Transaction Costs and Institutional Arrangements in Potato Marketing by Small Producers in Rural Peru

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OVERVIEW

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- Potato marketing in the Mantaro valley - Peru
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    - Selling seed potato on the spot market
    - Selling an improved variety to the industrial (Processed) potato market through contract-based agro industry arrangements
- Contract farming and transaction costs
- Determinants of access to dynamic markets
- Conclusions and policy implications

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Motivation

- Peruvian economy has been growing steadily over a more than a decade… however trickle-down effects are limited

Poverty-Growth Elesticities for Rural Peru

|	Rural Costa	Rural Sierra	Rural Selva	Urban Peru	Rural Peru
1997	-1.092	-0.737	-0.937	-1.367	-1.283
	(0.099)	(0.055)	(0.085)	(0.052)	(0.074)
1998	-1.046	-0.699	-1.296	-1.358	-1.358
	(0.091)	(0.051)	(0.107)	(0.056)	(0.074)
1999	-1.161	-0.647	-0.995	-1.358	-1.221
	(0.121)	(0.081)	(0.113)	(0.061)	(0.102)
2000	-1.323	-0.873	-0.915	-1.393	-1.366
	(0.150)	(0.084)	(0.130)	(0.080)	(0.107)
2001	-1.176	-0.559	-0.720	-1.364	-1.035
	(0.141)	(0.040)	(0.074)	(0.046)	(0.062)
2002	-0.941	-0.680	-0.755	-1.274	-1.087
	(0.080)	(0.037)	(0.059)	(0.043)	(0.049)

Note: Standard error in parenthesis. Calculations based on Duclos et.al (2004)
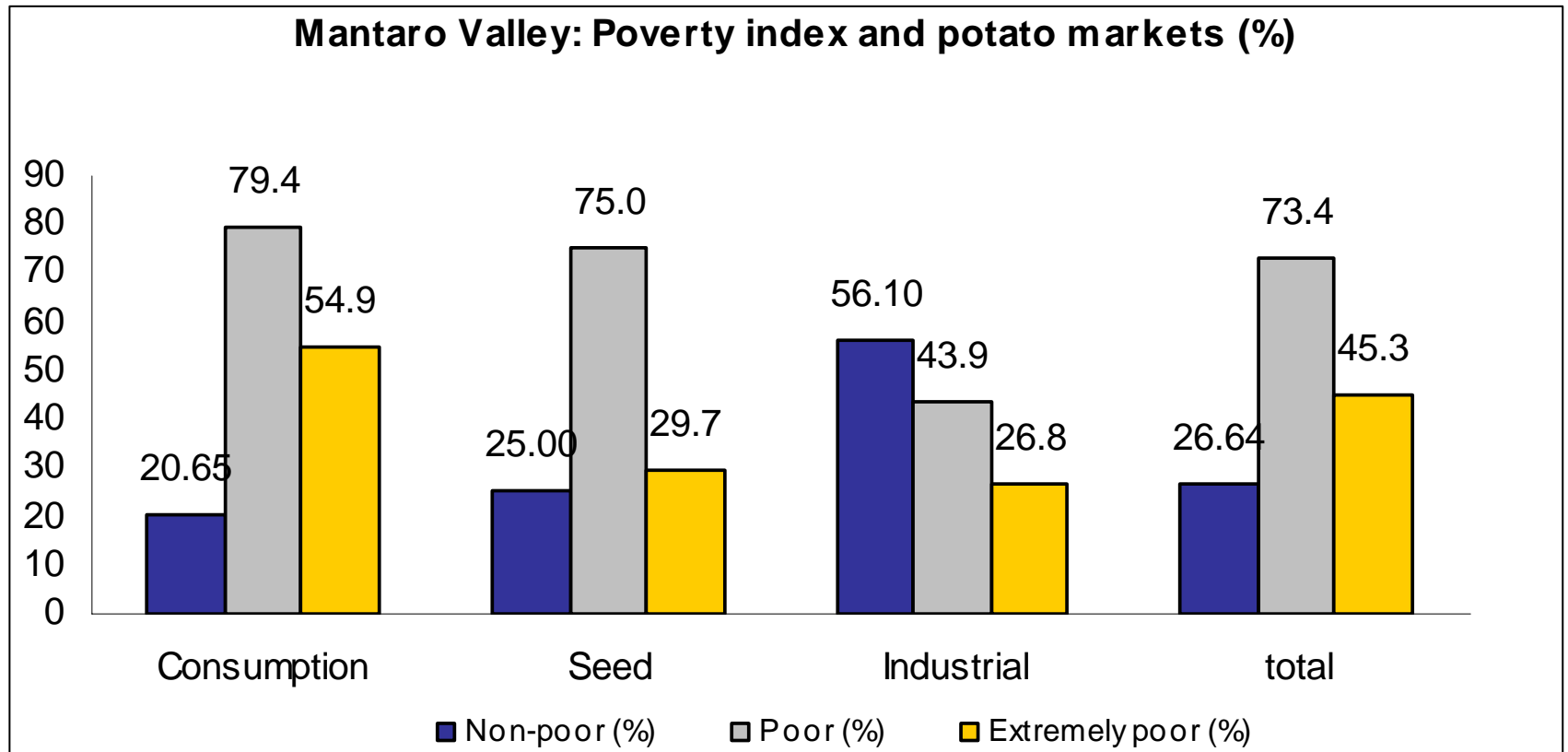
In rural sierra elasticity is much lower

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Study Area
Mantaro Valley - Peru
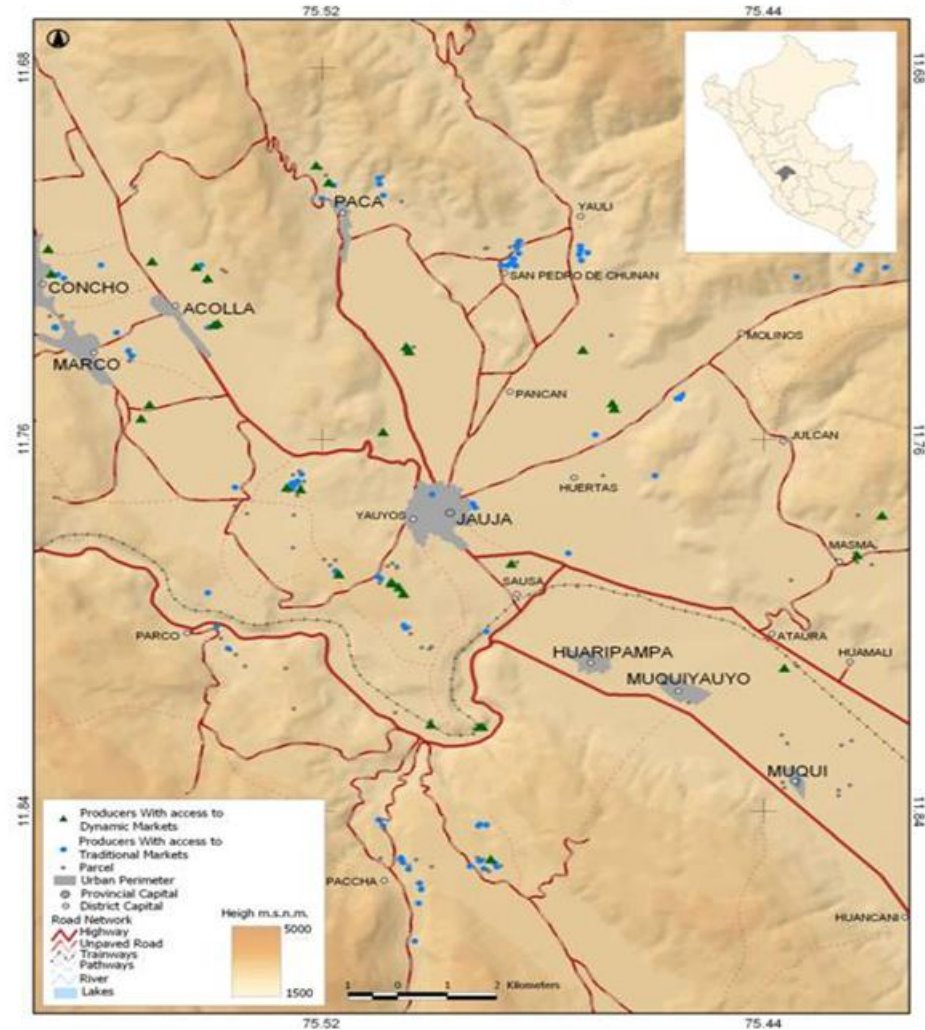
Connection to markets is different between regions
- Infrastructure differences
- Institutional differences

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Potato marketing in the Mantaro valley

Mantaro Valley: Poverty index and potato markets (%)

	Non-poor (%)	Poor (%)	Extremely poor (%)
Consumption	20.65	79.4	54.9
Seed	25.00	75.0	29.7
Industrial	56.10	43.9	26.8
total	26.64	73.4	45.3

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Key Hypothesis

- Certain marketing relations induce producers to invest more and/or target their production to specific "dynamic markets" (dynamic markets are those capable of absorbing increasing quantities of farmers' produce, either because of the scale of the market, or because demand is rising rapidly)

- Reducing transaction Cost improves the likelihood of small farmers of connecting to more profitable – yet more complex potato output markets,

- No investment/intervention by itself but complementary interventions are needed to connect small farmers in a profitable way to dynamic markets.

The Sample

- 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 potential control group to evaluate the impact and determinants of accessing dynamic markets.

Potato Farmers	Institutional arrangements	
	With access to dynamic Markets thanks to Technical Assistance	Control Group
Original Sample	100	200
Final Sample	83	206

Methodology

- We use a comparative statistics framework to compare marketing outcomes under two distinct institutional scenarios: (a) selling to the traditional potato market and (b) selling to the agro industry The comparison allows us to convey the magnitude of transaction costs involved in moving from producing potatoes for the traditional final consumer market to producing potatoes for the industry (chips)

- The estimation is done using a survey that included detailed information for all transactions generated for our sample of small farmers (financed in previous study)

- Complementary information was gathered through in-depth interviews to key actors along the marketing chain:
  - Producers
  - Agro-processors
  - Local Government Officials
  - Other public intervention agencies (credit / technological assistance)

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Empirical Strategy

- Based mainly on the strategy proposed by Williamson (1979). In this strategy, the need to directly evaluate transaction costs associated with the different trade relationships is "evaded" by reformulating arguments associated with transaction cost economics in terms of the effects that certain observable attributes would have on the differential costs of implementing, or not implementing, a market transaction.
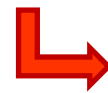
$$T^* = T^1, \ if \ CT^1 < CT^2$$

(1)

$$T^* = T^2, \ if \ CT^1 \geq CT^2$$

$$CT^1 = \beta_1 X + \varepsilon_1$$

(2)

$$CT^2 = \beta_2 X + \varepsilon_2$$

$$Prob(\ CT^1 > CT^2\ ) = Prob(e_1 - e_2 < (\ \beta_2 - \beta_1)X\ )$$

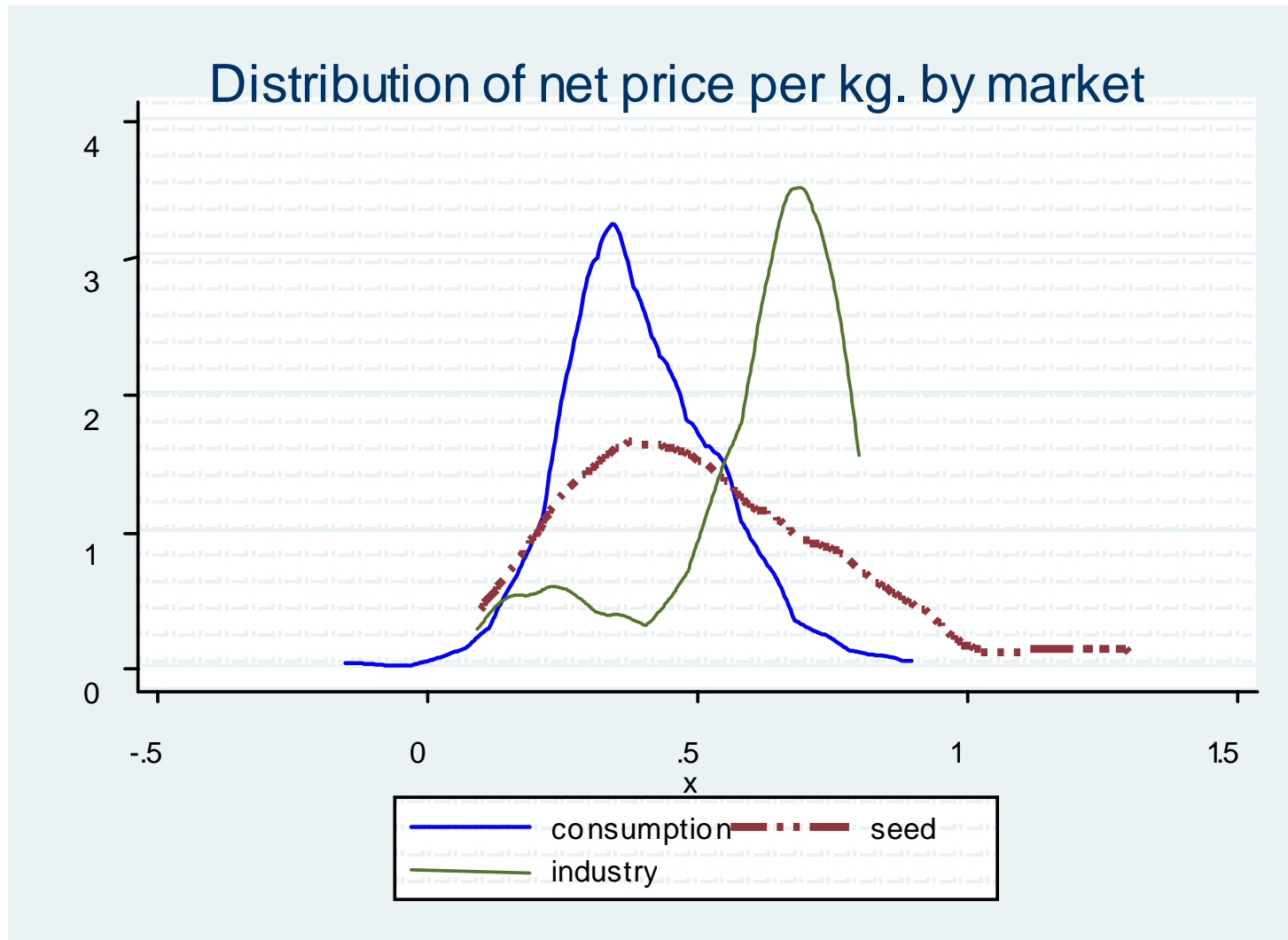$$\hat{x}_i^c - x_i^c = -\frac{X_i \beta}{\beta_c}$$

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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 and the utility that would be obtained if he do not have access to those markets. After estimating the likelihood that a farmer access a dynamic market, we simulate the increase on any exogenous variable for all the farmers not participating, so their probability of participating on the market exceeds 0.5.

Distance to Dynamic Markets

Utility

$U(Z_{sj})$

$U(Z_{si})$

δ_i

Z_{si} 0 Z_{sj} Sales
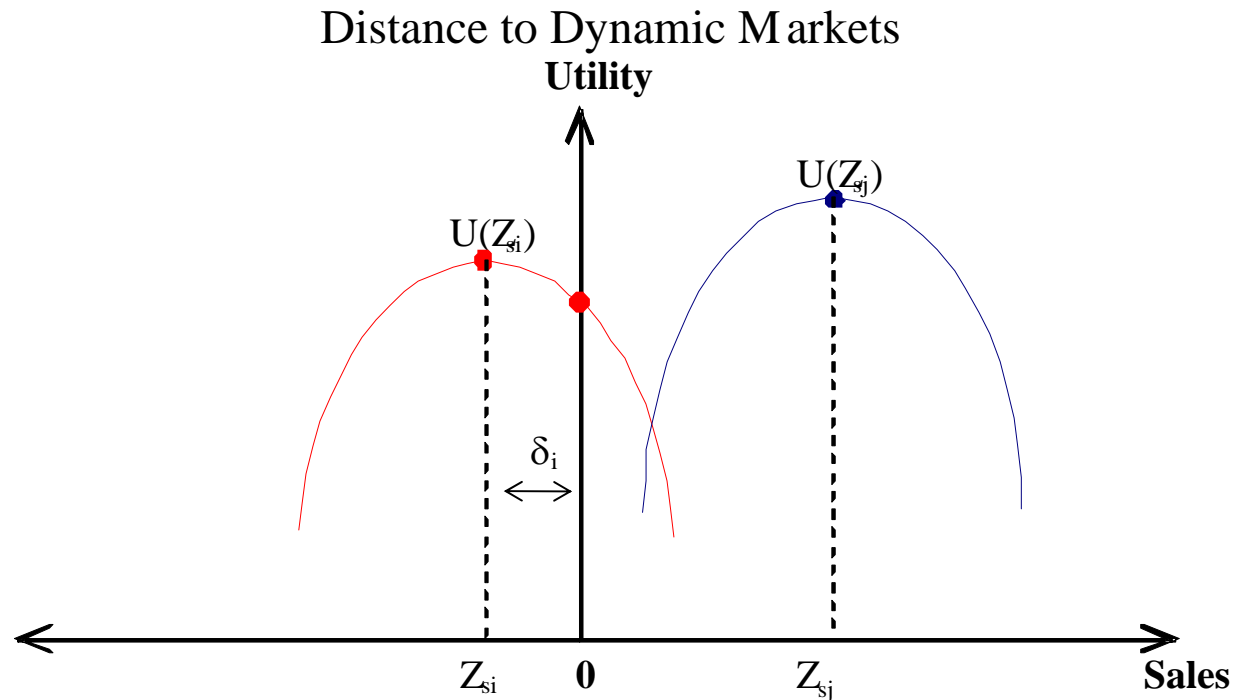
* Taken from Lapar et al (2003), page 190

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Potato marketing in the Mantaro valley: Main Results

Distribution of net price per kg. by market

Potato marketing in the Mantaro valley

Characteristics of potato producers by market

Variables	Direct consumption	Seed	Industrial
sex of head of household (1=male)	0.96	0.95	0.83 ***
Age of head of household	49.26	47.08	47.39
Average years of schooling - head of household	10.10	10.98	12.12 ***
Maximun number of years reached by any household member	12.14	13.11 **	13.68 ***
Average years of experience in potato production	17.10	17.09	18.44
Average years of experience selling potatoes	14.41	14.48	11.85
Use of certified seed (1=yes)	0.25	0.58 ***	0.76 ***
Total area of own land in hectares (ha)	1.87	5.70 ***	5.59 ***
Value of productive assets in median values (S/.)	4,442	13,668 ***	15,456 ***
Value of household assets in median values (S/.)	2,035	3,482 ***	3,092
Median Value of farm stock (S/.)	4,114	5,445	9,404 ***
Total savings (S/.)	3,487	7,806 ***	11,511 ***
Maximun credit line received (S/.)	7,044	17,020 ***	21,988 ***
Number of organiztions of which is a member	1.38	1.52	2.29 ***
index of risk by principal componets	12.37	12.86	12.30
Received technical assistance in the last 12 months	0.18	0.45 ***	0.76 ***
Average spending on technical assistance (s/.)	15.16	21.03	146.20 ***
Attented some training course (1=yes)	0.17	0.47 ***	0.80 ***
Use of certified seed (1=yes)	0.25	0.58 ***	0.76 ***

Note: *** ** * Diferences significant to 99%, 95% y 90% respectively
Source: Survey on Farm Services Markets. GRADE

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Contract farming as a factor in producer-agroindustry relationships
Transaction characteristics

	Variables	Spot market, consumption potatoes		Vertical integration,
		Farm	Wholesale markets	Agroindustry
Principal characteristics, by market	Total volume sold by producer (t)	17.98	42.4 ***	49.0
	Average price (S/. x kg)	0.42	0.46 **	0.73 ***
	Net transportation price (S/. x kg)	0.42	0.39	0.64 ***
	Transportation cost (S/. x kg)	0.00	64.48 ***	89.02 ***
	Merchandise signed for (1=yes)	0.04	0.38 ***	0.93 ***
Negotiation costs	Number of visits for negotiating	0.13	0.48 ***	0.45
	Number of hours spent in negotiating	0.31	3.81 ***	0.83
Monitoring costs	Number of visits for negotiating	0.37	0.83 **	0.95
	Monetary costs (S/.)	1.10	15.07 ***	21.64
	Cost in hours	0.17	2.78 ***	2.16
Marketing problems	deterioration of merchandise in transport is a problem important or very important (1= yes)	0.03	0.39 ***	0.59
	Has had problems of non fulfilmet by merchant	0.03	0.02	0.04
	Producer failed to fulfil contract once	0.12	0.09	0.00
	Conflict because quality not recognized	0.07	0.11	0.04
Relationships of trust	Trust in the merchant to whom selling (1=yes)	0.54	0.77 **	0.93 *
	Level of trust in merchant (7= total trust)	5.13	5.63 **	6.40 **
	Average years merchant known	4.99	7.89 **	2.59 ***
Availability of liquidity	Cash payment (1=yes)	0.99	0.95 **	0.59 ***
	Average days taken to pay	0.65	5.54	17.52

Note: *** ** * Diferences significant to 99%, 95% y 90% respectively

Source: Survey on Farm Services Markets. GRADE

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Additional Findings

- There is asymmetric bargaining power between the agro-industry and the small farmer… however there are circumstances (asset specificity) in which this bargaining power gets reduced:
  - High storage costs due to seasonality, difficulties for vertical integration
  - Existence of another party that assumes the monitoring costs
  - Building trust
- On the side of the producers risk bearing is high and not everybody can assume the high risks associated with the new seed variety

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Determinants of access to dynamic markets: methodology and empirical evidence

How close are small producers to more dynamic markets?
(Marginal contribution to estimated probability)

	Primary incomplete	Secondary and higher	Difference	Significance
1. By head of household`s education level	0.04	0.08	0.04 **	0.04
	tercile I (up to 1 hectare)	Tercile III (<= 2.5 hectares)		
2. By size of (own) land parcel	0.06	0.10	0.04 **	0.01
	Tercile of most fragmentation	Tercile of least fragmentation		
3. Fragmentation of land	0.07	0.10	0.03 *	0.07
	Most averse tercile	Least averse tercile		
4. Aversion to risk	0.05	0.07	0.02	0.28

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Determinants of access to dynamic markets: methodology and empirical evidence

How close are small producers to more dynamic markets?
(Marginal contribution to estimated probability)

	None	1 or more organizations		
5. Membership in organizations	0.04	0.08	0.05 ***	0.00
--- 3 or more		0.12	0.08 ***	0.00
	Tercile I (up to s/. 4,500)	Tercile III (s/. 9,500 or more)		
6. By credit line	0.04	0.13	0.08 ***	0.00
	Extremely poor	Not poor		
7. By monetary poverty	0.05	0.11	0.06 ***	0.00
---Not extreme poverty	0.05	0.08	0.03 **	0.04
	At least 1 UBN	No UBNs		
8. Poverty as measured by UBNs	0.06	0.11	0.06 ***	0.00

Source: Simulations based on estimates made in this study

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"Distance" to Dynamic Markets
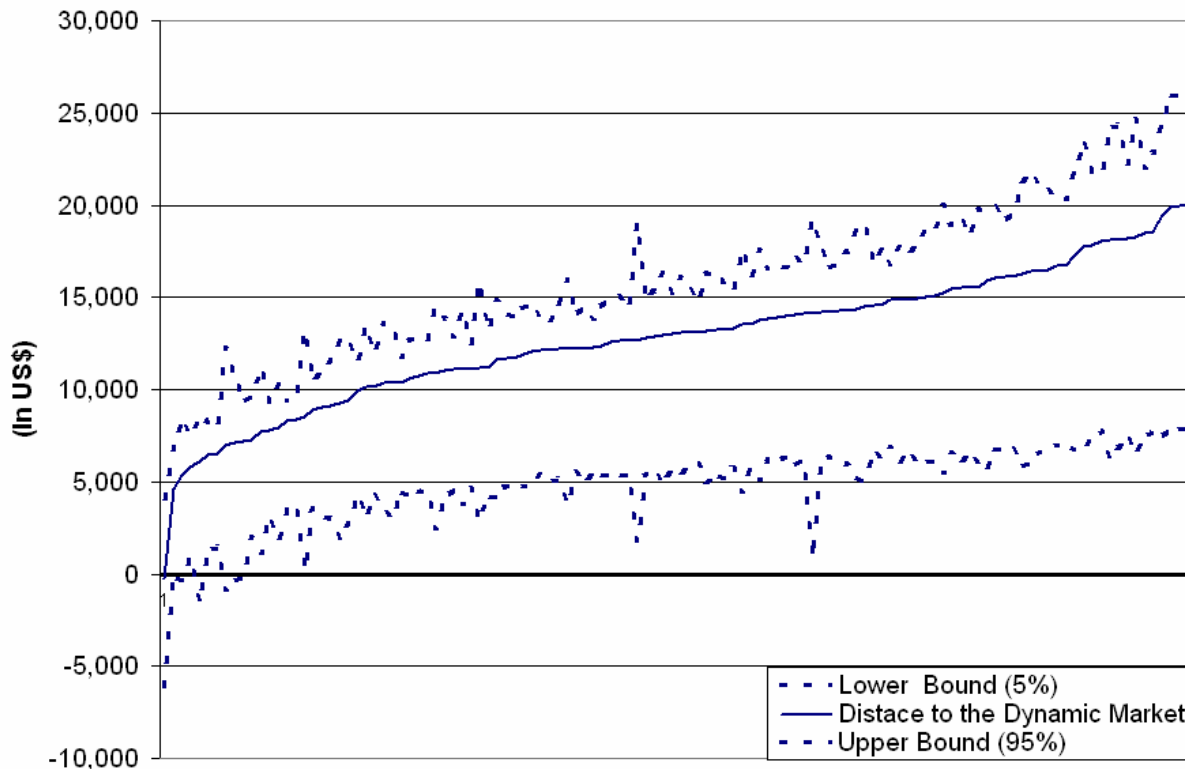
In a complementary paper (Escobal and Torero, 2006) we show that transaction costs can be viewed as the "distance to the market"

Chart legend:
- Lower Bound (5%)
- Distace to the Dynamic Market
- Upper Bound (95%)

Y-axis: (In US$)

Transaction Costs or Distance to "Dynamic Markets"
(in units of Credit)

Potato Producers by zone	Average increase on credit required to access a dynamic market (US$ thousands)	Credit increase per		
		hectare (US$ thousands per ha.)	Metric on of Potato Output (US$ thousands per ha.)	Credit increase as % of Potato value of Ouput
Muestra Total	7.8	7.1	1.4	1.39%
Muestra Ecoser	7.4	5.5	1.3	1.44%
Muestra Fovida	8.1	8.2	1.5	1.35%

Source: Owns estimated based on GRADE 2003 Survey

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Conclusions and policy implications

- 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. In this context it is unrealistic to expect that agro industry by itself will be successful in connecting farmers to output markets.

- According to the agro industry, the main bottleneck for connecting directly a processing firm to potato producers is producers' lack of scale. Most commercial producers have plot sizes smaller than five hectares. According to the industry, a minimum threshold of five hectare plot is required to absorb fixed costs of the potato production for the potato chips market. This fixed cost includes initial training costs, capacity to use (and destroy) a fixed batch of production for testing purposes, and paying for proper specialized soil analysis. The amount of fixed costs prevents many small farmers from entering to dynamic markets independently.

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Conclusions and policy implications

- Contracting farming may be a solution for a group: those more educated, with less financial constraint and either with larger holdings (direct contracting) or through group association, in the case contracting problems are solved. (reduction of monitoring costs). However this solution will reach the poor only if complementary interventions happened

- NGOs may act as intermediary between the agro industry and a small producer to help producers gain access to the additional benefits that come with economies of scale. These organizations use their information networks to identify and contact clients, to gain access to market information and inputs, and to obtain financial and technical assistance. FOVIDA, for instance, uses its information network effectively to help small potato producers gain access to new opportunities in dynamic markets.

Conclusions and policy implications

- The role of the NGOs in facilitating relationships between small producers and dynamic markets is evident in various activities, which may be summarized as: (a) using information networks, (b) building trust, and (c) building capacity for collective action.

- Financing problems are very important for producers. Credit does not reach farmers in time; although this is a serious problem in general, it is especially critical when farmers are growing a potato variety which requires enough liquidity from sowing to harvest.

- We show that the most complex commercial relationships are the most profitable. However, these relationships involve greater transaction costs, since they take place in markets that demand higher product quality and more product differentiation, requirements that can only be met if growers invest more in the productive process.

- Institutional costs play a dominant role in these markets because of information asymmetries. The high transaction costs entailed are a barrier to access for producers with fewer resources, and prevent them from entering these more dynamic and hence potentially more profitable markets

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Thanks!