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Economic impact of coordination in vegetable chains

-- The Propensity Score Matching Method

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-note: based on survey by Favri and Casrad-

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Rationale

- Increasing demand by urban consumers for food quality and safety
- Fast development of supermarkets in Vietnam (20% per year between 2001 and 2006) although still limited share (12%) of total food supply (USDA, 2007)
- Small scale of agriculture in Vietnam: 1.7 ha/household on average in the country, 0.6 ha in the red River delta
- Rationale for farmer organizations and vertical integration in the chain (Vorley et al, 2007)

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Conceptual framework

Forms of coordination (or governance)	Spot market	Market reciprocity	Contracts	Vertical integration
Mechanisms of coordination	Price	Trust	Interlinkages of transactions Centralisation of decisions-property	Centralisation of decisions-property
Efficiency in reducing transaction costs	-	+	++	+++
Efficiency in competitive cost-cutting	+++	++	+	-

Transaction costs not measured directly; proxied by indicators of asset specificity

Source: Williamson (1991); Jaffee (1990; 1995)

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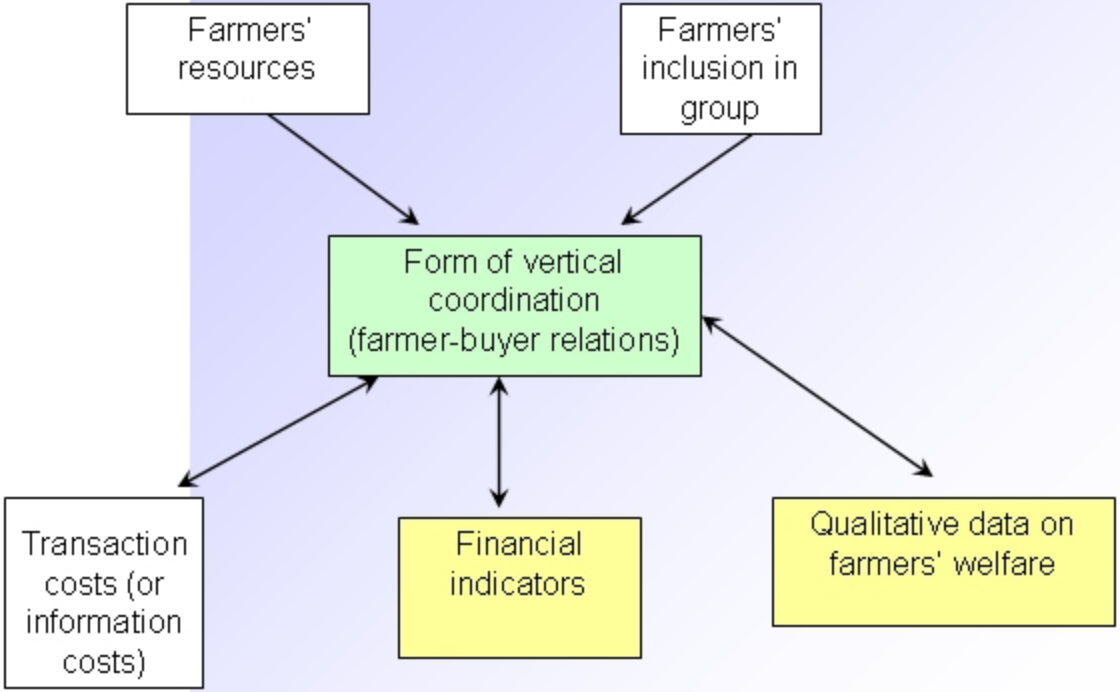
Application to vegetable chains in Vietnam
Nature of investigated information



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Vegetable farmers' survey sample

Nature of relations with buyers		Location	Number of farmers	
In spot markets		Soc Son and Dong Anh districts	66	
Contracted by	Company (Hadico)	Soc Son and Dong Anh districts	19	45
	Supermarkets	Ba Chu group, Dong Anh Dao Duc group, Dong Anh Minh Hiep group, Dong Anh Linh Nam group, Thanh Tri	23	
Selling directly to consumers		Van Tri group, Dong Anh Dang Xa group, Gia Lam Linh Nam group, Thanh Tri	31	

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Preliminary results

- Basic household characteristics
- Land information and planting pattern
- Financial data – **income from vegetables**
- Advantages and disadvantages

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Conclusion (1)

- Farmer organizations can help farmers increase the income in vegetable chains by linking them to supermarkets, companies, and consumers in rented shops.
- Selling directly to consumers in their own shops is the most profitable strategy for farmers.
- And followed by contracts with supermarkets and companies
- Farmers selling in spot markets have the lowest income.
- A further study (modeling) to quantify the economic impact by identify whether the differences in incomes result from farmers' participation in contracts rather than their resource or location characteristics.

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Propensity Score Matching Method

- Rationale
- Matching, which is a method for selecting comparison observations to match treated observations with similar covariates, has been becoming a popular procedure to estimate treatment effect under the assumption of unconfoundedness.
- When there are many covariates, it is impractical to match directly on covariates because of the curse-of-dimensionality. Since the celebrated result of Rosenbaum and Rubin (1983), an attractive way to overcome the curse-of-dimensionality has been matching by propensity score. [Zhao(2008,p.1)]

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Literatures

- Rosenbaum and Rubin (1983)
- Literature review on PSM:

  Imbens (2004), Morgan and Harding (2006), Caliendo and Kopeinig (2008) etc.
- Details:

  Dehejia and Wahba (1997, 2002) etc.
- PSM in STATA:
- Abadie et al (2004), Becker and Ichino (2002),Becker and Caliendo (2007),Nicols (2007), Bia and Mattei (2008), etc.

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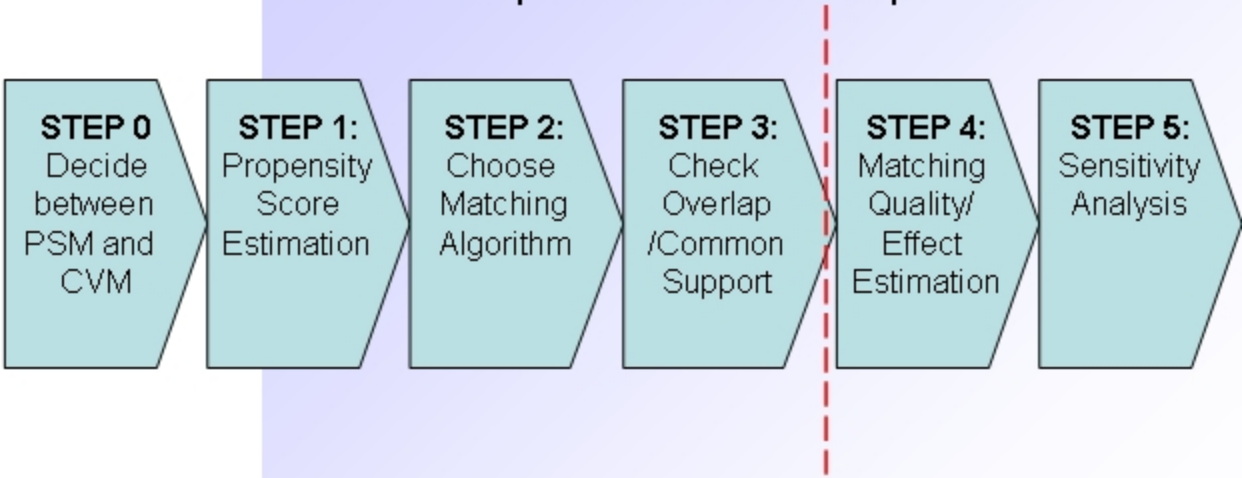
PSM – Implementation Steps



Drawn from Caliendo and Kopeinig (2008)

Assumptions

- A1. Conditional independence assumption

$$y_0, y_1 \perp D \mid \mathbf{x}$$

- A2. Common support assumption (overlap assumption)

$$0 < \Pr[D = 1 \mid \mathbf{x}] < 1$$

Propensity Score and Matching Method

- **Propensity Score**
- a high dimensional vector X

  (curse of dimensionality)

➢ Balancing Score

$$p(\mathbf{x}) = \Pr[D = 1 | \mathbf{x}] = \mathrm{E}[D | \mathbf{x}]$$

➢ Probit / Logit model (Binary treatment)

- **Matching method**

➢ Nearest Neighbor

➢ Caliper and Radius

➢ Stratification and Interval

➢ Kernel and Local Linear

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Variables selection

Size	Household size in 2007 (persons)
Female	Percentage of female in the family (%)
Age	Average age of the members (years)
Labor	Labors aged from 15 to 65 (persons)
Education	Average education yeas of the family (years)
Motor	Number of motorbikes per household
Cattle	Number of cattle
Land	Land area (m^2)
Market	Distance from nearest market (meter)
Road	Distance from nearest road (meter)
Percentage	Percentage of income from vegetable in household income (%)

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Thank you