

Market participation decisions and market choices: A case study of Bolivian potato farmers

Catherine Larochelle and Jeffrey Alwang, Department of agricultural and applied economics, Virginia Tech
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Introduction

• Potato production is vital for impoverished households in the Bolivian Andes.

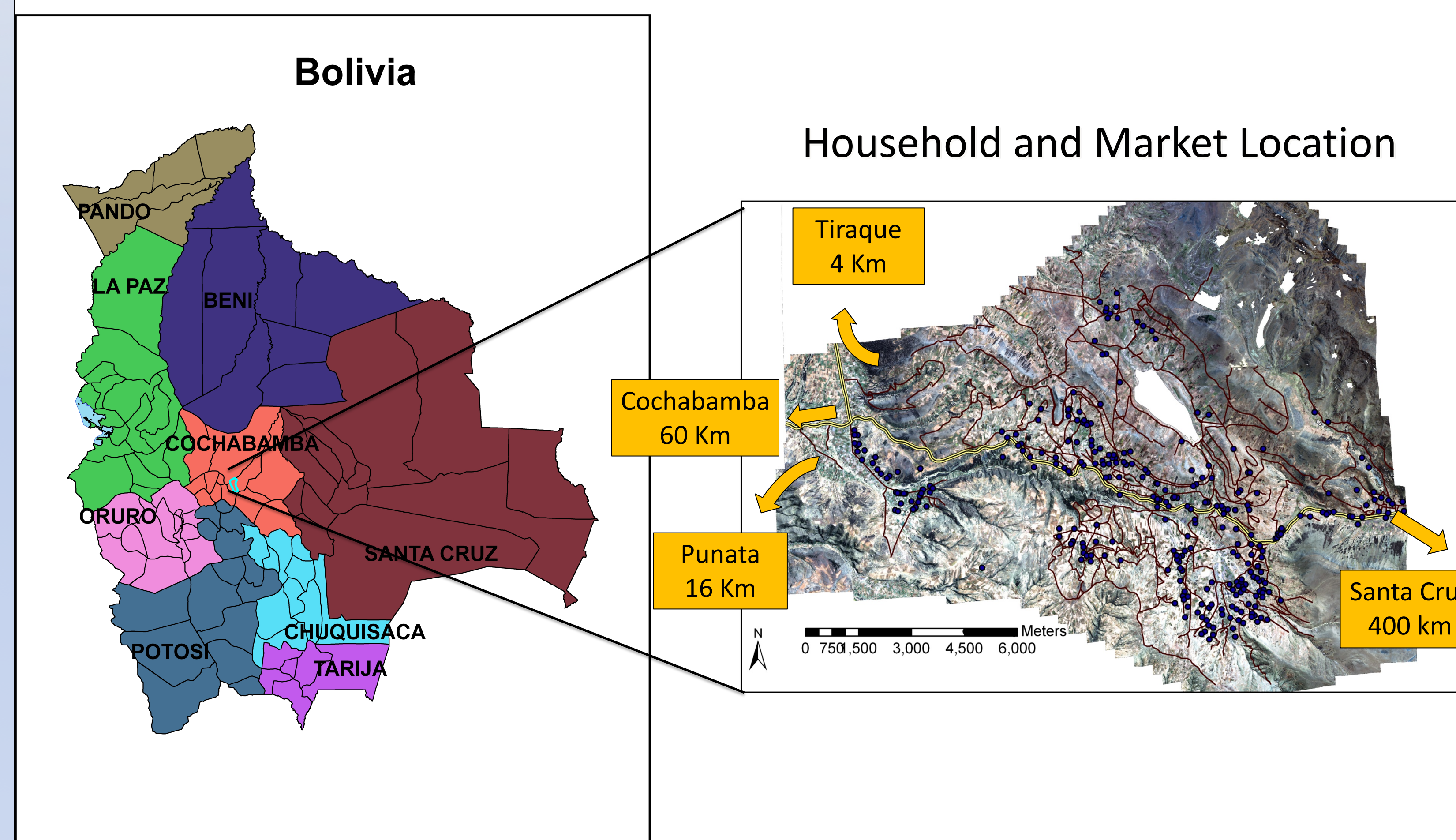
✓ Potato is the main food crop and cash crop followed by beans, cereal, and livestock.



✓ Potato sales represent 79.5% of crop revenue and 49.5% of total household revenue.

• Market participation can be a useful tool to lift small-scale farmers out of semi-subsistence farming and escape poverty¹.

• Identifying obstacles to market participation and factors to promote participation in higher-valued markets is necessary to increase farmers' income and welfare.



Research questions

1. What is needed to simulate small-scale farmers market participation and volume sold?
2. What is needed to improve marketing performance?

Methods

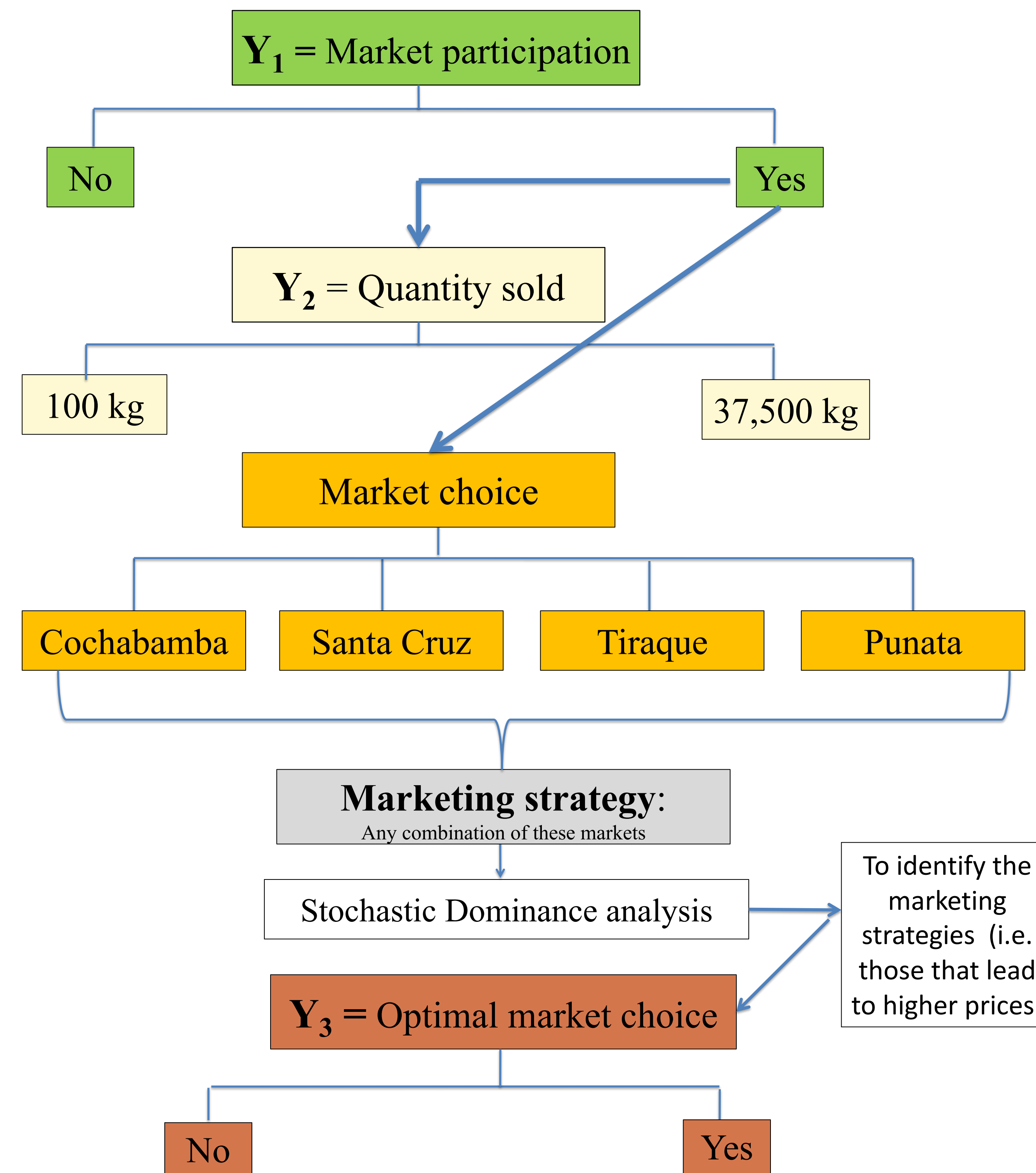
Simultaneous system of 3 equations with selectivity and a recursive equation²

$$\begin{aligned}
 y_1 &= f(x_1, x_2, x_3, x_4, x_5 | \gamma) + \mu_1 \\
 y_2^* &= f(x_2, x_3, x_4, x_5 | \beta) + \mu_2 \\
 y_3 &= f(y_2, x_1, x_2, x_5, x_6 | \delta) + \mu_3
 \end{aligned}$$

$$(\mu_1 + \mu_2 + \mu_3) \sim N(0, \Sigma)$$

$$\Sigma = \begin{bmatrix} 1 & \sigma_{12} & \sigma_{13} \\ \sigma_{21} & \sigma_{22} & \sigma_{23} \\ \sigma_{31} & \sigma_{32} & 1 \end{bmatrix} \Rightarrow \rho_{12}, \rho_{13}, \rho_{23} \neq 0$$

Conceptual framework



- X_1 = Fixed transaction costs
- X_2 = Proportional transaction costs
- X_3 = Determinants of household supply of potato
- X_4 = Determinants of household demand for potato
- X_5 = Household characteristics
- X_6 = Access to liquidity



Data

- Survey data:
 - ✓ 354 potato farmers
 - ✓ Data on agricultural activities, market participation, household characteristics, etc.
 - ✓ Geo-referenced household location
 - ✓ GIS data for road network, elevation, soil, etc.
- Market participation and quantity sold
 - ✓ 317 households sold an average of 4914 kg (5881) of potato
- Optimal market choice:
 - ✓ Optimal marketing strategies are: 1) Santa Cruz, 2) Cochabamba, 3) Punata/Tiraque/Cochabamba, and 4) Punata/Tiraque/Santa Cruz.
 - ✓ 36 households selected an optimal marketing strategy



Results

Market participation	Quantity sold	Optimal market choice
Fixed transaction costs		
-Radio ownership increases the probability of market participation by 6.5%. -An one unit increase in population density increases (population/0.8 km ²) the probability of joining the market by 0.6 percent.	NA	-Radio ownership increases the probability of selecting an optimal marketing strategy by 3%.
Proportional transaction costs		
-Living 1 km further away from Tiraque and Santa Cruz markets decreases market participation by 1.1% and 0.02% respectively.	-Living 1 km further away from Tiraque and Santa Cruz markets decreases quantity sold by 280kg and 5kg respectively.	-Living 1 km further away from the Tiraque and Santa Cruz markets decreases the likelihood of selecting an optimal marketing strategy by 13.9% and 0.2% respectively.
Determinants of household supply of potato		Supply
Insignificant	-An additional hectare in farm size increases quantity sold by 872 kg.	Selling an additional 1,000kg of potato increases the likelihood of selecting an optimal marketing strategy by 2.2%.
Determinants of household demand for potato		
-An additional child decreases the probability of market participation by 1.3%.	Insignificant	NA
Household characteristics		
-Households whose head attended secondary school are 11.9% more likely to participation in the market compared to households whose head has no formal education.	-Being a female household head reduces the quantity sold by 919 kg. -Primary education of the household head increases quantity sold by 574 kg compared to no education.	-Primary education of the household head increases the probability of selecting an optimal marketing strategy by 4.6% compared to no education. -An one-year increase in the age of the household head reduces the probability of selecting an optimal marketing strategy by 1.1%
Access to liquidity		
NA	NA	-An additional 1,000 Bs in livestock ownership value increases the likelihood of selecting an optimal marketing strategy by 1.3%.

Conclusions

- Reducing the costs of obtaining price information (additional price broadcasting, cellular use, training) could raise producers welfare.
 - Improving transportation alternatives and road quality in the study area could increase quantity sold and facilitate sales in more lucrative markets.
 - Policies aimed at increasing market surplus, such as technical assistance, could generate additional sales and provide better market opportunities to farmers, increasing their income.
- Credit programs, easing liquidity constraints, could help farmers adopt more profitable marketing strategies.

Acknowledgment:

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Reference:

- [1]: Barrett, C.B. (2008), Smallholder market participation: Concepts and evidence from eastern and southern Africa, *Food Policy* 33(4): 299-317.
- [2]: Roodman, D. 2011. Fitting fully observed recursive mixed-process models with cmp. *Stata Journal* 11: 159-206

