

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

**Catherine Larochelle**

**Jeffrey Alwang**

**Department of agricultural and applied economics**

**Virginia Tech**

***Selected Poster prepared for presentation at the International Association of Agricultural Economists (IAAE) Triennial Conference, Foz do Iguaçu, Brazil, 18-24 August, 2012.***

*Copyright 2012 by Catherine Larochelle and Jeffrey Alwang. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.*

# 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  
International Association of Agricultural Economists (IAAE) Triennial Conference, Foz do Iguacu, Brazil, 18-24 August, 2012.

## Introduction

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

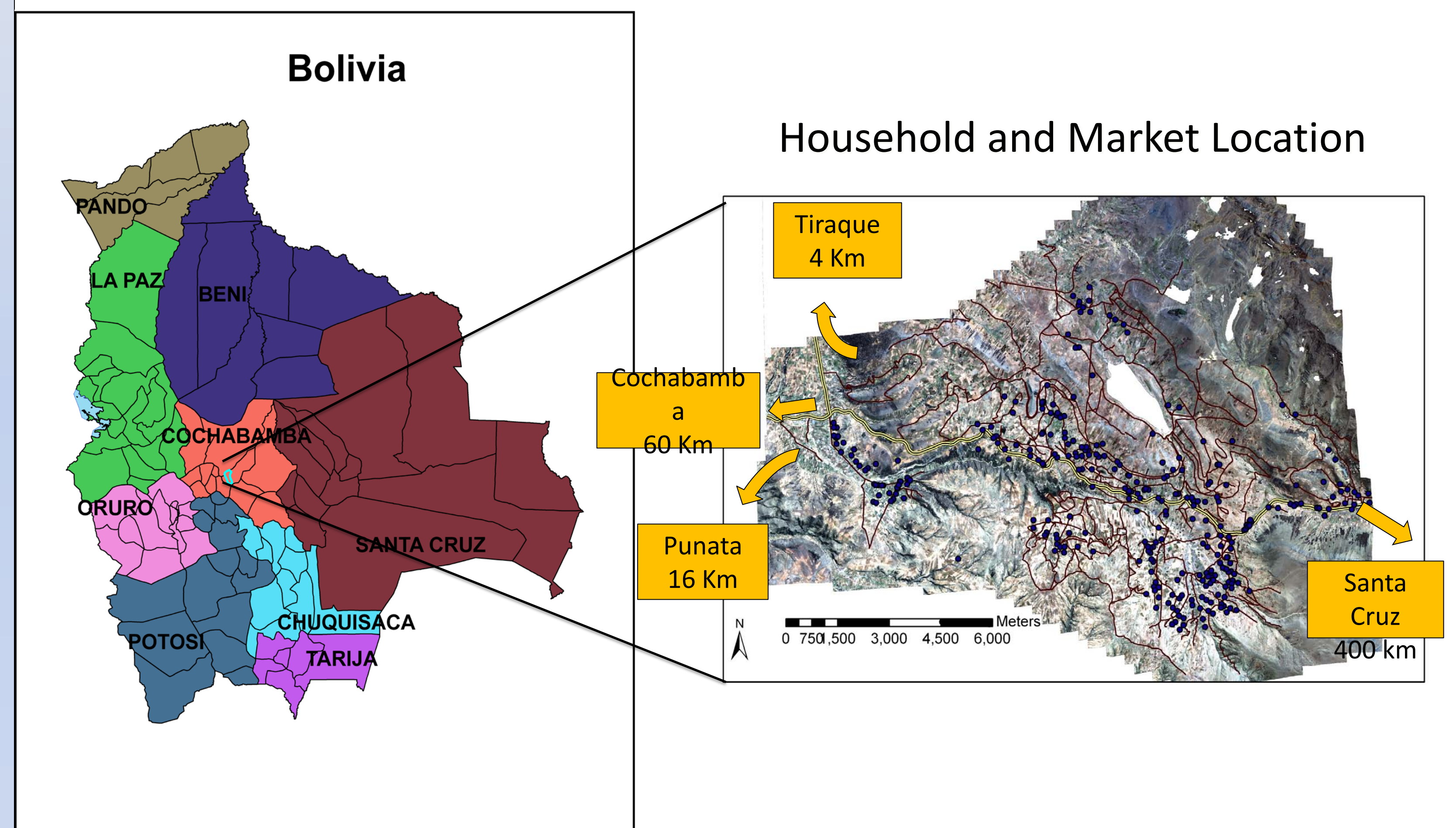
✓ Potato is the main food crop and cash crop followed by beans, cereal, and livestock.



✓ 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 poverty<sup>1</sup>.

• 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

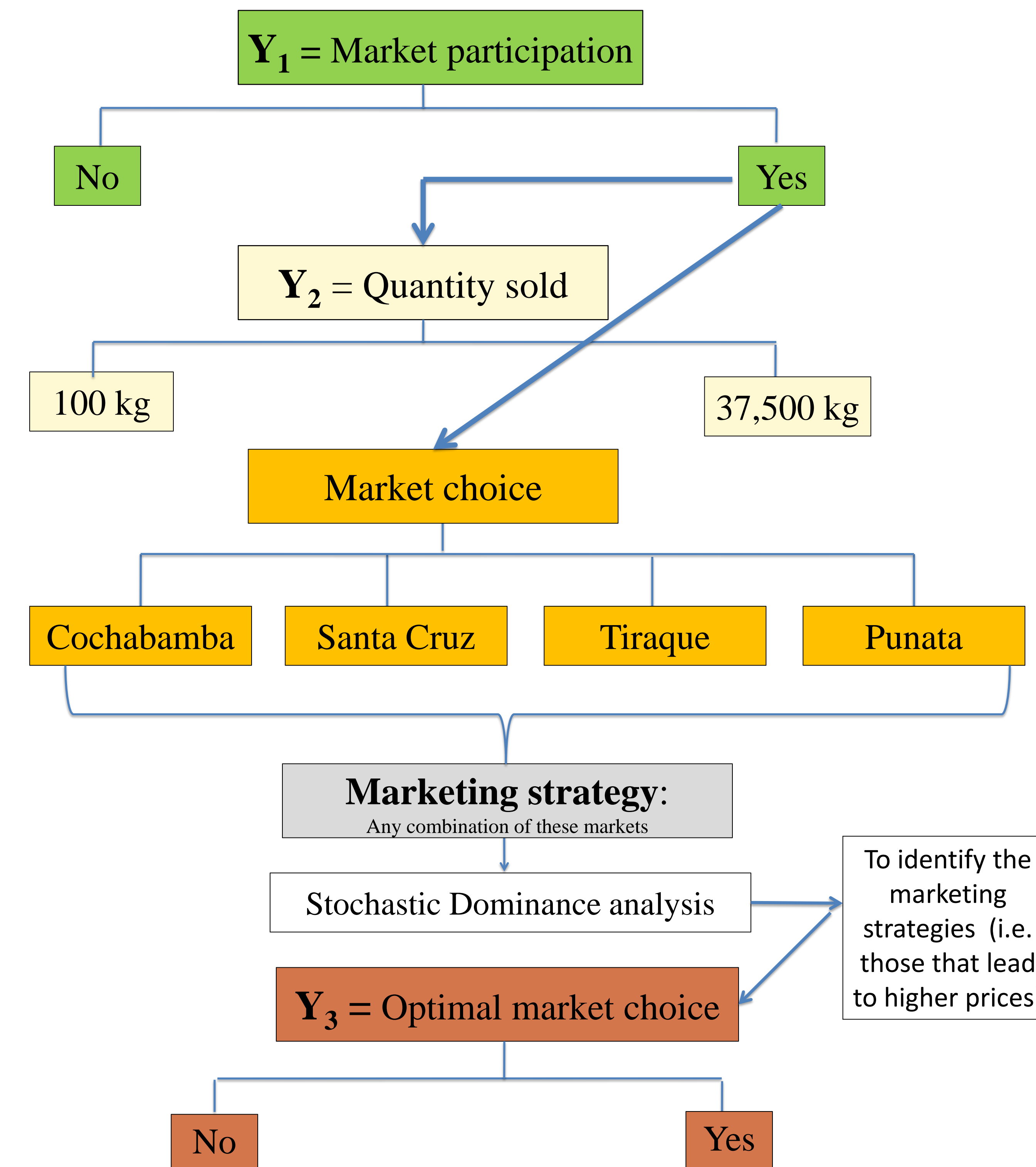
Simultaneous system of 3 equations with selectivity and a recursive equation<sup>2</sup>:

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

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

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

## 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
<b>Fixed transaction costs</b>		
-Radio ownership increases the probability of market participation by 6.5%. -An one unit increase in population density increases (population/0.8 km <sup>2</sup> ) the probability of joining the market by 0.6 percent.	NA	-Radio ownership increases the probability of selecting an optimal marketing strategy by 3%.
<b>Proportional transaction costs</b>		
-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.
<b>Determinants of household supply of potato</b>		<b>Supply</b>
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%.
<b>Determinants of household demand for potato</b>		
-An additional child decreases the probability of market participation by 1.3%.	Insignificant	NA
<b>Household characteristics</b>		
-Households whose head attended secondary school are 11.9% more likely to participate 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%
<b>Access to liquidity</b>		
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:

We acknowledge funding support from Sustainable Agricultural and Natural Resource Management Collaborative Research Support Program (SANREM CRSP).



### 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

