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

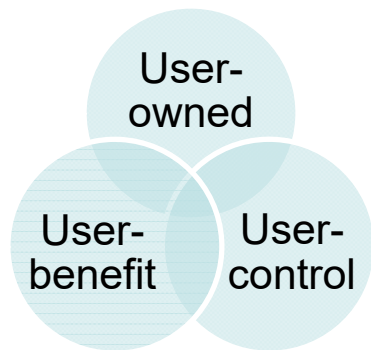
**Prepared for NCERA-210 Workshop  
November 4, 2015  
Ziran Li**

**With Hang Qian and Keri Jacobs**

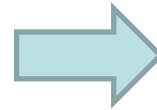
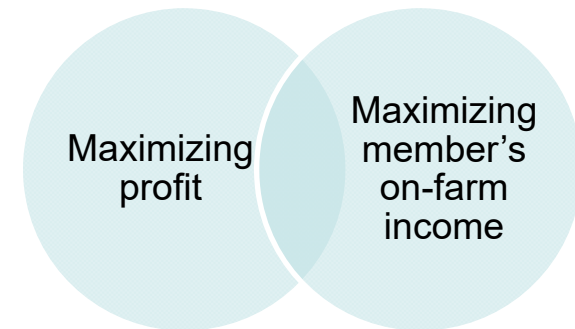
**Department of Economics  
Iowa State University**

# Motivation

## Cooperatives' principles



## Cooperatives' objectives



### Market environment

Monopoly

Oligopoly

### Co-op's Objective

Single objective

Multiple objectives

### Actions

Pricing

Signaling

### Performances

Profit

Market Share

# Objective

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- 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

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- 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

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- Objective function

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

- 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

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- IOF maximizes expected profit

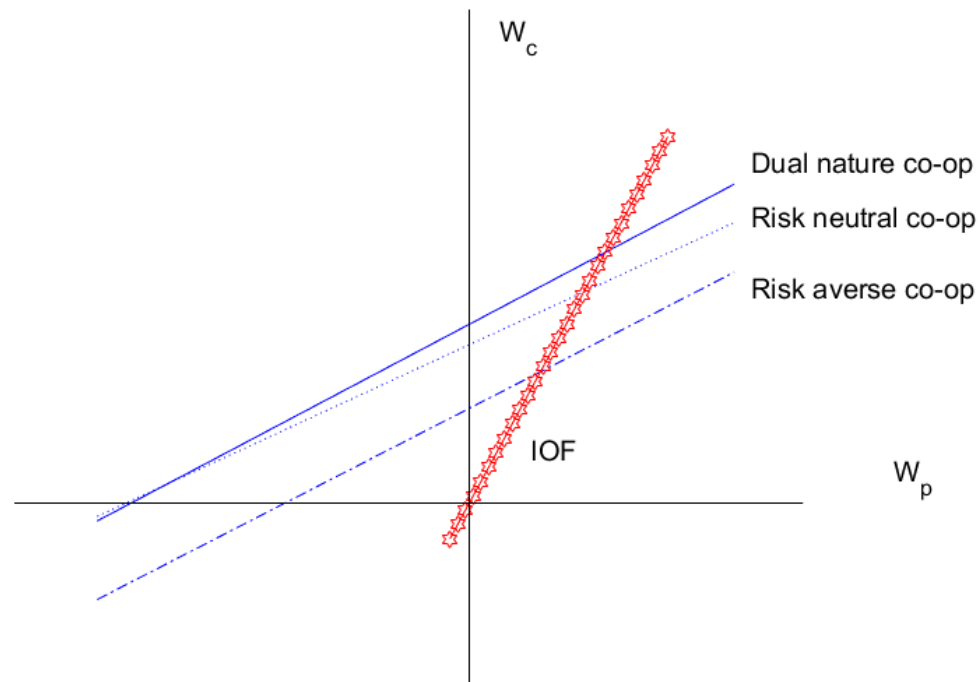
$$\max_{w_p} E[\pi_{IOF}(\delta, p)] = [E(p) - w_p - c](1 - \delta).$$

- Co-op's objective function:

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

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

# Equilibrium



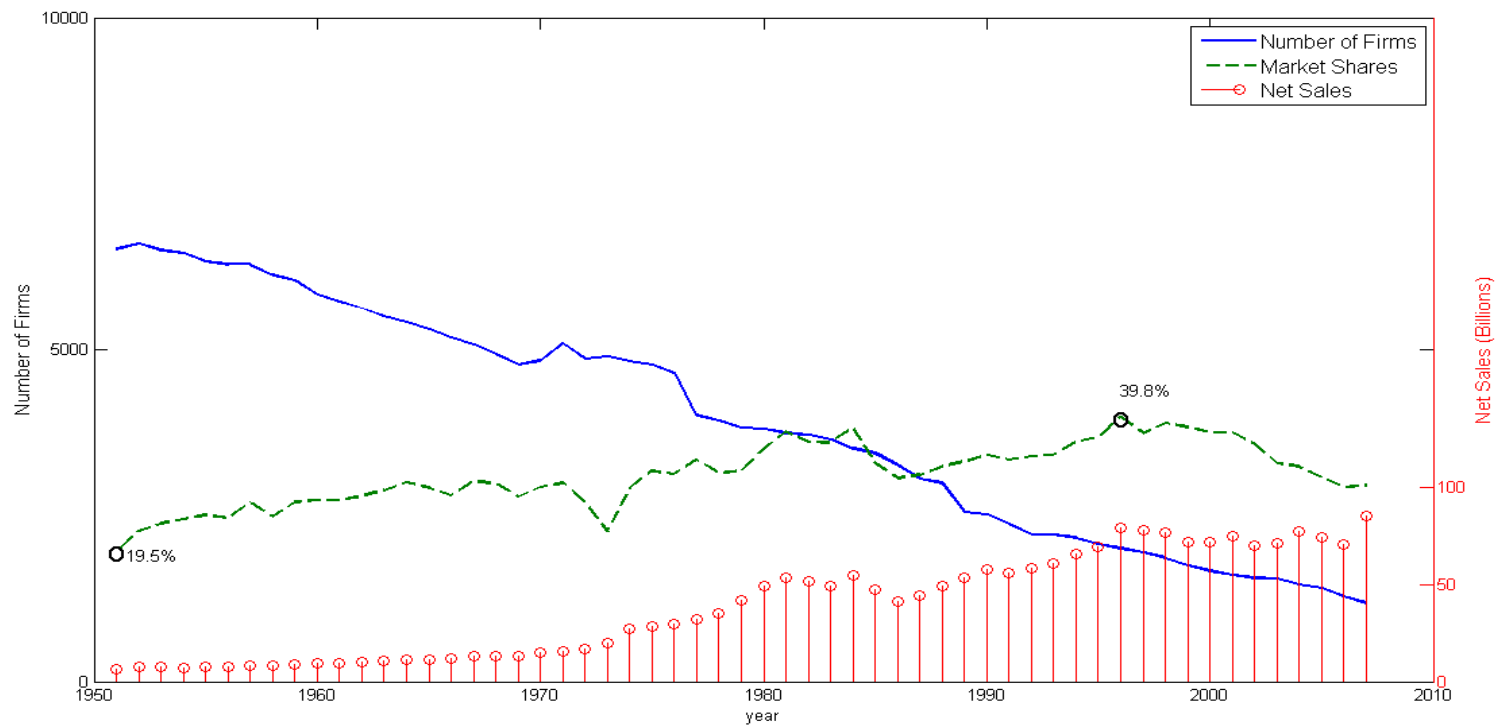


# Implication

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- 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

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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!