Value Chains for the Small Farmer

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Background

- Transformation of agriculture
  - Declining importance of grains & other staple foods
  - Rising importance of high-value agricultural commodities
  - Green Revolution was supply-led, but this transformation is largely demand-driven
- Widespread implications
  - Change in marketing channels – more coordination
  - Opportunities and challenges for small farmers
  - New roles for government

4 Drivers of shift to high-value agriculture

- Rising income
- Urbanization & population growth
- Outward-oriented trade policy
- Foreign direct investment

Emergence of farmer-buyer linkages

- Causes
  - Perishability of commodity
  - Specific demand requirements of consumers
  - New crops and varieties not familiar to farmers
- Need for formalized links with farmers
  - To ensure quantity, quality, timing, etc
  - To transmit information, inputs, credit, etc.
  - To establish trust regarding safety & quality through coordination from inputs to table
- Institutional solutions
  - Contract farming
  - Farmer organizations & cooperatives that link to industrial processing or retailing
  - Private and public standards for quality and safety

Paradox of smallholders

Efficiency argument

- Lipton (1993) points that there is extensive empirical literature that point to the 'inverse relationship' between farm size and production per unit of land
- Lipton (2005) says economies of scale are weak
- Dyer (1991, 1996): Small farmers more efficient use of labor
- Poulton (2005) says scale of farm operations affects transactions costs for different activities in different ways
- Cornia (1985), Heltberg (1998) show small farmers employ more labor than large farmers (labor markets are imperfect)

Problems faced by small farmers

- Changes in production methods are not scale neutral as were with the Green revolution
- Economies of scale in agriculture may apply in input supply, processing of harvests and in transport
- Modern food value chain impose new restrictions for smallholders as a result they are not linked to dynamic markets (e.g. auditing and certification costs, Raynolds 2004, and many papers of Reardon)
- Market imperfections imply higher transactions costs

Reducing bottlenecks to link farmers to markets

Production	Supply Chain	Processing	Marketing
			
Poor extension Quality inputs Low productivity Non demand linked production	Weak road infrastructure Lack of storage High wastages Multiple intermediaries	Low processing Lack of quality Poor returns Low capacity utilization	Poor infrastructure Lack of grading No linkages Non transparency in prices

Key problems we plan to answer

Problem 1: Heterogeneity of small holders: Identifying efficiency and potential to achieve market access

Problem 2: Access to infrastructure

Problem 3: Resolving market failures and obtaining economies of scale

Problem 4: Scaling up of solutions

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Heterogeneity of small farmers

- Rural households in developing countries are extremely diverse in their economic characteristics due to:
  - Heterogeneity in the quantity and quality of their assets,
  - The technologies available to them,
  - Transaction costs in markets for outputs and inputs,
  - Credit and financial constraints,
  - Access to public goods and services,
  - Local agro ecological and biophysical conditions.
- Rural development policies have to take this heterogeneity into account to be effective.

The concept of (stochastic) profit frontiers

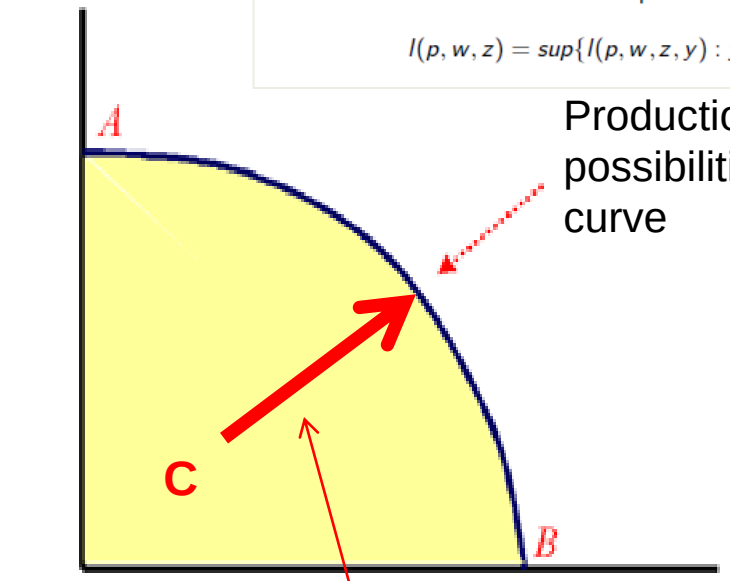
- This approach is based on a simple economic concept: the **P**roduction **P**ossibility **F**rontier (PPF).
- Inside the PPF are all the feasible production bundles.
- Outside the PPF are all the unattainable production bundles.
- The efficient use of resources occurs on the frontier itself.

Given a technology Ψ_I the set of all attainable profits can be defined as

$$\Psi_I = \{(p, w, z, l) : l \leq l(p, w, z),\ p \in \Re_+^M, w \in \Re_+^D, z \in \Re_+^S\}$$

where p is a vector of output prices, w is a vector of input prices and z is a vector of fixed factors in production and

$$l(p, w, z) = sup\{l(p, w, z, y) : y \in \Re_+^M\}$$



Estimated expected farm efficiency is estimated by

$$e_i = -\frac{\hat{\sigma}_u^2}{\hat{\sigma}_u^2+\hat{\sigma}_v^2}(l_i - g(z_i, p_i, w_i)) + \frac{\hat{\sigma}_u\hat{\sigma}_v}{\sqrt{\hat{\sigma}_u^2+\hat{\sigma}_v^2}} \frac{\phi\left(\frac{\hat{\sigma}_u}{\hat{\sigma}_v\sqrt{\hat{\sigma}_u^2+\hat{\sigma}_v^2}}(l_i-\hat{g}(z_i,p_i,w_i))\right)}{1-\Phi\left(\frac{\hat{\sigma}_u}{\hat{\sigma}_v\sqrt{\hat{\sigma}_u^2+\hat{\sigma}_v^2}}(l_i-\hat{g}(z_i,p_i,w_i))\right)}$$

We postulate that

$$E(u_i|l_i - g(z_i, p_i, w_i)) = f(E_i) + \zeta_i \geq 1 \text{ for all } i.$$

where E_i is a vector of demographic and market accessibility variables and f is an otherwise unrestricted smooth function. We use the estimates e_i and the Bootstrap methods in Simar and Wilson (2007) to estimate f.

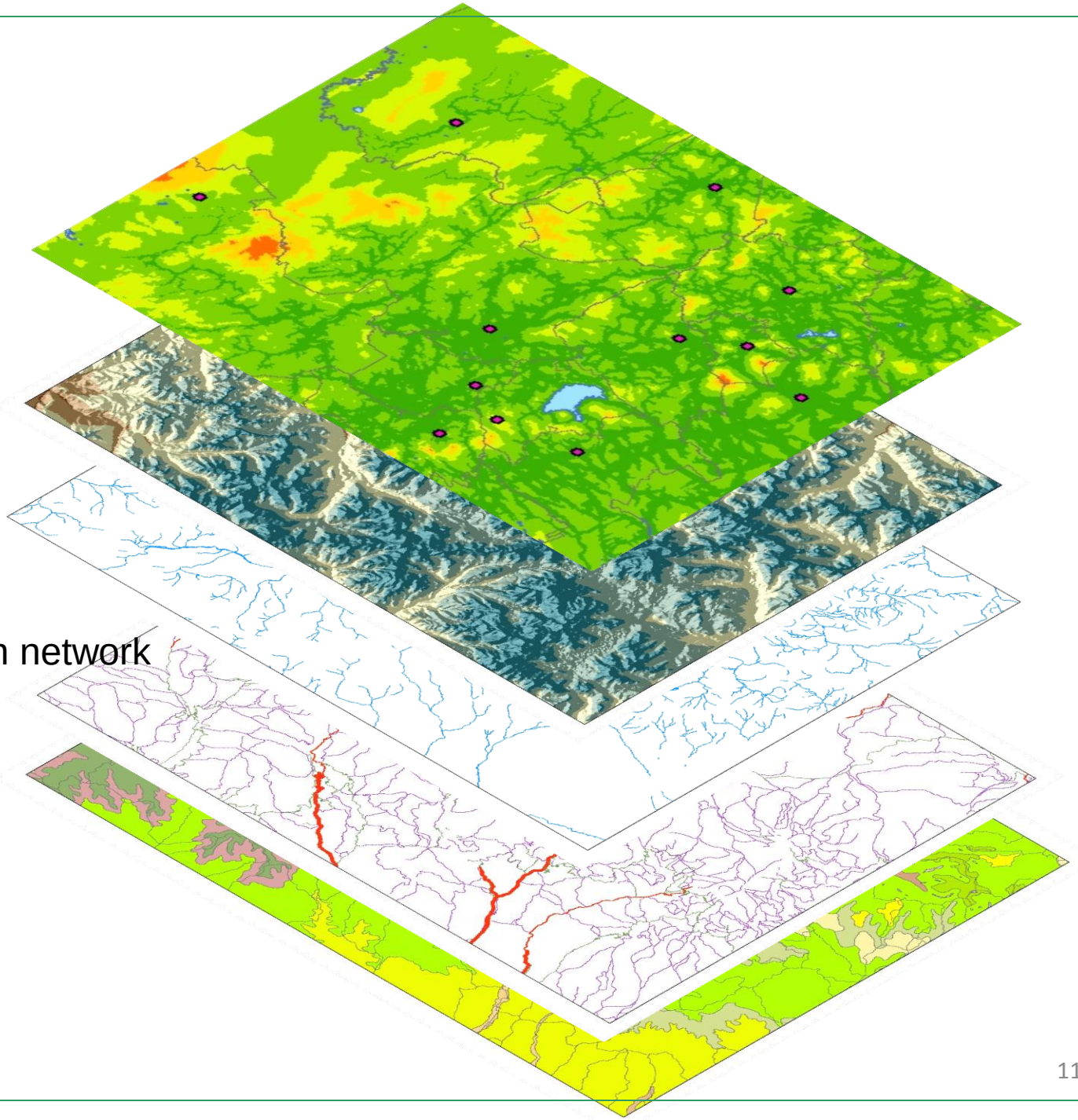
Accesibility

Height

Rivers

Transportation network

Soil use



Building the Typology of Development Domains

Efficiency (E)| Potential (P)	High E & High P	High E & Low P	Low E & High P	Low E & Low P
High Poverty	Identify why poverty is not being reduced	High Priority area identify the bottlenecks that constraint an expansion in the frontier	High Priority: identify bottlenecks that prevent the micro-regions from being closer to the frontier	High priority: design programs of transfers and to strengthen safety nets
Low Poverty	Learn from successful experiences	Low priority area: identify the bottlenecks that constraint an expansion in the frontier	Low priority: identify bottlenecks that prevent the micro-regions from being closer to the frontier	Low priority

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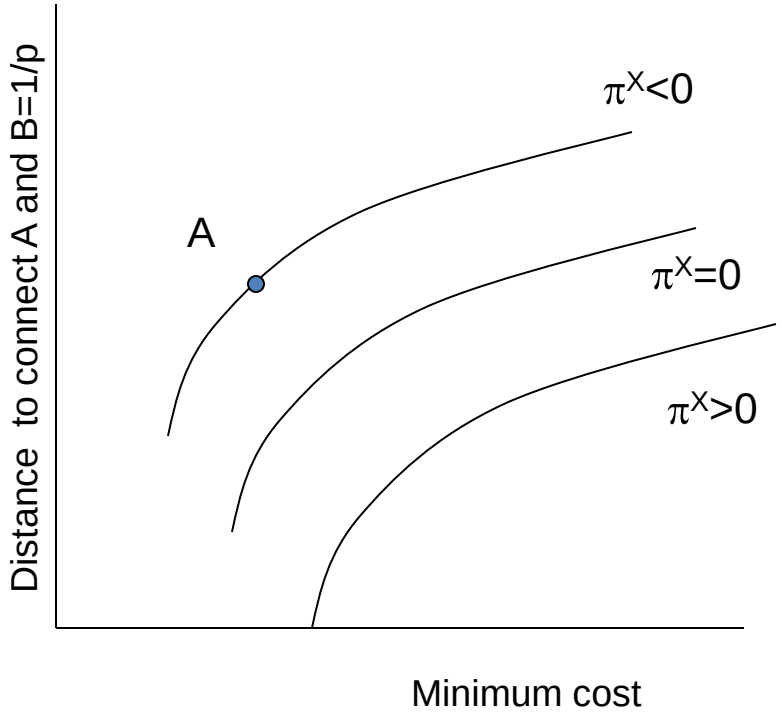
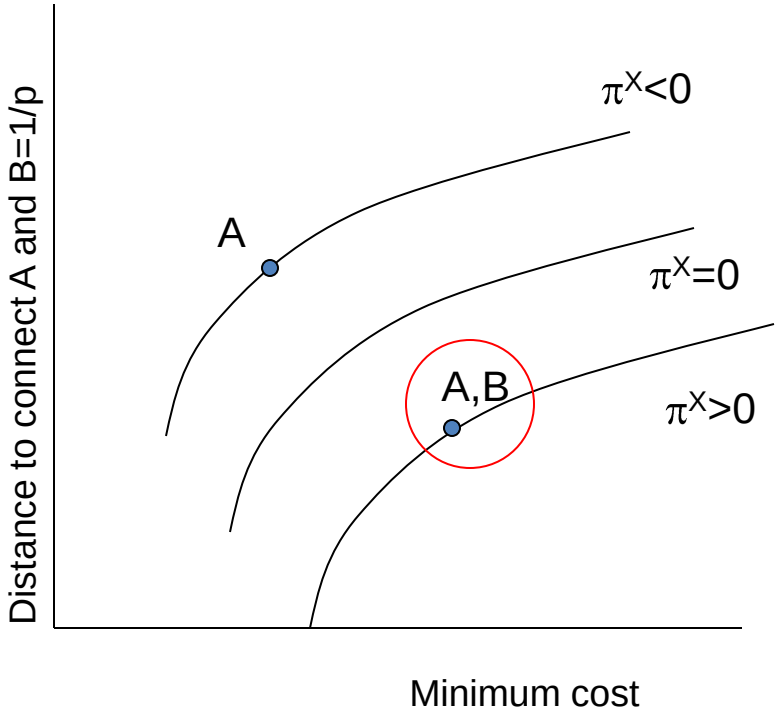
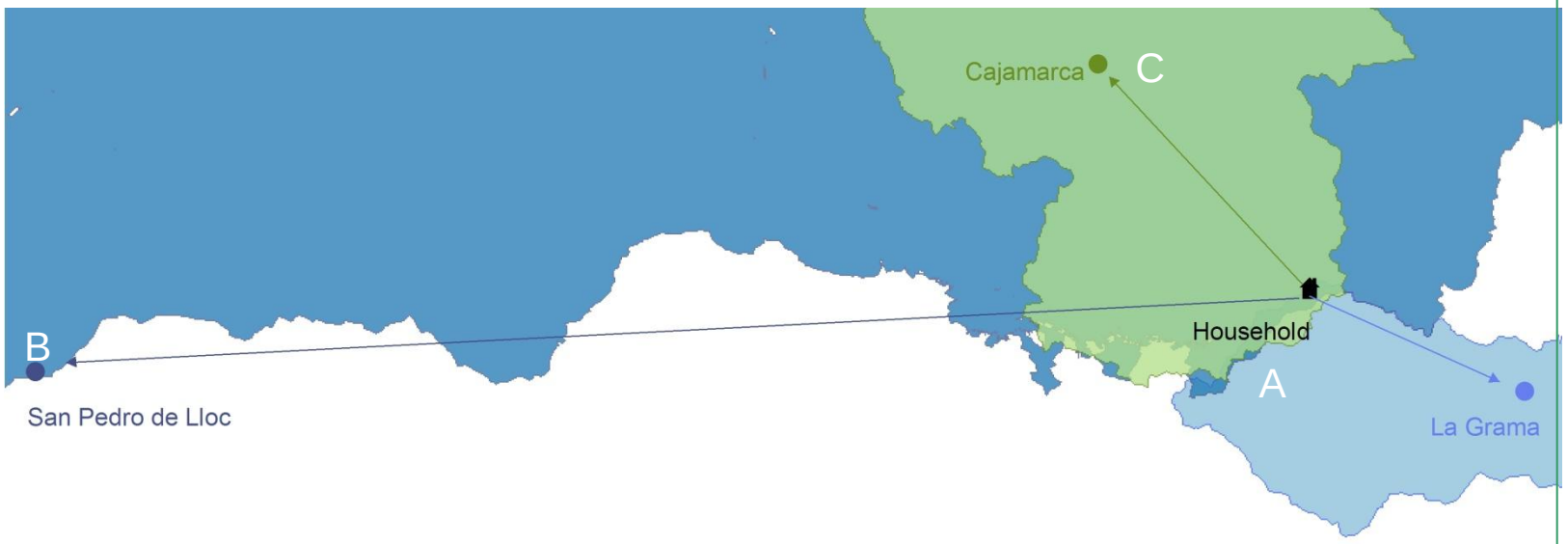
Modeling Isoprofits

Using only minimum cost



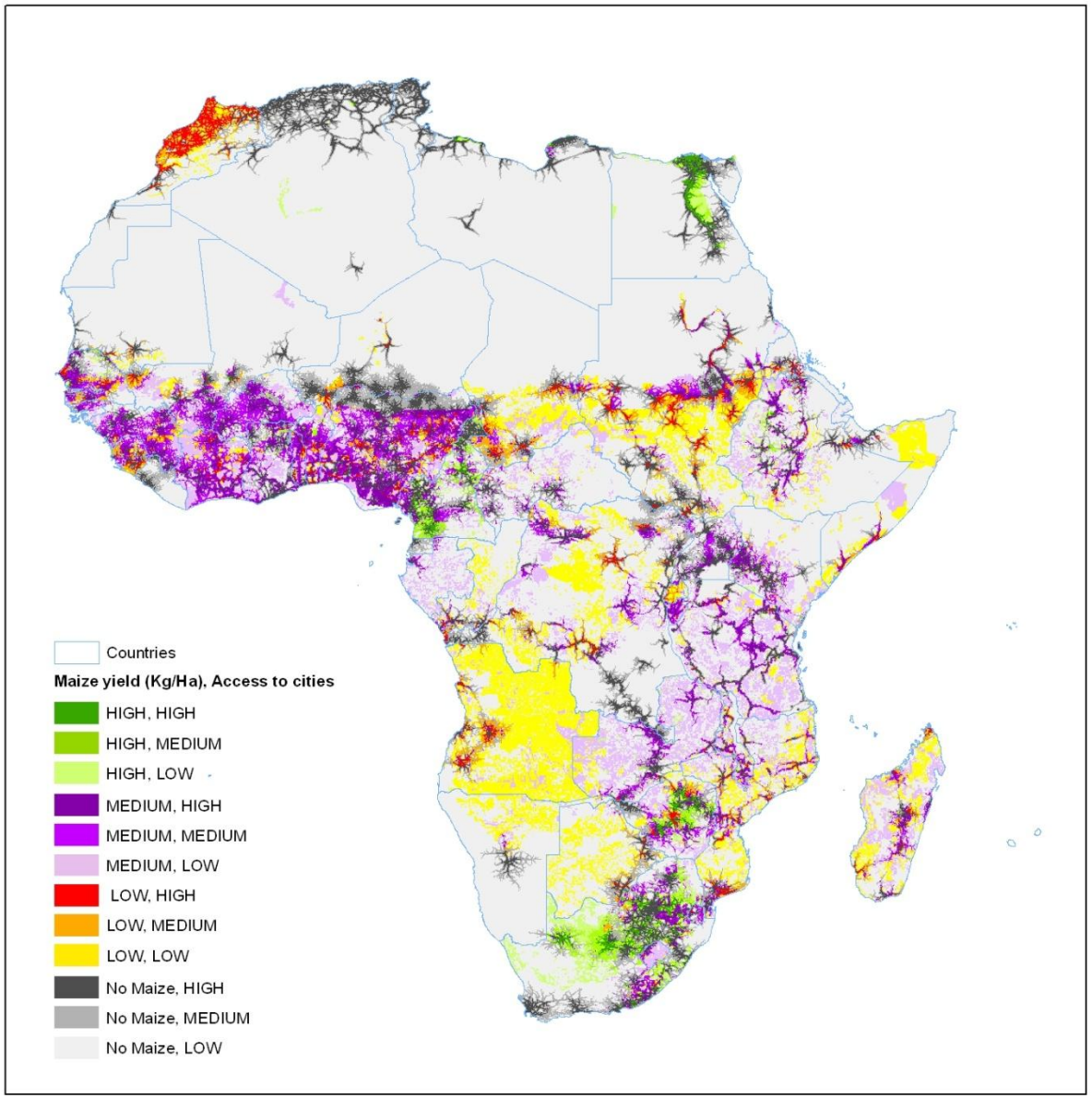
Including profits





Modeling Isoprofits

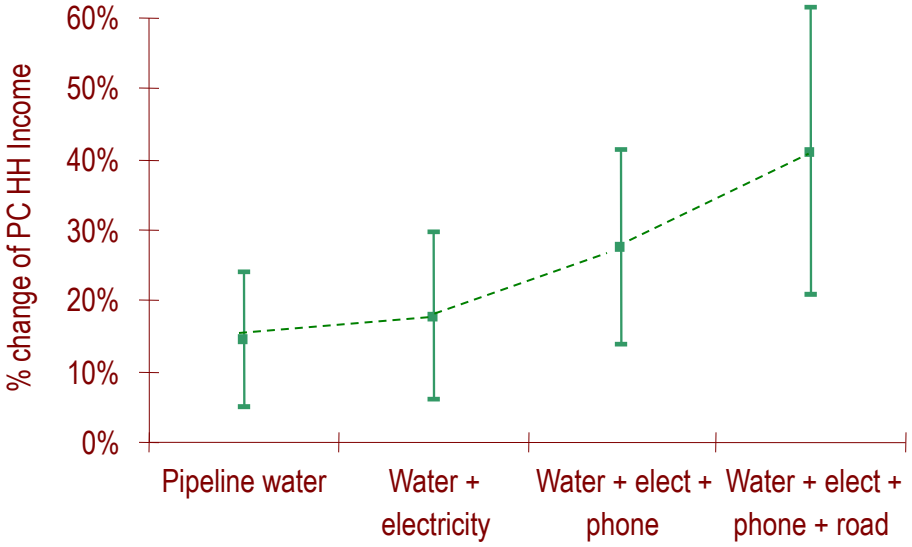
Prioritized infrastructure corridors with Economic development corridors



Complementarities of infrastructure

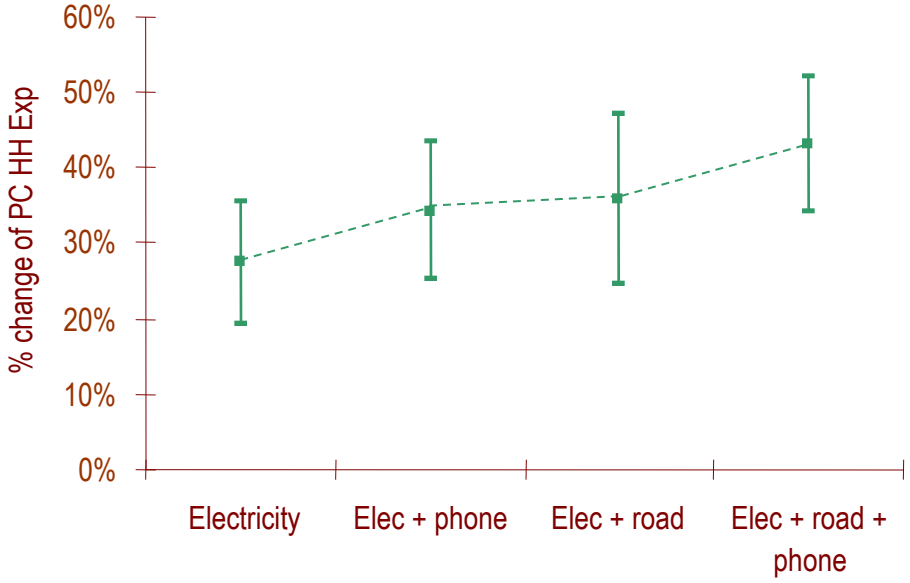
Impact of infrastructure on household welfare

Peru, 2002



Source: Escobal and Torero, 2004.

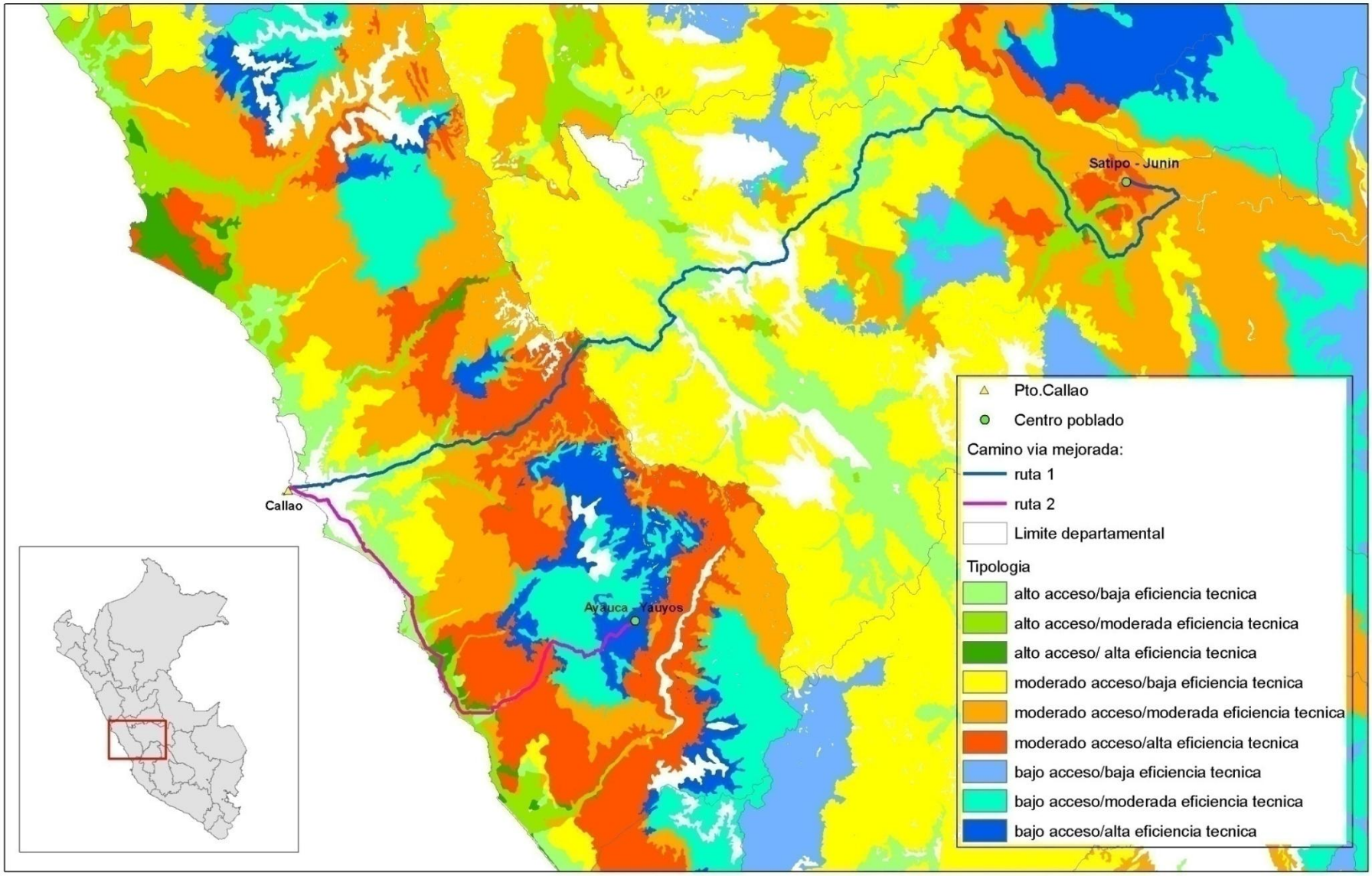
Bangladesh, 2000-2004



Source: Torero and Chowdhury, 2006

- **Infrastructure does seem to have an impact on household's welfare**
- **There exists complementarities in the provision of different types of infrastructure**

The role of transportation value chain



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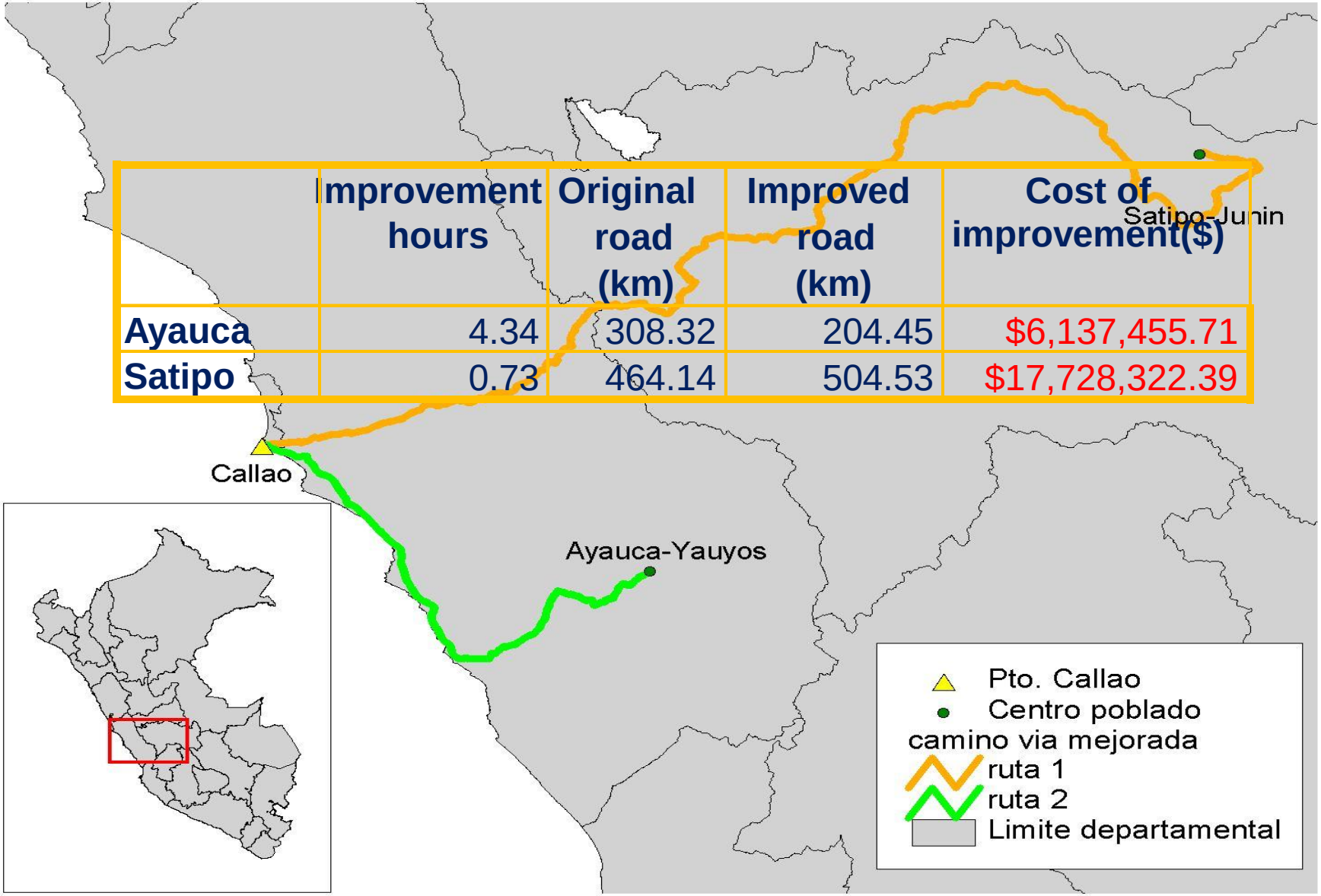

	Improvement hours	Original road (km)	Improved road (km)	Cost of improvement($)
Ayauca	4.34	308.32	204.45	$6,137,455.71
Satipo	0.73	464.14	504.53	$17,728,322.39

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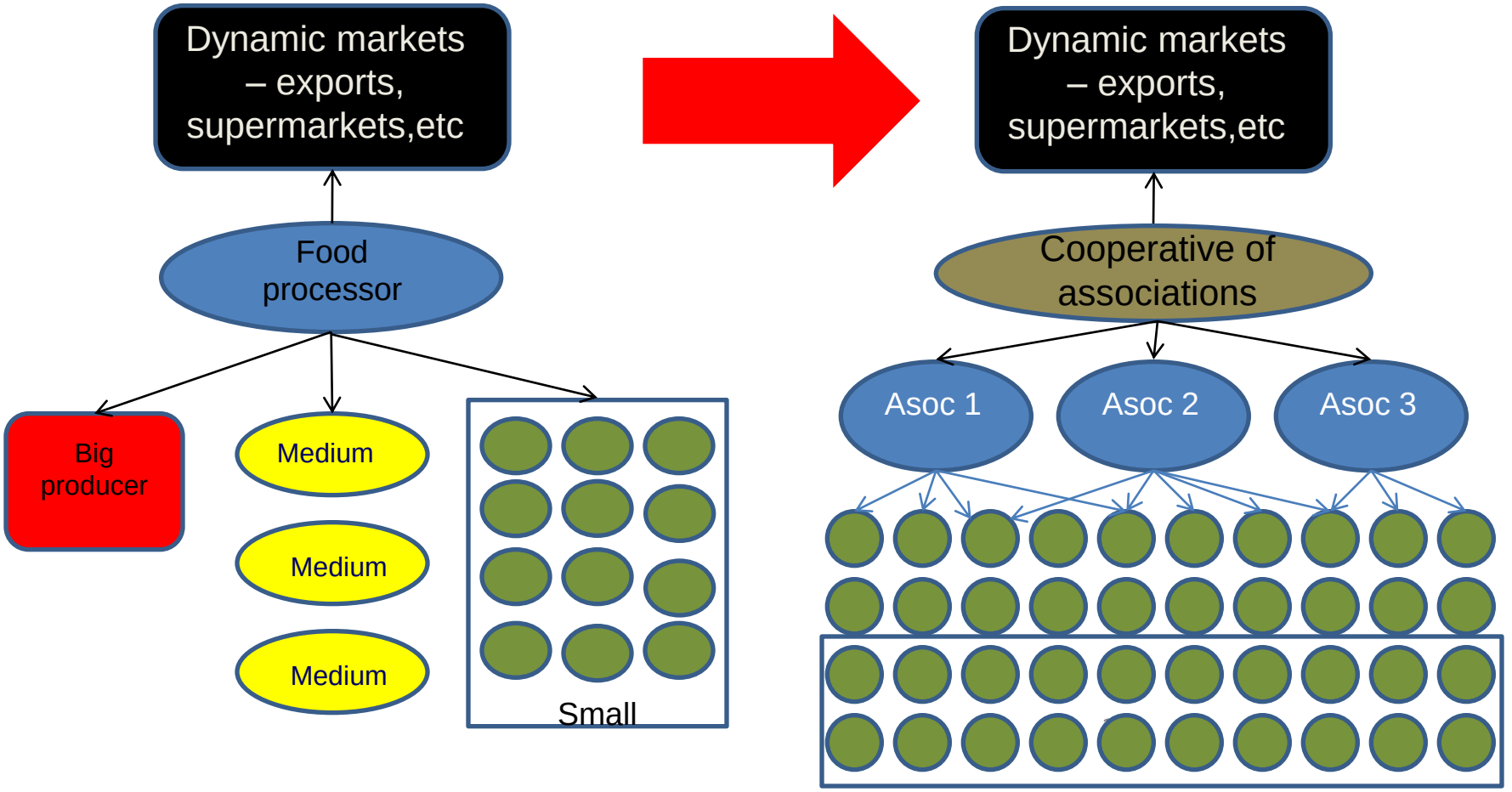
Contract farming two extreme models



Received Wisdom

- There are barriers to vertical integration that makes it desirable to contract out (e.g., land laws and need for flexibility)
- Product differentiation makes contracting an attractive option
- Being a price taker and facing price variability puts significant pressure on contracts
- **But exploitation** is possible when firms have monopsonistic power

Conventional Contract Farming

- Tendency away from smallholders from contractors – too high monitoring costs
  - cash-constrained farmers sold directly to middlemen for cash [Wibonpoongse et al., 1998]
  - Small producers not have resources to meet the quality specifications [Boselie et al,2003]
  - Standards in modern value chain are more sophisticated [Reardon and Berdegué,2002, Reardon et al, 2003, Weatherspoon and Reardon, 2003]
  - Small growers may divert inputs (such as feeds in contracts involving livestock products), [Delgado et al 2003]
- Problems to producer that accepts the contract
  - Monopsonistic power of contractor [Schrader, 1986; Currie & Ray, 1986; Glover, 1984; Glover, 1987; Korovkin, 1992; Morvaridi, 1995;etc.]
  - Increase in specific production risk [Featherstone and Sherrick, 1992; Royer, 1995; Rehber, 1998]
  - Higher costs [Runsten & Key, 1996; Rehber, 1998; Swinnen, J.F.M 2007]
  - Contractor defaults [Glover, 1987; Abbott, 1994; Runsten and Key, 1996]

Incentive-Compatible contracts

• Costs of monitoring	• Club formation
• Abuse of monopsony power	• Developing strong rural farmer associations and tied products
• Price schemes	• Price schemes with incentives on productivity and quality
• Quality standards	• Joint definition of quality
• Access to credit	• Double ransom model
• Productivity	• Clear price incentives

Benefits of Contracts

- Pareto improvement for farmer and firm (more $$)
- Less reneging, more stability
- Bring in new farmers (low-value to high-value crops)
- General contracts – lessons learned could apply to other product markets, more general impact
- Integrate commercial small farmers into dynamic and export markets
- Contract innovation

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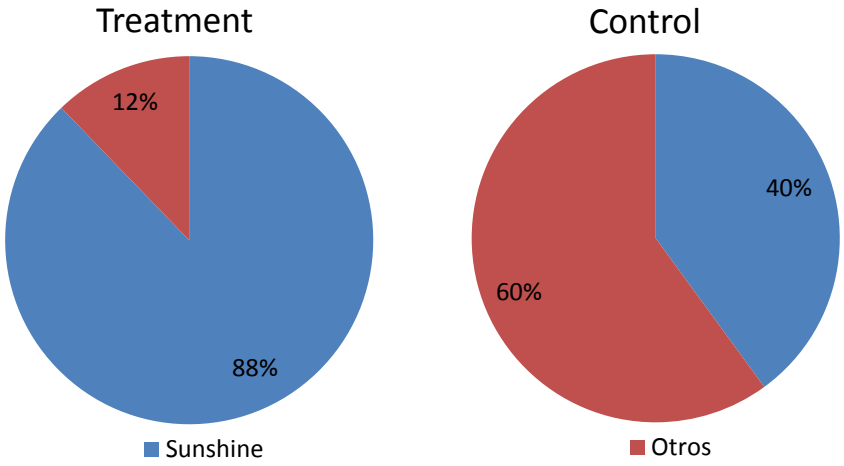
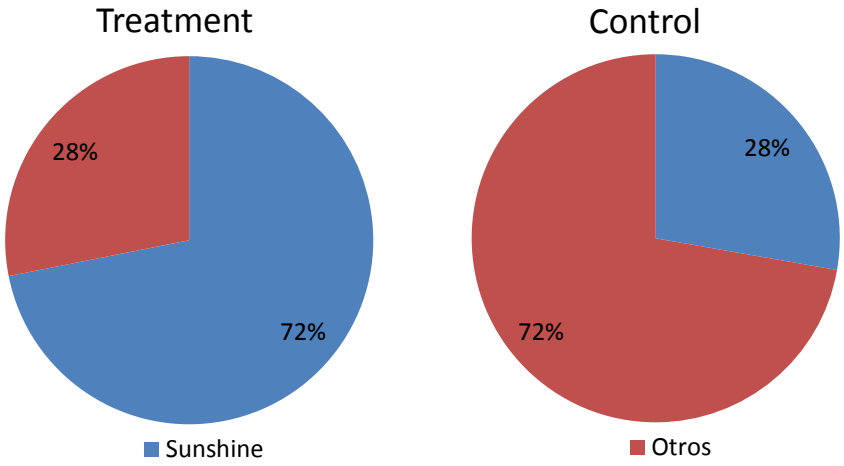
Results

Sales of Mango Kent to Sunshine
Season 2008-2009



Sales of Mango Kent to Sunshine
Season 2007-2008



Sales of Mango Kent a Sunshine
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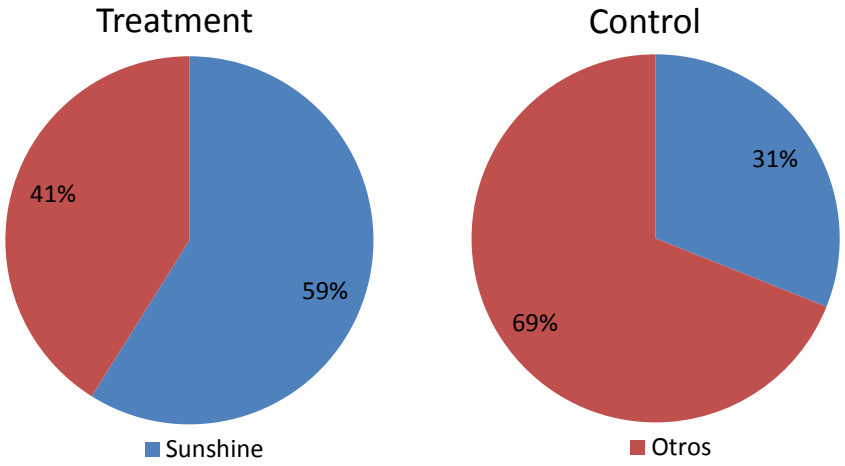
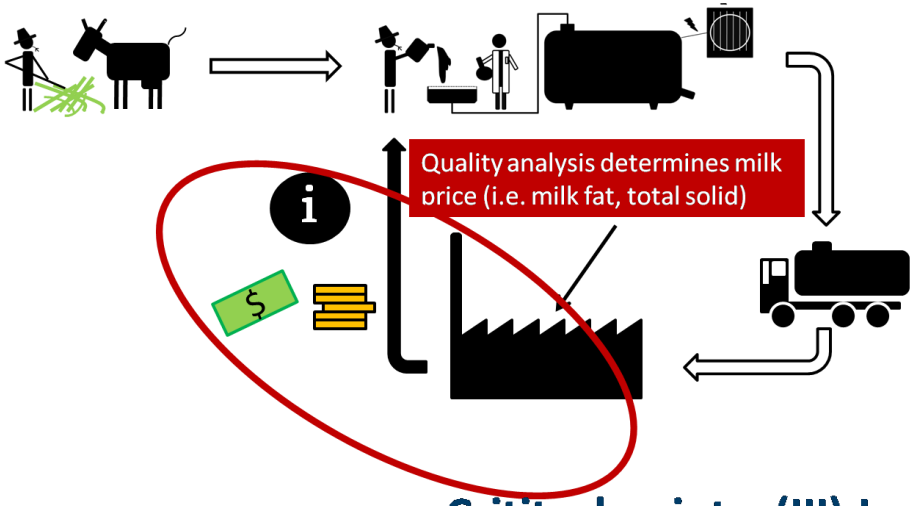


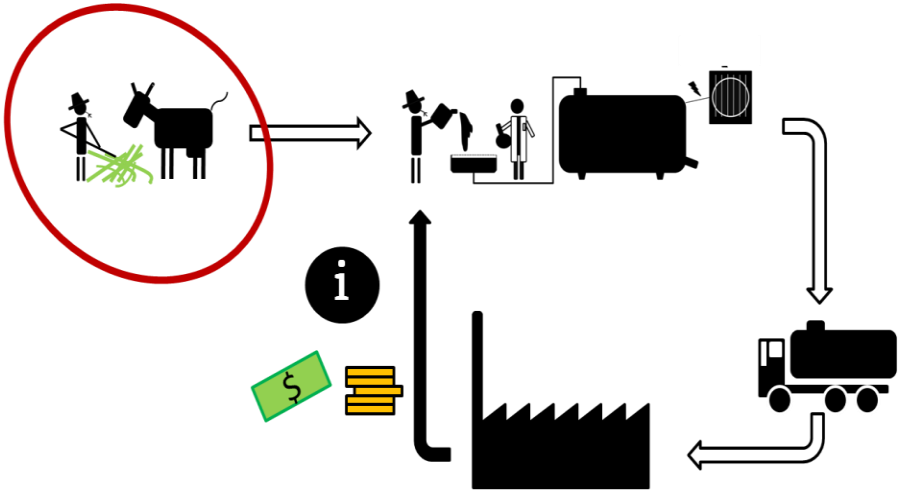
Source: Castillo, Petrie, Torero; (2010). Contracting Out of Poverty

Contracting out of Poverty - Vietnam

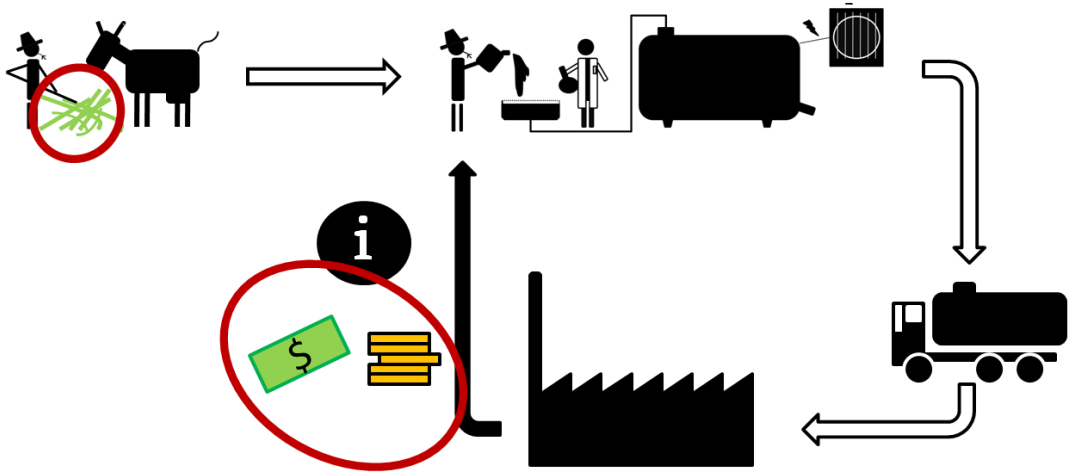
Critical points: Milk quality assessment



Crititcal points: (II) Farmers' know-how



Crititcal points: (III) Input vs. output prices



Source: Saenger & Torero; (2010).
Contract Farming in Vetnam

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Need for evaluation

- Helps identify and measure the results
- Helps identify the **causal link** between intervention and results
- Provides a systematic and objective assessment of program impacts
- Helps determine if interventions are relevant and cost effective
- Promotes accountability, evidence-based policymaking, and learning.

Final comments

Problem 1: Heterogeneity of small holders

=> **Use a typology**

=> **Use stochastic profit frontiers**

Problem 2: Access to infrastructure

=> **Prioritization**

=> **Complementarities**

=> **Corridor concept**

Problem 3: Resolving market failures and ES

=> **improved CF + RPO**

Problem 4: Scaling up of solutions

=> **Impact evaluation + typology**