distance" to dynamic markets.

4.1. Methodological Framework

Following Lapar et al (2003), a way of studying the decision of the farmers on the matter of accessing or not dynamic markets, is the comparison between the utility that the farmer would receive if he would have access to those markets (for example thru the assimilation of technological knowledge), $y_i^* = U(Z_1)$, and the utility that would be obtained if he do not have access to those markets, $v_i^* = U(Z_0)$, where Z are the sales obtained[5]. Assuming that this difference between the utilities is determined by a set of specific characteristics of each producer, x_i, the following relationship can be raised:

$$y_i^* = f_i(x_i) \qquad (1)$$

[5] The asterisk (*) has been used to represent the fact that both utility levels are latent variables (not observable variables)

Where it is assumed, without loosing generality, that the utility when not having access to dynamic markets is equal to 0, and therefore the difference of utilities is equal to y_i. If the Z_{si} value, sells value, of those who can not sell in that market could be observed , this would be negative value (Z_{si} <0), and the distance to zero will indicate how far is that farmer from those dynamic markets. Due to the fact that the utility levels are not observable, it is necessary to define an observable indicator, $\boldsymbol{y}$, which will take the value of 1 when the utility related to the access to dynamic markets higher to the utility of not having that access, and 0 in the contrary case. In this context, a probit model approximation of access to dynamic markets would be:

$$prob(y_i = 1) = \Phi(X_i \beta) \tag{2}$$

where the endogenous variable takes the value of 1, if the household has access to a dynamic market, and 0 otherwise. The X_i vector contains a set of variables that characterize the farmer, these include: demographic variables (number of household members, and head of the household age), education (years of education for the head of the household), value of goods possessed (value of households assets for production), measures of risk aversion (the rate of risk aversion is calculated through a set of games), of access to credit (farmers perception of credit line) and social capital (number of organizations in which the household takes part). β is a vector of coefficients that controls the relationship between the household characteristics mentioned earlier and the dynamic markets participation; and finally u_i is a random error.

Once the estimation of the probit model has been made, it is possible to obtain from the equation an estimation of the "distance to the market" (δ). This distance is defined in terms of the required increase in any variable that characterizes the farmers for example x^c, in such a way that the farmers that do not participate on the market of technical assistance can still have access to the market:

$$\delta \equiv \hat{x}_i^c - x_i^c = -\frac{X_i \beta}{\beta_c} \tag{3}$$

In this case $\hat{x}_i^c$ is the amount of credit that the household i needs to be able to participate on a dynamic market, x_i^c is the credit level observed on that household. β_c is the parameter that represents the measure of the effect of the credit over the participation and $X_I\beta$ is the product of the matrix of characteristics of the household multiplied by the coefficients without the credit level. It is important to note that we have chosen credit as a convenient monetary yardstick, but δ can certainly be measured through any other indicator, like years of education, land size, etc.

Since the data is only observable for the potato sales that take place on dynamic markets, the only farmers that are being considered are those that participate on those markets and not the ones that sell to traditional markets, for the latter ones the sales are calsified as 0 (censured data). To address the censored nature of the data a Tobit model is relevant, because it would allow us to obtain an estimator of the latent variable for those that are not accessing dynamic markets. Once the estimators of the Tobit equation are obtained it is possible to use the decomposition of the marginal effects proposed by McDonald and Mofitt (1990), to assess, under an exogenous shock, the relative importance of the presence of new producers' respect to the increase on the sales of the ones that were already selling on the dynamic markets. That decomposition is as follows:

$$\frac{\partial \mathrm{E}[y_i/x_i]}{\partial x_i} = \Pr ob[y_i > 0]\frac{\partial \mathrm{E}[y_i/x_i, y_i > 0]}{\partial x_i} + \mathrm{E}[y_i, y_i > 0]\frac{\partial \Pr ob[y_i > 0]}{\partial x_i} \quad (4)$$

From this equation, a change in x_i has two effects, the first one affects the conditional average of y^*_i on the positive part of the distribution; and the second one, affects the probability that the observed data falls on that part of the distribution.

5. Empirical results

5.1 Determinants of access to dynamic markets for the small potato farmers

Table 2 shows the main determinants of farmers having access to dynamic markets for potato. As it can be seen, the main variables that explain participation are those

associated to the degree of organization of the producers, the level of education of these, and the access to credit (represented by the credit line indicator).

Table 2
Probit Models for Market Participation in Potato Dynamic Markets

Variables	*Marginal Effects (St. Desv.)*		
	Model 1		*Model 2*
Number of Household Members	-0.028	*	-0.026
	(0.015)		(0.015)
Age of Head of Household	-0.004	**	-0.003
	(0.002)		(0.002)
Maximum Years of Education within the Household	0.021	*	.
	(0.011)		.
Máximum Education Achieved is Incomplete Primary (0=no, 1=yes)	.		-0.224
	.		(0.060)
Risk Attitude - (1=more averse, 5=less averse)	0.023		0.025
	(0.018)		(0.019)
Credit Line (thousand of soles)	0.01	***	0.011
	(0.003)		(0.003)
Land Holding (Has.)	0.005		0.005
	(0.006)		(0.006)
Number of Organization Memberships	0.114	***	0.118
	(0.024)		(0.024)
NGO Dummy (0=Ecoser, 1=Fovida)	-0.122	**	-0.124
	(0.060)		(0.061)
Number of Observations	287		287
Pseudo R-square	0.219		0.222
	Participants		
% positive predctions	40.7%		34.6%
% negative predictions	59.3%		65.4%
	Non participants		
% positive predctions	5.8%		4.4%
% negative predictions	94.2%		95.6%

Note: Marginal Effects are calculated for dummies reflect the change when dummy changes from 0 to 1.
***99% significance, ** 95% significance, * 90% significance.

Table 3, shows the results of the estimation of the necessary credit increase to turn non-participant farmers to participate in the dynamic markets as a result of the technical assistance services. To express the distance to the market on monetary units, the necessary amount of the credit line increase has been simulated for those that do not access to dynamic markets.

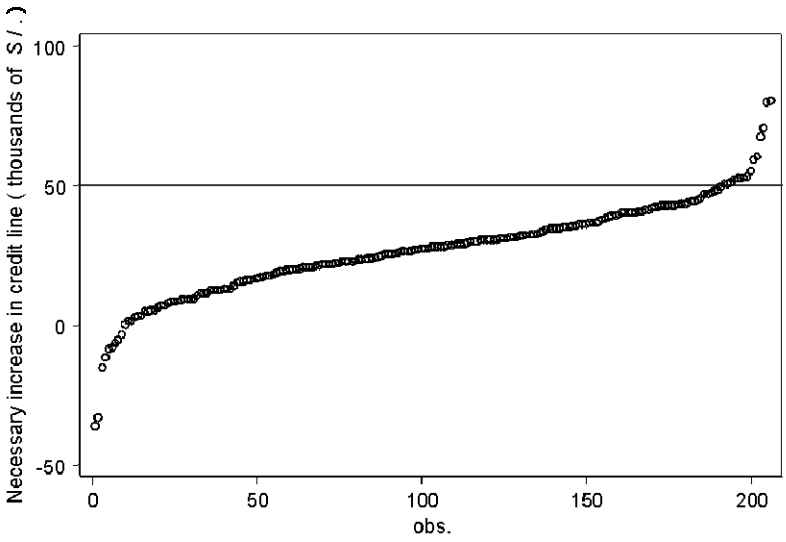
Table 3
Distance to "Dynamic Markets"
(in units of Credit)

Potato Producers by zone	*Average increase on credit required to access a dynamic market (thousands of soles)*	*Credit increase per*		*Credit increase as % of Potato value of Ouput*
		hectare (thousand soles per ha.)	*Metric on of Potato Output (thousand soles per ha.)*	
Muestra Total	26.9	24.4	4.9	1.39%
Muestra Ecoser	25.4	19.1	4.5	1.44%
Muestra Fovida	28.1	28.3	5.1	1.35%

Source: Owns estimated based on GRADE 2003 Survey

It is surprising the relative magnitude of that "distance". In average the distance represents less than 2% of the production value making evident that those not entering dynamic markets may not be as far away as we may believe. However, as it is shown on Figure 1, there is a strong within variance between farmers. Some farmers are extremely close to the market, on the sense that just a small increase on the credit line would allow them to access dynamic markets. On the other hand, an important group of small farmers (more than half of them) are located further away from the market; at a distance of 25,000 soles[6] (in this case the number is almost three times higher than the average sales from a farmer to the traditional market). Moreover, 10% of the sample is located at distances higher than 50,000 soles (i.e. 15,150 US$), which is the maximum credit line registered on the sample of farmers that had access to the dynamic markets.

Figure 1
Additional Credit Needed to Participate in a Dynamic Market



5.2 Impacts of the sales to dynamic markets

Obviously, it is not only important to know how close can a farmer be from selling his first unit of production in a new market, but also know how much could he sell in that market if some of the restrictions that he faces would be relaxed. Table 5 shows different

[6] This is approximately 7,500 US$.

simulations based on the Tobit regression results depicted in Table 4. The first simulation duplicates the average credit line available, but distributes it evenly among farmers (the same amount for each one). On the other hand, the second simulation duplicates the credit line of each individual farmer. Finally, the third one duplicates the credit line per hectare of each farmer.

Table 4

Tobit Model for Sales in Potato Dynamic Markets in accordance to NGO's Influence Zone

Variables	***Marginal Effects (Standard Dev.)***		
	All	***Ecoser***	***Fovida***
Number of Household Members	-2.291	-5.772	1.179
	(4.470)	(8.252)	(2.354)
Age of Household Head	-1.418 **	-1.223	-0.74 **
	(0.701)	(1.285)	(0.371)
Máximum Education Achieved is Incomplete Primary (0=no, 1=yes)	-71.908	-1.897	-247.696
	(56.238)	(92.586)	(0.000)
Risk Attitude - (1=more averse, 5=less averse)	0.067	0.413	0.306
	(5.609)	(10.705)	(2.787)
Credit Line (thousand of soles)	2.789 ***	4.92 ***	1.043 ***
	(0.598)	(1.146)	(0.304)
Land Holding (Has.)	4.801 ***	5.671 **	0.518
	(1.549)	(2.377)	(1.158)
Number of Organization Memberships	22.124 ***	28.147 **	10.046 ***
	(6.750)	(13.869)	(3.227)
NGO Dummy (0=Ecoser, 1=Fovida)	-53.047 ***	.	.
	(17.807)	.	.
Constant	-48.793	-112.56	-26.648
	(46.488)	(89.938)	(21.243)
Number of Observations	287	128	159
Number of Censured Observations	207	89	118
Pseudo R-square	0.0689	0.0781	0.0772
		Participants	
% positive predictions	30.1%	41.5%	28.6%
% negative predictions	69.9%	58.5%	71.4%
		Non participants	
% positive predictions	2.9%	3.4%	2.6%
% negative predictions	97.1%	96.6%	97.4%

Note: Marginal Effects are calculated for dummies reflect the change when dummy changes from 0 to 1.

***99% significance, ** 95% significance, * 90% significance.

Table 5

Decomposition of Dynamic Markets Sales Variation after Simulations of Positive Credit Shocks

Decomposition	**(1)** $credit_t + \overline{credit}$		**(2)** $credit_i * 2$		**(3)** $credit_i + \left(\overline{\frac{credit}{ha}}\right) * has_i$	
By older sellers	920	35.7%	2,443	58.0%	4,316	62.1%
By newer sellers	1,654	64.3%	1,772	42.0%	2,637	37.9%
Total variation	2,573	100.0%	4,215	100.0%	6,953	100.0%
Percentage increase over total sales	46.8%	-	76.7%	-	126.5%	-

Results of the first simulation suggest that the response is important, yielding a 47% increase of 47% on the sales to dynamic markets. Furthermore, two thirds of this increase is concentrated on producers that had never been related to those markets, and only a third of it is related to old farmers that already had access these markets. On the other hand, under the other two scenarios, as it was expected, we found a bigger impact on older farmers that already had access, had a greater amount of land and possessed other assets that made them more productive. In contrast, under these scenarios, farmers with no current access would have smaller possibilities to access dynamic markets.

5.3 How robust are these results?

One potential problem with the estimated "distance to market" is that it is difficult to know its statistical distribution to be sure that the average values reported above are a reasonable approximation to the expected value of the distance to the market. The problem lies in that is not possible to obtain directly the distribution of δ since it is the ratio of two random quantities (see equation 3).

As has been already mentioned, δ measures what is needed for producer i , in terms of a particular observable (in this case credit), to participate and sale some quantity in the dynamic market. The problem is that δ is the ratio of two random quantities, which depend on u^p and u^s. One indirect way of evaluation the distribution of δ is using some Monte Carlo simulation method. In this case following Holloway et al (2002) we use a Gibbs sampler, which is a Markov Chain Monte Carlo method. The idea behind this way of retrieve the posterior distribution of δ is that if we know the conditional distribution of:

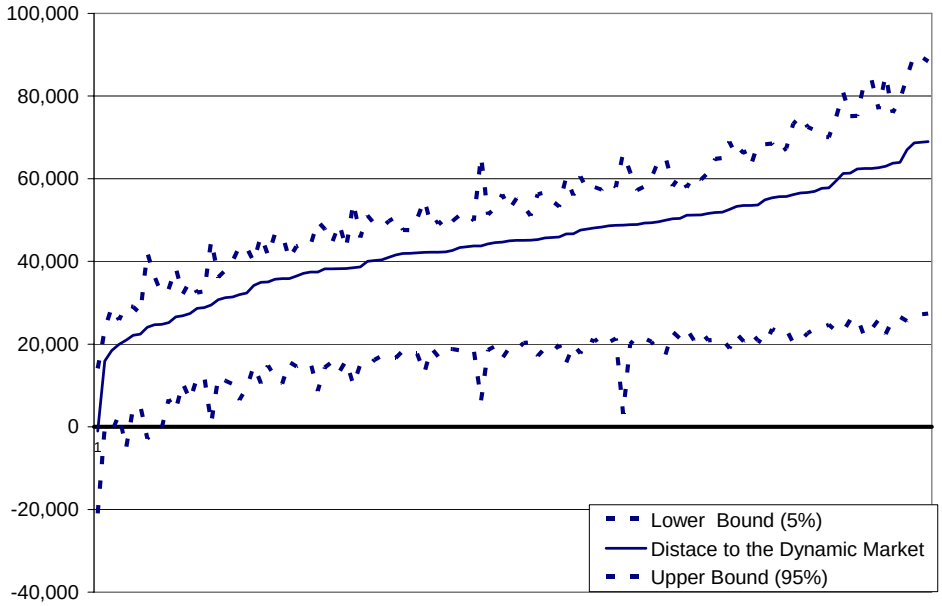
$$
\begin{aligned}
&y^P \mid \Sigma, \beta, y^S \sim \textit{Truncated Normal}[E(y^P), v(y^P)] \\
&y^S \mid y^P, \Sigma, \beta \sim \textit{Truncated Normal}[E(y^S), v(y^S)] \\
&\beta \mid y^S, y^P, \Sigma \sim \textit{Normal}\ [E(\beta^S), v(\beta^S)] \\
&\Sigma \mid \beta, y^S, y^P \sim \text{Wishart - Normal Inverse}\ [E(\Sigma), v(\Sigma)]
\end{aligned}
\tag{5}
$$

is possible to draw random samples of the posterior distribution of $F(y^P, y^S, \beta, \Sigma)$, which is the joint distribution of all parameters of interest (the latent variables that measure the distance to the market and the standard deviations of those estimates) this

random samples can be obtained in a consistent way following the iterative procedure suggested by Holloway et al (2002). This procedure allows us to obtain simultaneously the parameters of the probit and tobit equation plus the estimate of the "distance to the market and its confidence interval.

Figure 3 shows the confidence interval obtained for the distance to dynamic potato markets[7]. It is interested to note that although the average values are similar to the ones reported above, the distribution of the parameter of interest (δ) is asymmetric and biased towards zero. This pattern may be a signal that farmers in the area under study may be more easily prone to enter the market than initially thought as it may be need a lower increase in any of the independent variables to motivate a demand for technical assistance that pushed the producer into the dynamic market.

Figure 3
Esimated Distance to the Potato Dynamic Market
(Monte Carlo Simulation)



[7] Participation and sales equations are very similar to the ones reported above and are not report here but are available upon request.

6. Conclusions

Market failure in rural Peru is widespread due to many problems like poor infrastructure, market segmentation, poor enforcement of contracts, imperfect information, high risk, and regulatory uncertainty, among the most important. Under this scenario, it is unrealistic to expect that agro industry by itself will be successful in connecting farmers to output markets. Such a situation of non-competitive markets and inefficient private provision may justify Government and/or NGO intervention. However, these interventions need to be cautious to avoid amplifying these problems and further retarding or, even worse, impeding the development of efficient and competitive markets

As mentioned, the relationship between the small farmers and the two dynamic markets identified in this study has been mediated, in both cases, through NGOs. In cases were thin or underdeveloped markets prevail, NGOs may provide the "social capital" needed to successfully link small producers facing high marketing and transaction costs with processors that face high uncertainty and monitoring costs. NGOs may provide market access information through its networks of contacts. They may also reduce transactions costs in contracting by building trust in both sides of the market spectrum. Further, NGOs may build capacity for collective action in small and disperse farmers.

As Johnson et al (2002) argue that firms use their information networks to identify and contact clients, to access market information and inputs, and to obtain technical and financial assistance. In this case, it is clear that both NGO's, and specially FOVIDA, are very successful in using its information network to help small potato farmers reach new dynamic market opportunities.

In addition financing problems for the producers are quite serious. Credit does not reach the farmer in time. Considered as a serious problem in general, this fact is critical when farmers are growing a variety like Capiro, which requires enough liquidity from sowing to harvest. For example, for some farmers interviewed for this research, the loans were

only disbursed after the harvest. As a consequence, they were not able to test the sugar content of the potato (which cannot exceed 0.03%) and harvest them before reaching required levels.

In summary, the results obtained point out the fact that appropriate investment policies in infrastructure need to go together with well-functioning market institutions to take advantage of market opportunities, sustain increased agricultural output, and raise rural incomes. This is a critically important for small holders. When market information and markets themselves are not accessible to the small holders, even when hard infrastructure exists, farmers capture little of the value they create. The demand and supply remain highly unstable, and so are the distribution costs for goods produced in rural areas. All in all, markets often do not work for the small holders and there is a need of interventions as the ones analyzed in this paper.

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