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

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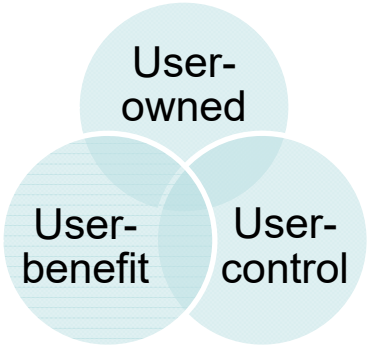
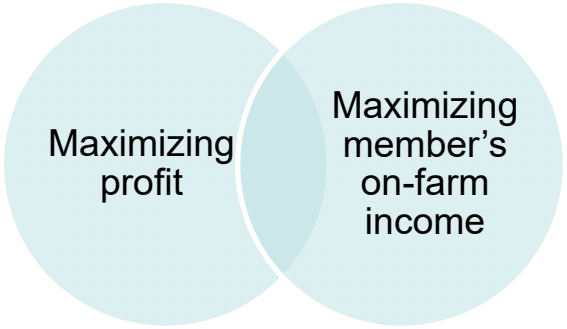
Motivation

Cooperatives' principles



Cooperatives' objectives



Market environment	Co-op's Objective	Actions	Performances
Monopoly	Single objective	Pricing	Profit
Oligopoly	Multiple objectives	Signaling	Market Share

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

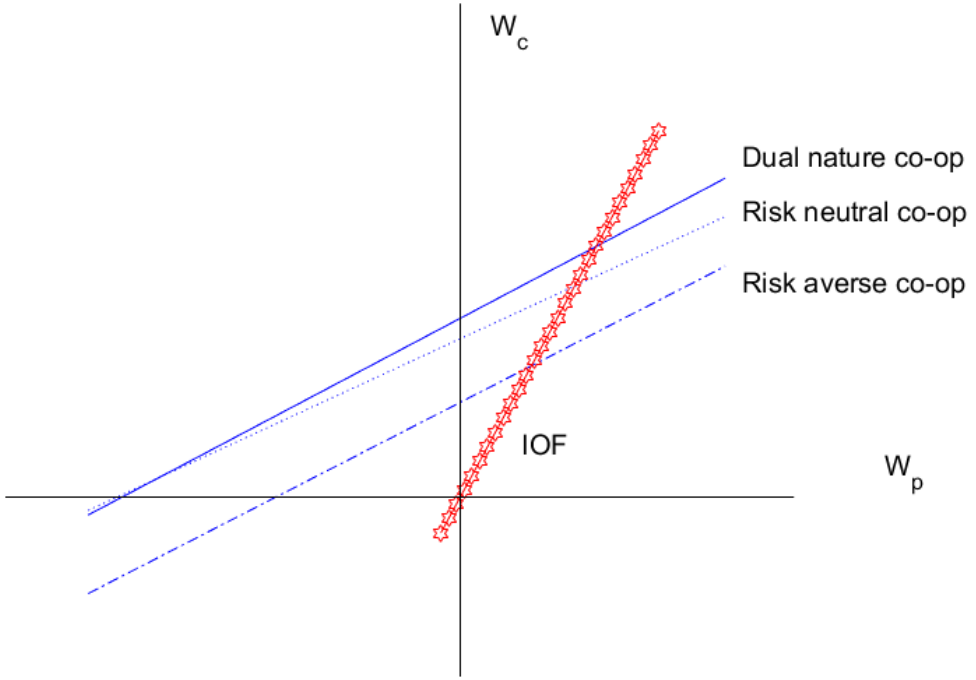
$$\max_{w_p} E[\pi_{IOF}(\delta, p)] = [E(p) - w_p - c](1 - \delta).$$

- Co-op's objective function:

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

  - α=θ=0 : expected profit maximizer
  - α=0, θ>0 : risk averse profit maximizer
  - α>0, θ>0 : objective reflecting dual natures

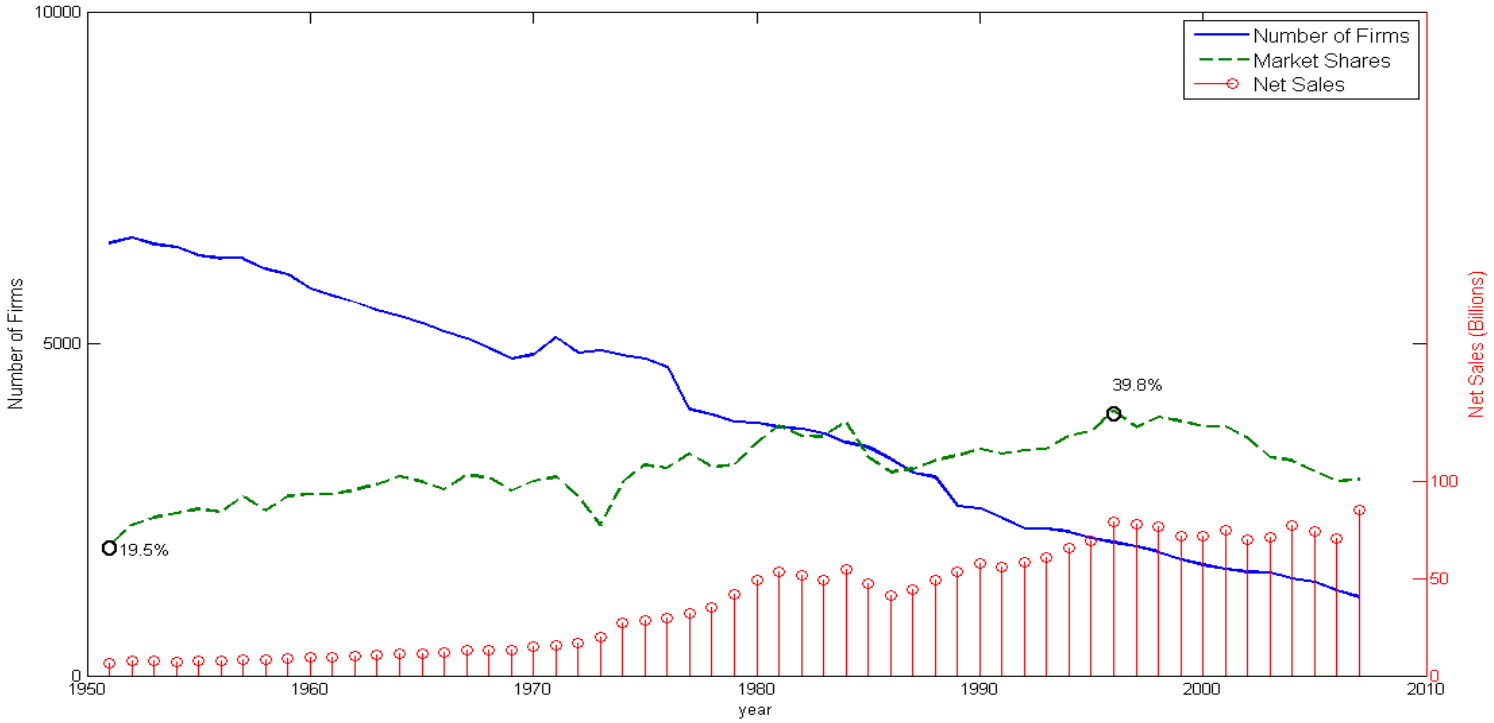
Equilibrium



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


Number of Firms
Market Shares
Net Sales
10000
5000
0
Number of Firms
Net Sales (Billions)
100
50
0
19.5%
39.8%
1950
1960
1970
1980
1990
2000
2010
year

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!