Supermarket development in Indonesia and its impacts on agricultural labor markets: the case of chili

by

Sahara Sahara, InterCafe and Departmenf of Economics, Bogor Agricultural University

Arief Daryanto, Business Schoool, Bogor Agricultural University

Dale Yi, The University of Adelaide

Randy Stringer, The University of Adelaide

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Introduction

Supermarkets are developing rapidly in Indonesia.

- From 2004-2008, the numbers of hypermarket outlets increased from 34 to 130; supermarkets from 956 to 1,447; and convenience stores (mini-markets) from 5,604 to 10,289.

Influencing the supply chain of agricultural products

The impact of supermarket development on profit and income obtained by farmers have been examined

- Hernández et al., 2007; Natawidjaja et al., 2007; Neven et al., 2009; Rao and Qaim, 2011; Sahara, et al., 2015; Schipmann and Qaim, 2010

However, the studies paid less attention on possible employment effects in rural areas.

Introduction

The development of supermarkets does not only impact directly on small farmers supplying to supermarket chains
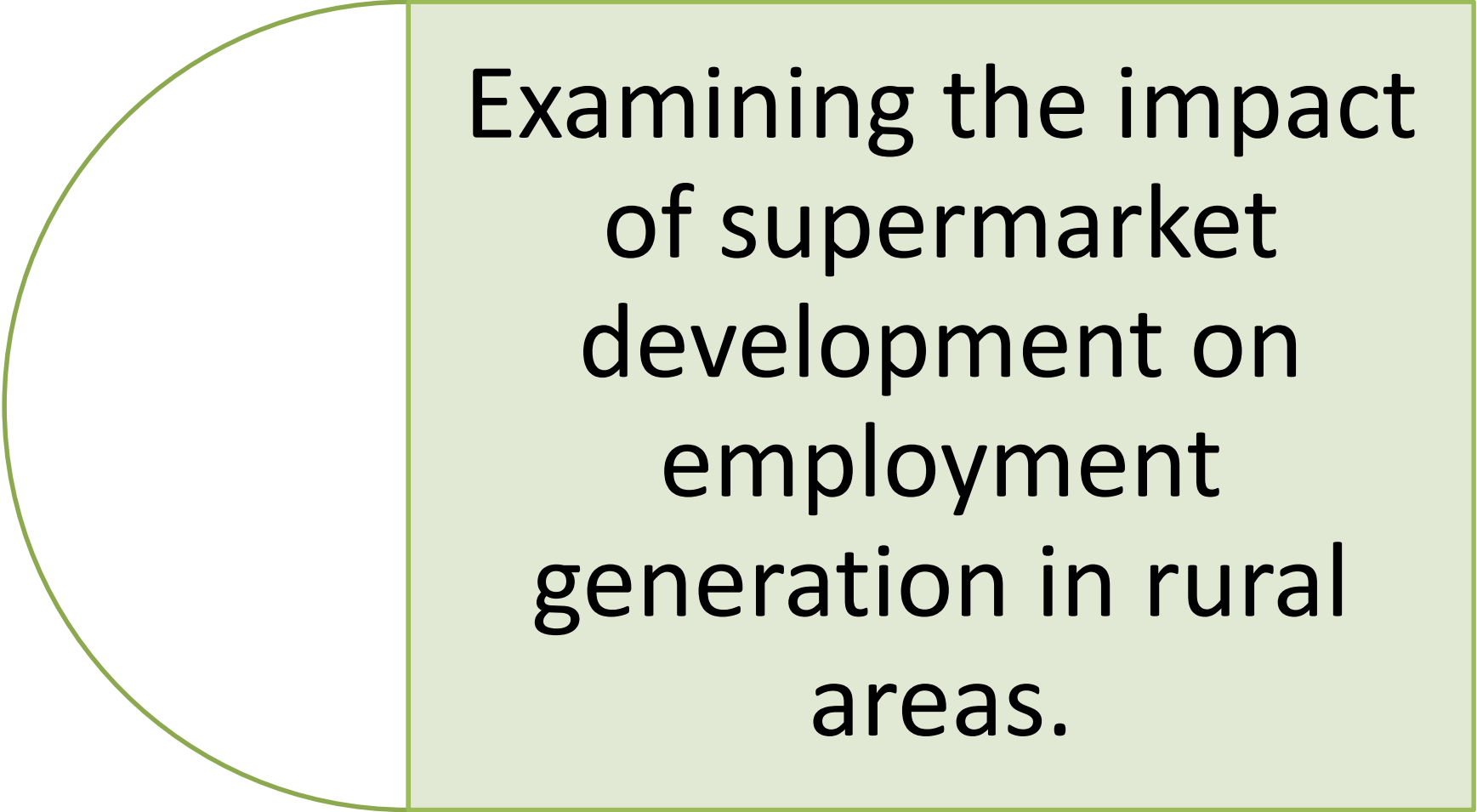
It may impact indirectly on poor households in rural areas who cannot participate directly in the supermarket chains.

Such impact could happen through their participation in agricultural labor markets.

Objective

Examining the impact of supermarket development on employment generation in rural areas.

Focus on chili

Essential ingredient in the Indonesian daily diet

Produced by >400,000 small scale producers

Important cash flow income for small scale producers

Labor intensive

Supermarkets currently sell chilies in the fresh produce section in order to attract consumers

Method

The data comes from a farm survey conducted between March and April 2010 of 602 chili farmers selling to the traditional and supermarket channels in West Java Province

After cleaning process there are:

Garut

Tasikmalaya

Ciamis

470 respondents: traditional channels

109 respondents: supermarket channels

Method

Following Rao and Qaim (2011): A double-hurdle model was performed→ two stage decision allowing the option of deliberate zero observation

Observed demand for hired labor:

First decision: whether to hire labor

Second decision: exact quantity labor to be hired
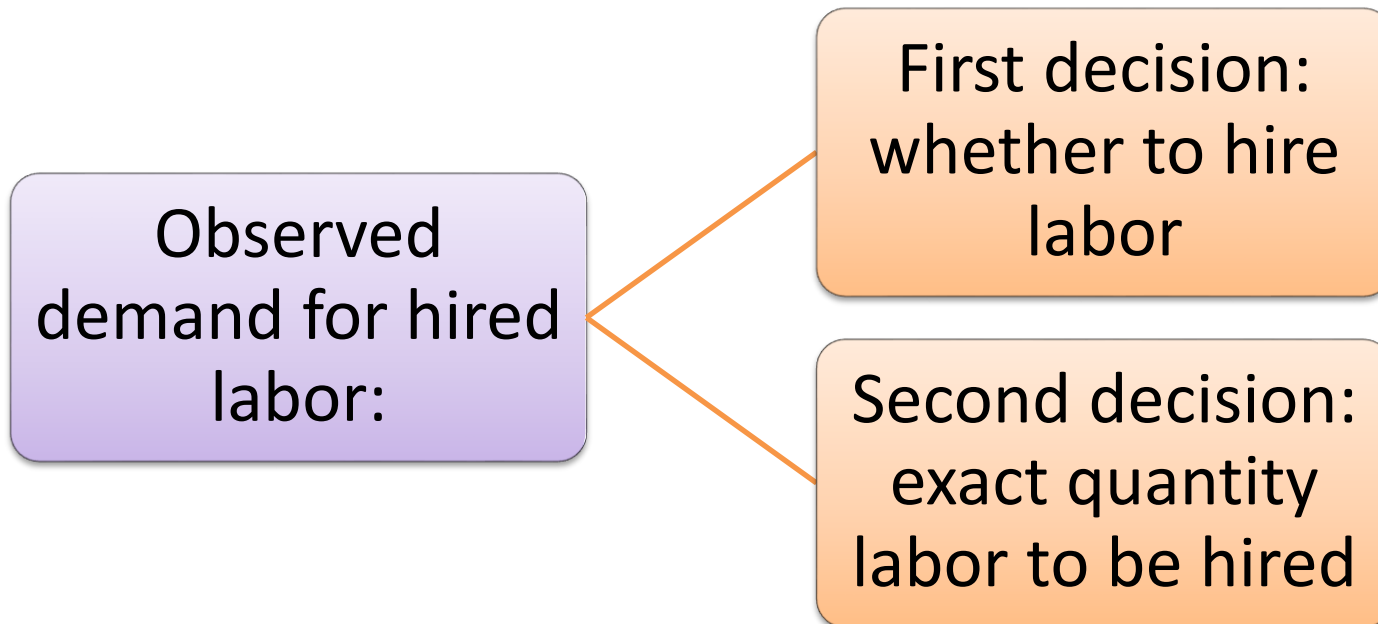
Estimation Procedure

- **The decision to hire labor:**

$$d_i^* = ax_i + u_i \qquad u_i \sim N(0,1) \qquad (1)$$

with

$$d_i \begin{cases} 1 \ if \ d_i^* > 0 \\ 0 \ otherwise \end{cases} \qquad (2)$$

d_i : variable measuring whether or not outside labor is hired

d_i^* : a latent (unobserved) for d_i

x_i : the decison to hire labor

- **Quantity of labor to be hired:**

$$y_i^* = \beta z_i + v_i; \qquad v_i \sim N(0, \sigma^2) \qquad (3)$$

with

$$y_i = \begin{cases} y_i^* \ if \ y_i^* > 0 \ and \ d_i = 1 \\ \qquad 0 \ otherwise \end{cases}$$
(4)

y_i : the observed amount of labour hired

y_i^* : the latent variable for y_i

z_i : the quantity of hired labor used

- Positive quantities of hired labor are observed only if $d_i = 1$ and $y_i^* > 0$ → OLS estimator inconsistent

Selection of Variables

Demand for agricultural inputs:

- Market characteristics
- Farm and household characteristics
- Agro-ecological condition

The main focus :

- The effect of supermarket participation→ independent variable

Wage is not included since it similar in the three districts (no variation)

Variable
Channel (1=supermarket, 0=traditional)
Sorting chilies (1=yes, 0=no)
Age of household head (years)
Education of household head (years)
Current land ownership (ha)
Irrigated-land ownership (1=yes, 0=no)
Current waterpump ownership (units)
Current mist-blower ownership (units)
Current power-tiller ownership (units)
Current buffalo ownership (units)
Chili-farming experience (years)
Season (1=rainy, 0=dry)
Main job (1=agricultural, 0=non agricultural)
Share of total area planted with chili (%)

Descriptive Statistics

Variable	Traditional Channel (n=470)	Supermarket Channel (n=109)	Significance	
Age of household head (years)	46.24	43.86	2.07	**
Education of household head (years)	6.46	7.96	-4.84	***
Current land ownership (ha)	0.46	0.44	0.33	
Irrigated-land ownership (1=yes, 0=no)	0.50	0.59	-1.64	*
Current waterpump ownership (units)	0.29	0.32	-0.67	
Current mist-blower ownership (units)	1.12	1.37	-2.80	**
Current power-tiller ownership (units)	0.01	0.03	-0.77	
Current buffalo ownership (units)	0.13	0.12	0.18	
Chili-farming experience (years)	9.44	6.74	3.85	***
Season (1=rainy, 0=dry)	0.51	0.58	-1.27	
Sorting chilies (1=yes, 0=no)	0.14	0.54	-9.80	***
Main job (1=agricultural, 0=non agricultural)	0.93	0.87	2.20	**
Share of area planted with chili (%)	61.06	69.34	-1.55	

*ρ<0.1, **ρ<0.05, ***ρ<0.01

Descriptive Statistics

Variable	Traditional Channel (n=470)	Supermark et channel (n=109)	Significanc e	
Total hired labor use in chili per cycle per ha (persons)	341.29	529.95	-5.31	***
Hired labor by operation per cycle per ha (persons)				
Seedling bed	13.76	23.16	-3.12	**
Land preparation	109.61	227.26	-7.32	***
Plastic and holes	21.73	29.49	-1.20	
Planting	17.34	18.97	-0.52	
Fertilization	21.07	46.79	-4.00	***
Stake and rope	10.29	16.00	-2.50	**
Weeding	26.70	33.71	-1.59	*
Spraying	28.71	37.15	-1.13	
Harvesting	92.09	97.43	-0.47	

*$\rho<0.1$, **$\rho<0.05$, ***$\rho<0.01$

Maximum likelihood estimates of double-hurdle models

Variable	Decision to hire			Labor Quantity		
	Coef.	Std. Err.		Coef.	Std. Err.	
Channel (1=supermarket, 0=traditional)	0.551	0.230	**	164.602	74.421	**
Age of household head (years)	-0.007	0.007		-2.312	3.005	
Education of household head (years)	0.126	0.030	***	25.158	10.355	**
Current land ownership (ha)	-0.137	0.089		-21.169	47.856	
Irrigated-land ownership (1=yes, 0=no)	0.056	0.151		113.967	64.555	*
Current waterpump ownership (units)	0.045	0.150		65.030	58.469	
Current mist-blower ownership (units)	0.090	0.087		61.067	38.201	
Current power-tiller ownership (units)	-0.142	0.515		135.288	149.223	
Current buffalo ownership (units)	4.324	101.798		-133.746	63.435	**
Chili-farming experience (years)	-0.008	0.010		-5.239	5.176	
Season (1=rainy, 0=dry)	0.217	0.140		-208.075	62.450	**
Sorting chilies (1=yes, 0=no)	-0.239	0.178		138.356	73.512	*
Main job (1=agricultural, 0=non agricultural)	0.356	0.279		-20.619	104.871	
Share of total area planted with chili (%)	-0.002	0.001		-0.010	0.753	
Constant	0.165	0.493		105.744	214.811	
Sigma				439.008	30.141	***
Log-likelihood	-3624.0299					

Conclusion and Implication

- The likelihood to hire labor is influenced by:
  - Supermarket channel
  - Education level
- Factors influencing the quantity of hired labor:
  - Marketing channel: supermarket>traditional
  - Education
  - Irrigated land
  - Buffalo asset
  - Season
- Supermarkets have potential opportunity to increase labor absorption in rural area
- Inclusion small farmers in supermarket channels can potentially reducing poverty