Mark-ups Adjustment in Rice Market

Trade Proseminar (Spring 2023)

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Motivation

- Exchange rate policies in developing countries.
- Who benefit from exchange rate movement? Exporters or farmers?
- Firms' short-run adjustment mechanism when downstream firms have the power to adjust the intermediate input prices to upstream firms.

Research Question:

- How would terms of trade shock affect surplus of exporters and farmers?
- Would the exporters act as insurers for the farmers against income shock?

Today's Presentation

Methodology

- Empirical evidence of price pass-through in rice market.
- Mechanism: market power of rice mills (intermediate input buyers).

Preliminary Result

- Farmers that located in the area with high concentration of rice mill receive higher farm price.
- At the same time they experience higher price fluctuation.

Literature

- Volatility and Trade
  - Allen and Atkin (2016); Helpman and Rainn (1978); Newbery and Stiglitz (1984)
- Market power and intermediaries
  - Atkin and Donaldson (2015); Chatterjee (2020); Zavalu (2022)
  - Empirical estimation using policy tools: Dhingra and Tenreyro (2020); Van Patten and Mendez-Chacon (2021)
  - Experiment: Barks, Brooks, Kabuki and Pelnik (2021); Bergquist and Dinerstein (2020); Casaburi and Reed (Forthcoming)
- Agricultural and trade
  - Costinot, Donaldson and Smith (2016); Sotelo (2020); Farrokhi and Pellegrina (2021); Bergquist, Faber, Fally, Hoelzlein, Miguel and Rodriguez-Clare (2019)
- Insurance
  - Development: Burgess and Panda (2005); Jayachandran (2006)
  - International shock: Rodrik (1998); Alesina and Warziarg (1997); Epifanni and Gancia (2006)

Outline

Recap: Background and Setting

Thai Rice Industry Overview

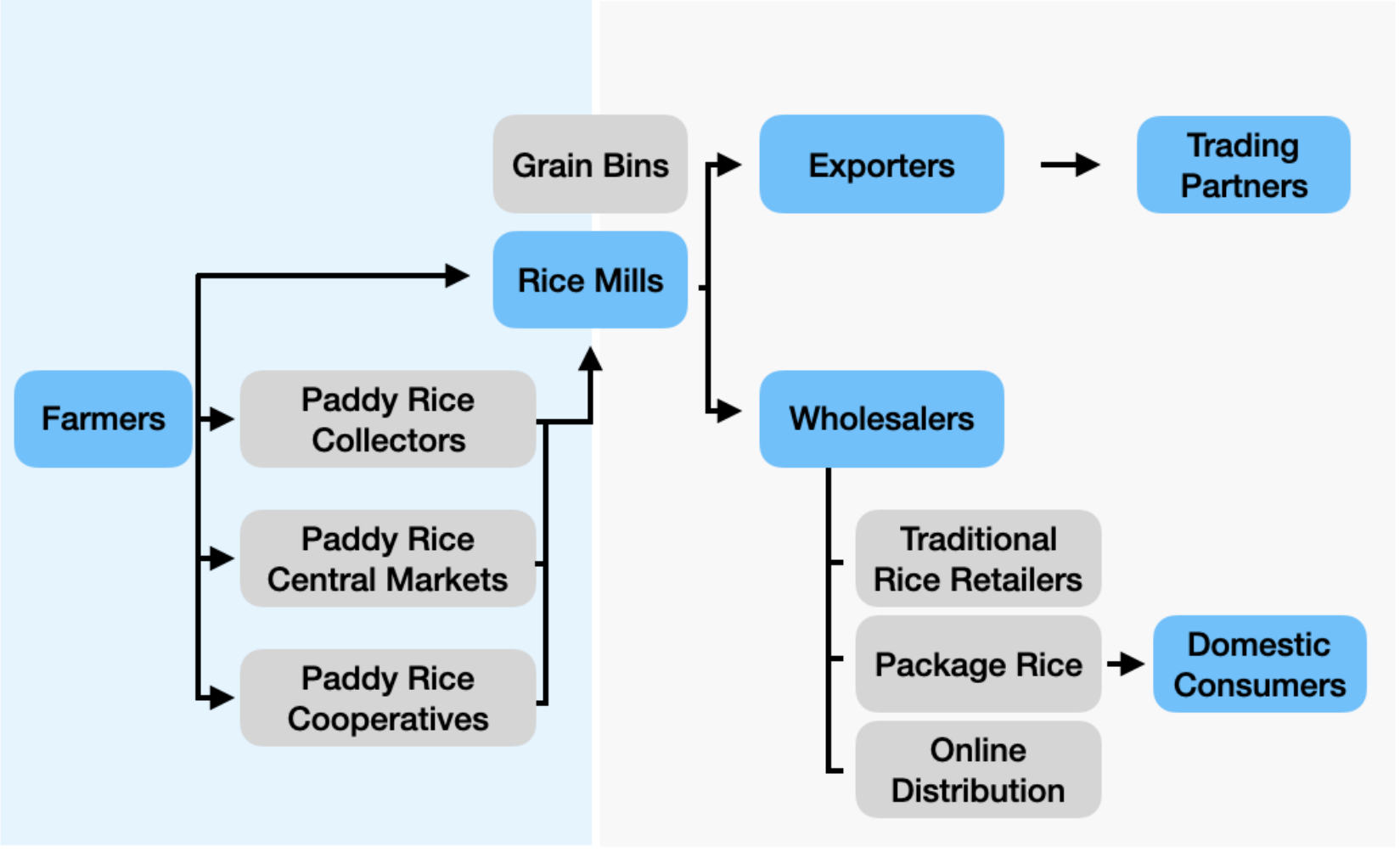
Rice and Thai Economy

- 46% of total harvest area in Thailand.
- 40% of household are in agricultural sector and 60.5% of agricultural household are rice farmers.
- The output is split half and half for domestic consumption and export.

International Rice Market

- 9.7% of total global rice production is for export
- Thailand is the 6th in terms of production (3.7% of total production), after China (29.3%), India (24.1%), Indonesia (7.0%) , Bangladesh (6.8%), and Vietnam (5.4%).
- Thailand is the 3rd in terms of export (11.9%); after India (38.9%) and Vietnam (12.9%)

Rice Industry in Thailand



Rice Business Licensing

The following businesses are required to register in order to operate in Thailand.

1. Exporters
   - 1.1 Package Rice Exporters
   - 1.2 Border Exporter: Exporters that located near the border.
2. Importers
3. Rice Mill
   - 3.1 Small: 5-60 tons/day
   - 3.2 Medium: 60-300 tons/day
   - 3.3 Large: >300 tons/day
4. Rice Market
5. Wholesaller: more than 40 tons per months
6. Rice Trader: middle man between rice mill and wholesalers/retailers

Empirical Strategies

Assumptions

- International price shock and short terms adjustment of firms.
- Take production decision as given and quantities are predetermined.
- I treat rice export price as exogenous.

Testable Hypothesis Whether the firms maintain their mark-ups (fully insured on their profits) and pass-through the price shock to upstream firms (farmers).

1. Relationship between farm price and rice mills' market power.
2. Ability for rice mills to pass-through price shock to the farmers.
3. Consumption adjustment and insurance of farmers.

Data

Data

1. Cross-sectional Thai Agricultural Household Survey (2006-2019)
   - 1.1 Price and Quantity
   - 1.2 Distrbution Channels
2. Rice Business Registration Data and Google Maps Data
   - 2.1 Location (Village/District/Province)
   - 2.2 Distance

Variables of Interests:

1. Farmer Size: Land Area, Total Income, Total Expenditure, Quantities sold
2. Market Power: distance from other buyers, distance from other sellers
3. Distribution Channel
4. Financial Constraint: Loan, Share of nonagricultural income
5. Geography: Province, District, Sub-district, Village
6. Variable of interest: Price (local currency)

Thai rice farmers are small

	Mean	s.d.	P25	P50	P75	Obs
Land for Rice Production						
- sqm	27,520	27,520	11,200	19,200	33,600	4,752
- share (%)	75.9	28.2	55.5	90.0	97.0	4,752
Quantities Produced						
- kg/year	10,122	13,702	2,000	4950	13,000	2,461
Price						
- Thai Baht/kg.	10.4	3.5	7	11	12.5	2,461

Distribution Channels

Channels	Household		Qunatities Sold		Price	
	No.	Share	No.	Share	Mean	S.D.
No intermediaries	93	3.7%	365,058	1.4%	13.7	6.6
Trader	637	25.3%	4,572,623	17.3%	10.82	3.06
Mill	1686	67.9%	20,643,227	78.3%	9.8	3.1
Market	37	1.5%	485,555	1.8	11.4	2.2
Co-op	58	2.3%	289,886	1.0%	13.3	4.7
Contracts	5	0&	20,000	0%	16.7	5.0

Empirical Prediction 1: Surplus splitting and market power

How surplus are splitting between exporters, rice mills and farmers

- Does surplus split between rice mills and farmers depend on market power of the rice mill?

Hypothesis 1:

Farmers that located in the area with high concentration of rice mill receive higher prices.

$$Price_{hh,year} = \beta_0 + \beta_1 Mill_{province,year} + \beta_2 Quantities_{province,year} + \alpha_{year} + \varepsilon_{province,year}$$

Empirical Fact 1: Distance from rice mills and markups

	Price (Thai Baht per metric ton)			
	(1)	(2)	(3)	(4)
Number of Mill				
- Total	27.75			
	(20.04)			
- Large		19.73		
		(47.67)		
- Medium			62.32	
			(35.47)	
- Small				43.12
				(37.06)
Quantities	-0.05	-0.06	-0.05	-0.05
	(0.008)	(0.009)	(0.007)	(0.008)
Provincial Rice Production	0.04	0.03	0.05	0.04
	(0.01)	(0.01)	(0.01)	(0.01)
Year FE	Yes	Yes	Yes	Yes
N	25,922	25,922	25,922	25,922
Adj R-sq	0.47	0.46	0.47	0.46
Clusters	Province	Province	Province	Province

Empirical Fact 1: Concentration of rice mills and markups

Hypothesis 1:

Farmers that located in the area with high concentration of rice mill receive higher prices.

Result

- Geographic location explains around 60% of price variations that farmers received.
- Farmers that live in the provinces that have higher concentration of rice mills get relatively higher prices.

Empirical Prediction 2: Pass-through and asymmetry

Testable Hypothesis: How rice mills adjust their mark-up when they are hit by international price shock?

- Does the rice mills maintain their mark-ups and completely pass-through the price shock to the farmers?
- Are there any asymmetry between positive and negative shocks?
- I use monthly country-level farm price and export price data from Jan 2005 to August 2022 to investigate the aggregate pass-through from export price to farm price.

$$\Delta \log P_t^{farm} = \beta \Delta \log P_t^{ex} + \alpha_{month} + \delta_{year} + \varepsilon_{month,year}$$

Empirical Fact 2: Pass-through from export price to farm price is incomplete

$$\Delta \log P_t^{farm} = \beta \Delta \log P_t^{ex} + \alpha_{month} + \delta_{year} + \varepsilon_{month,year}$$

	$\Delta \log P_{farm}$		
	(1)	(2) $\Delta P_{ex} > 0$	(3) $\Delta P_{ex} < 0$
$\Delta \log P_{export}$	0.75	0.74	0.85
	(0.02)	(0.04)	(0.07)
Month FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Adj R-sq	0.94	0.94	0.78
N	200	85	114

Empirical Fact 3: The pass-through during negative export price shock is higher than during positive export price shock

	$\Delta \log P^{farm}$	
	(1)	(2)
$\Delta \log P^{ex}$	0.46	
	(0.02)	
$\Delta \log P^{ex} * \mathbf{1}\{\Delta P^{ex} \geq 0\}$		0.40
		(0.03)
$\Delta \log P^{ex} * \mathbf{1}\{\Delta P^{ex} < 0\}$		0.59
		(0.06)
Province FE	Yes	Yes
Adj R-sq	0.11	0.11
N	3,319	3,319

Empirical Prediction 4: Pass-through and market power

Testable Hypothesis: How rice mills adjust their mark-up when they are hit by international price shock?

- Does higher competition among rice mills generate a result that is closer to a complete pass-through where exporters fully propagate the shock to local farmers?
- I use number of rice mills controlling total rice production in each province as a proxy for the market power.

Empirical Fact 4: Higher concentration of mill higher pass-through

	$\Delta \log P^{farm}$			
	(1)	(2)	(3) $\Delta P^{ex} < 0$	(4) $\Delta P^{ex} > 0$
$\Delta \log P^{ex} * \mathbf{1}\{\#Mill < 20\}$	0.44			
	(0.05)			
$\Delta \log P^{ex} * \mathbf{1}\{\#Mill > 20\}$	0.48			
	(0.05)			
$\Delta \log P^{ex} * \mathbf{1}\{\#LargeMill < 4\}$		0.39	0.49	0.36
		(0.05)	(0.1)	(0.06)
$\Delta \log P^{ex} * \mathbf{1}\{\#LargeMill > 4\}$		0.52	0.67	0.46
		(0.05)	(0.09)	(0.05)
Cluster	Province	Province	Province	Province
N	3,322	3,322	2,014	1,308

Empirical Hypothesis 5: Consumption Adjustment

- Farmers that live in the area with high concentration of rice mills receive higher prices.
- At the same time, they also experience higher income shocks.
- Investigate the fluctuation in consumption given income shock.

- Do small farmers get lower price but more insurance (less fluctuation in prices)?
  - Would this lead to a better outcome when farmers are financially constraint?
  - Calculate the surplus of the farmers and rice mills.

Conclusion and Next Step

- The paper studies the empirical facts about the pass-through from international price shock to upstream producer.
- This paper focus on short-run price adjustment, taking production decision as fixed.
- Higher the number of mills in the region, farmers got higher price but more fluctuation.
- The next step, I plan to establish an empirical result for consumption adjustment of the farmers. Then, I plan to incorporate the empirical facts to the model to conduct the welfare and policy analysis.