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Pricing under Uncertainty in Agricultural Grain Markets and the Objectives of Cooperatives: A mixed Oligopoly Analysis

Prepared for NCERA-210 Workshop November 4, 2015 Ziran Li

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Motivation

Cooperatives' principles

Cooperatives' objectives

Userowned
Userbenefit control



Maximizing profit

Maximizing member's on-farm income

Market environment

Monopoly

Oligopoly

Co-op's Objective

Single objective

Multiple objectives

Actions

Pricing

Signaling

Performances

Profit

Market Share

IOWA STATE UNIVERSITY

Department of Economics

Objective

- Study the role of objectives for marketing co-ops in determining the equilibrium price in a grain market.
- Provide testable hypotheses on relationship between co-op's pricing behavior and its profit and market share.

Environment

- Three period mixed oligopoly
- In the first period, a co-op and an investor owned firm (IOF) make price offers to purchase inputs (grain) from producers.
- In the *second period*, producers allocate their grain between the two firms.
- In the final period, firms sell to a value-added market.
- Risk: Firms do not know the output price until the third period

Producer

Objective function

$$\max_{\delta} E(u(w)) = \max_{\delta} (1 - \delta) w_p + \delta w_c + \beta E[\pi_c(\delta, p)] - \frac{1}{2} \rho \beta^2 Var[\pi_c(\delta, p)]$$

- A risk-averse representative producer
- Endowed with one unit of crop
- Face a portfolio problem: how to allocate his grain between the co-op and the IOF.
- User-owner principle patronage refund based on use.

Firms

IOF maximizes expected profit

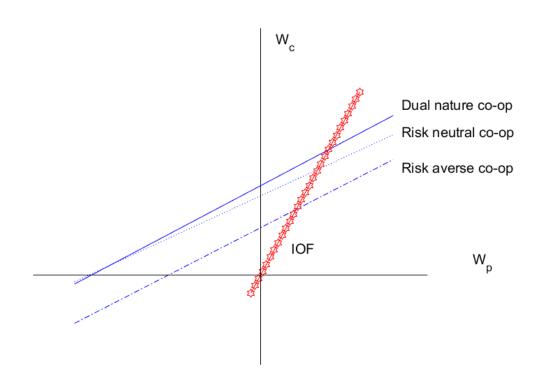
$$\max_{w_p} E[\pi_{IOF}(\delta, p)] = [E(p) - w_p - c](1 - \delta).$$

Co-op's objective function:

$$\max_{w_c} \{\alpha \delta w_c + (1-\alpha)\delta \left(\beta(E(p) - w_c - c) - \frac{1}{2}\theta \beta^2 \sigma^2 \delta\right)\}$$

- $\alpha=\theta=0$: expected profit maximizer
- $\alpha=0$, $\theta>0$: risk averse profit maximizer
- $\alpha > 0$, $\theta > 0$: objective reflecting dual natures

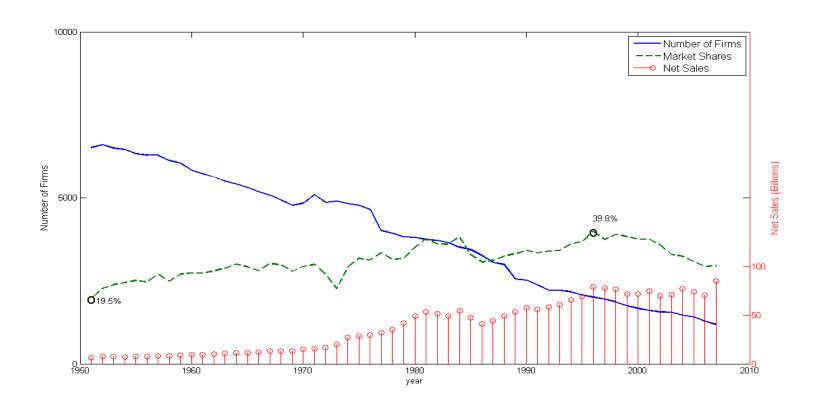
Equilibrium



Implication

- The co-op has a smaller market share
- The co-op pays a higher price
- If a co-op is profit maximizing, the market share for the co-op is unaffected by margin.

Reality



Neo-Institutional

Cook (1995): vaguely defined property rights challenges the survival of traditional cooperatives and thus forces co-ops to restructure.

- Free rider problem
- Horizon problem
- Portfolio problem
- Control problem

Thank you!