Hedging Behavior of Agribusiness Cooperatives and Investor Owned Firms in Germany

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Prepared for the Conference Mats,
Collège de France, Paris, May 15, 2024

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Motivation

- **Agricultural commodity markets are unique.**
  - Producer-owned cooperatives (coops)
  - Corporate agribusinesses or investor owned firms (IOFs)
- **Commodity prices are increasingly volatile.**
  - Producer, agribusiness hedging (e.g., Pennings & Garcia 2004)
  - Coop's hedging simulation (e.g., Manfredo et al. 2003).
  - Risk averse producers join coops (Franken et al. 2022).
- **Which agribusinesses hedge how much?**

Objective: Study Coop & IOF Hedging

- **Producer-owned coops**
  - Exist to benefit owner-members.
  - Perform risk mitigating functions: assurance of markets, pooling revenues & costs, use of contracts to match supply & demand (Ollila 1994; Shaffer 1987; Sexton 1986; Shi & Cao 2021; Staatz 1987).
- **Investor-owned firms**
  - Exist to maximize shareholders' ROI.
  - Do not have same incentives to limit producers' risks.

Literature & Hypotheses

- **Many studies on producers' hedging**
  - Find perception of & attitude toward risk matter

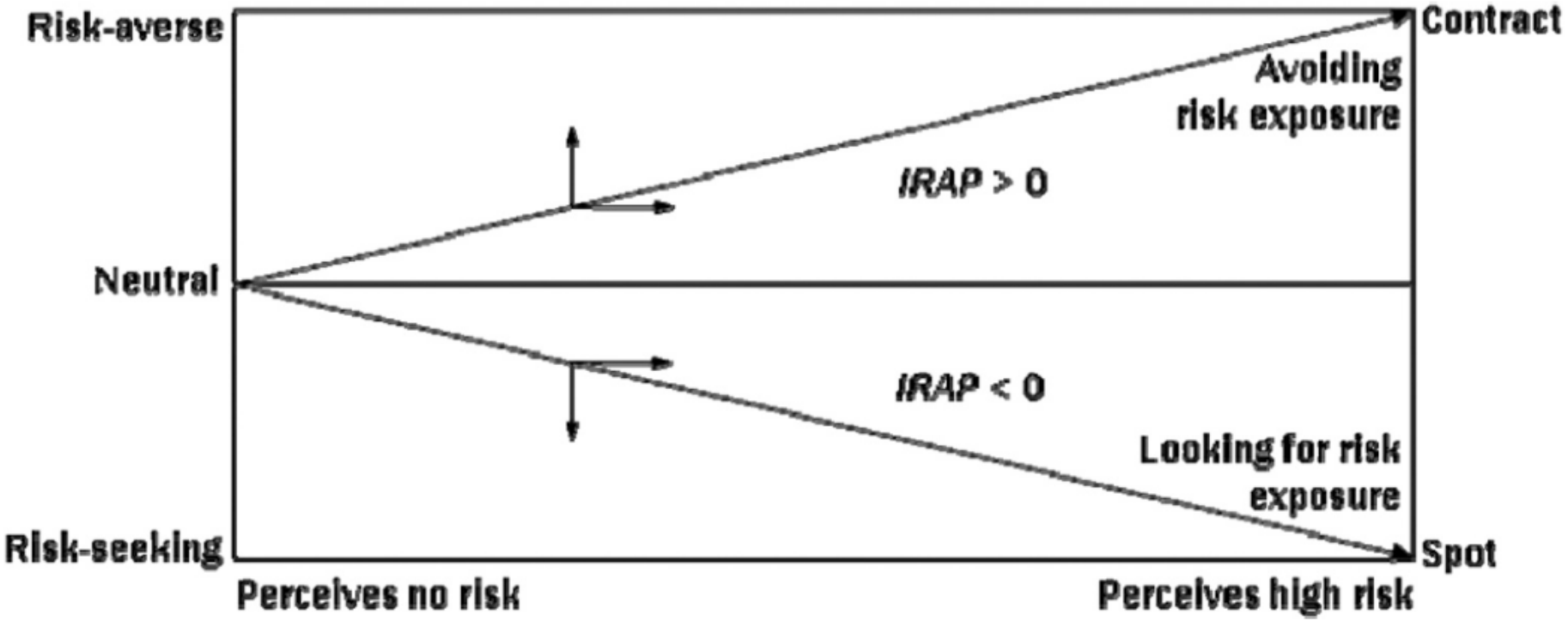

Fig. 1. Influence of the Interaction of Risk Attitude and Risk Perception on Risk Management.
Source: Pennings, J.M.E. and B. Wansink (2004). Channel Contract Behavior: The Role of Risk Attitudes, Risk Perceptions, And Channel Members' Market Structures." *Journal of Business*, 77(4): 697-723.

Literature & Hypotheses

- Coops – options with real value!
  - **GICL Workshop: "Balancing Market Demand & Producer Supply" (October 21-23, 2019)**

    "Take all members produce" but pool-pricing, quality control, & value-added/commodity pools .
  - **Put** - Negotiated contingency agreement to accept *all* that members deliver (Shaffer 1987; Sykuta 2019).

    "(T)ransfers the uncertainty of delivery into a risk of possibly lower prices to all the members in a situation of surplus" (Ollila, 1994, p. 92).

    →Then use insurance, pooling, and hedging.

Literature & Hypotheses

- Hedging
  - "(T)he cooperative could offer improved price expectations by contracting with its buyers or by hedging on the futures market." (Shaffer, 1987, p. 69).
  - "(M)embers … not … comfortable with using futures … and would rather work with the elevator managers on a forward contract …" (Fulton et al 1998, p. 63).
- Pooling
  - "(P)revalent in subsectors like fruit and vegetables, where … futures market are unavailable" (Staatz, 1987, p. 101).

Literature & Hypotheses

- **Coops' propensity to hedge higher than IOFs'**
  - Assurance of markets & stable prices are often listed among the benefits of cooperation (Sexton 1986).
  - Members are more risk averse (Franken et al. 2022).

  H_0: Coops are more likely than IOFs to hedge.

- **Coops' intensity of hedging lower than IOFs'**
  - Less speculative positions (Conlon et al. 2016),
  - Natural hedges and/or custom risk management plans (Pennings & Kalogeras 2020).

H_0: Coops' hedging ratios are smaller than IOFs'.

Research Context: German Agribusiness

- **Qualtrics survey of employees/executives responsible for risk management at 217 firms**
  - List acquired from communication with milk, sugar, grain, & oilseed commodity associations.
  - 124 firms participated with 96 (29 coops and 67 IOFs) complete, usable responses obtained.

Variable	Coops				IoFs				t-test
	n	mean	comment	SD	n	mean	comment	SD	H_0: diff = 0 Pr (|T|> |t|)
Risk attitude (RA)	29	0.759	RA ~ low risk-averse	0.769	70	1.048	RA ~ low risk-averse	1.353	0.283
Hedging ratio (HR)	27	2.592	HR ~ 20-30 %	0.844	39	5.435	HR ~ 50-60 %	1.182	0.499
DMU	31	3.935	DMU is neutral about hedging	0.814	67	4.522	DMU is rather positive about hedging	1.198	0.015*

Note: Displayed are the results of the mean comparisons showing the differences between Coops and IoFs regarding the respective independent variable. The two columns "comment" explain the interpretation corresponding to the respective mean categories.
*n = number of observations; SD = standard deviation; Pr (|T|> |t|) = p-value; * ~ p < 5 % level and ** ~ p < 1 % level*

se)

Summary Statistics

Table 1

Summary statistics.

Variable	Mean	Std. Dev.	Min	Max
HEDGE RATIO (%)	0.25	0.32	0.00	1.01
HEDGE (1-yes, 0 =no)	0.67	0.47	0.00	1.00
DMU	4.32	1.13	2.00	7.00
IRAP	5.07	5.85	-5.00	19.00
COOP (1 =yes, 0 =no)	0.30	0.46	0.00	1.00

Note: N = 96

Correlations

Table 2
Correlations.

	Hedge ratio	Hedge	DMU	IRAP	COOP
HEDGE RATIO (%)	1.00				
HEDGE (1-yes, 0 =no)	0.55	1.00			
DMU	0.38	0.20	1.00		
IRAP	0.19	0.32	0.09	1.00	
COOP (1 =yes, 0 =no)	0.17	0.78	-0.24	-0.24	1.00

Note: N = 96.

Empirical Methods

- Hurdle Model (Cragg 1971):

$$\ln L = \sum_{c_i=0} \ln \Phi(-\gamma' z_i) + \sum_{\alpha_i>0} \left\{ \ln \Phi(\gamma' z_i) + \ln \left[\frac{1}{\sigma} \phi\left(\frac{\alpha_i - \beta'_\alpha x_i}{\sigma} \right) \right] - \ln \Phi\left(\frac{\beta'_\alpha x_i}{\sigma} \right) \right\}$$

Probit | Truncated OLS

  - x_i , z_i = independent variables, β_α , γ = coefficients, σ = variance, and α_i = proportion contracted.

Regressions Results

Explanatory Variable	Binary Probit	Truncated Regression
DMU	0.332 * **	0.063
	(0.071)	(0.111)
IRAP	0.008	-0.002
	(0.009)	(0.018)
COOP (1 =yes, 0 =no)	0.466 * **	-0.948 * *
	(0.078)	(0.441)
Pseudo R2	0.423	
Log likelihood	-35.278	7.810
N	96	64

Notes: * ** ,* *,* Significance at the 1%, 5%, and 10% levels.
Standard errors in parentheses.

Conclusions

- First study to compare hedging of coops & IOFs
  - Coops traditionally thought to be more conservative.
- Results
  - No evidence of risk preference effects for sample.
  - Corroborate prior findings for DMU.
  - Coops more likely to hedge but more sparingly!

  (not apparent if apply Tobit models to hedge ratios)
- Future research
  - Other commodities, countries, variables (size, debt).
  - Overall risk management (insurance, contracts)

Questions?