What Drives the Market Share of Livestock Risk Protection (LRP)? An Empirical Analysis at National and State Level in the United States and County Level in Nebraska

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Introduction

- Livestock Risk Protection (LRP), a commodity insurance product administered by the USDA's Risk Management Agency
- Available for feeder and fed cattle, sheep, and swine and protects against decline in price
- LRP offers an alternative price risk management, providing per-head insurance at a set premium cost
- Adoption of LRP was initially modest until a recent surge in participation (Collins 2011)
- This increase is coincident with major enhancements like subsidy rate restructuring, product improvements, institutional policies, and risk management education efforts
- Research shows reduced LRP costs in cattle from higher premium subsidies (Boyer and Griffith 2023), but broader economic and policy drivers remain unclear

Objective

Explore economic and policy factors driving the utilization of LRP-feeder at state and county level in Nebraska

Method

Data

- USDA-RMA's Summary of Business (SOB), Quick Stats at the USDA-National Agricultural Statistical Service (NASS) and a database of Extension Risk Management Education (ERME) program
- Two separate panel datasets (2003-2022) for observations: national and state level in the United States

Feeder cattle estimation

Nationally and statewide via NASS data
Feeder cattle inventory = Calves + Heifer GE 500lbs. (excl replacement) + Steer GE 500 lbs. – Cattle on feed ……. (1)

Variables construction and definition

- Feeder cattle inventory
- Market share (Y) = Insured heads/feeder cattle inventory
- Price (P) = Received average price per cwt. in the given marketing year
- Market volatility (V) = Total premium/liability
- Weighted subsidy (W) = Total subsidy/total premium
- Education (E) = cumulative no. of completed projects funded by ERME program nationally and statewide

Model

- Ordinary least squares (OLS) estimation
- Simple linear model, for state i, year t, fixed effect f and idiosyncratic error term ∈,

$$Y_{it} = \alpha + \beta P_t + \gamma V_{it} + \delta W_{it} + \emptyset E_{it} + f + \in_{it}$$

Data Visualization

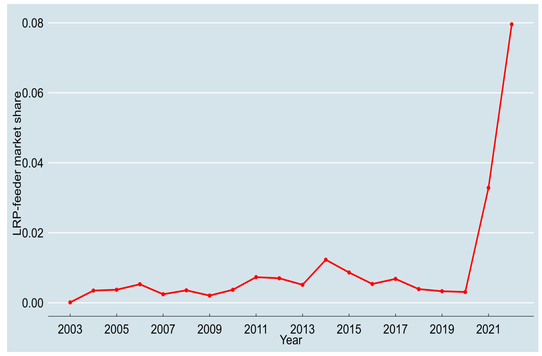

Figure 1. Market share of LRP-feeder cattle by year

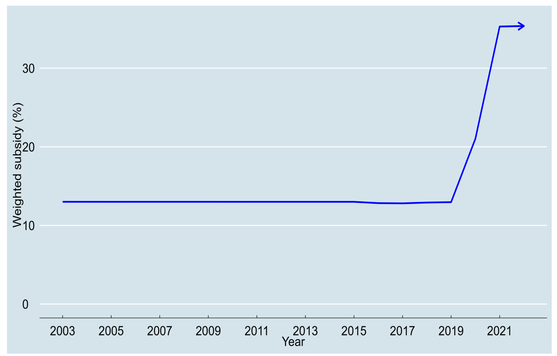

Figure 2. Weighted subsidy received (%) in LRP-feeder cattle by year

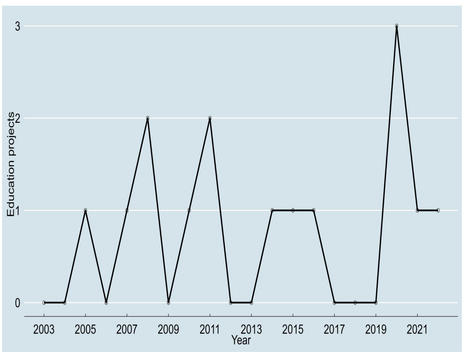

Figure 3. No. of risk management education project on LRP-feeder cattle completed by ERME by year

Econometric Estimation

Table 1. OLS estimation of national models (2003-2022)

	National (2003-2022)		
	Model 1	Model 1A	Model 1B
Variables			
Intercept	-0.046108*(0.018415)	-0.032378** (0.009874	-0.00165003 (0.027707)
Price	0.000132 (0.000085)	0.000072(0.000051)	-0.00000901 (0.000137)
Market volatility	0.252246(0.455734)	-0.075291 (0.264575)	-0.12373641 (0.755284)
Weighted subsidy	0.231784***(0.042341)	0.213151*(0.036497)	No
Education	-0.00117(0.001321)	No	0.00242309(0.001922)
Total observations	20	20	20
Adjusted R2	0.714876	0.718715	0.198675

Figures in the parentheses are standard errors and *, **, *** indicate less than 5%, 1%, and 0.1% significance levels, respectively.

Table 2. OLS estimation of state models (2003-2022)

	States (2003-2022)	
	Model 2A	Model 2B
Variables		
Intercept	-0.006029* (0.002472)	-0.004925 (0.004497)
Price	0.000021(0.000016)	0.000016 (0.000015)
Market volatility	-0.368533***(0.063872)	-0.434529 (0.064943)
Weighted subsidy	0.144100***(0.010833)	0.146927***(0.010549)
Education	0.006592***(0.000971)	0.009751*** (0.001454)
State fixed effect	No	Yes
States		
Minnesota		-0.011604*(0.005555)
Nevada		0.011135*(0.005463)
New Mexico		0.016156**(0.005444)
South Dakota		0.026963***(0.005566)
Total observations	820	820
Adjusted R2	0.328586	0.40122

Figures in the parentheses are standard errors and *, **, *** indicate less than 5%, 1%, and 0.1% significance levels, respectively.

Results Summary

- In national models: only weighted subsidy is a significant
- Dropping the education variable in model 1A reduced the effect of the subsidy
- Without state fixed effects, the intercept, market volatility, weighted subsidy, and education were significant.
- Weighted subsidy and education positively affected market share, while market volatility had a negative effect
- With state fixed effects, weighted subsidy and education remained significant
- Both weighted subsidy and education had positive effect on market share in state models (2A, 2B)
- Out of 40 states, five (Minnesota, Nevada, New Mexico, and South Dakota) were significant

Discussion

- Weighted subsidy seems dominant nationally and statewide
- Subsidy and education both look positive for driving market share although many other variables could confound the result
- While price and volatility are both expected to drive up market share, only volatility looks prominent
- Volatility, could potentially drive up the insurance costs, which could mitigate the expected positive effect on market share
- An event study with county-level program data in Nebraska is planned as part of the ongoing research

References

- Collins, Dr Keith. 2011. "The state of US livestock insurance. No. 1143-2016-92931
- Boyer, Christopher N., and Andrew P. Griffith. 2023. "Subsidy Rate Changes on Livestock Risk Protection for Feeder Cattle." Journal of Agricultural and Resource Economics 48 (1): 31-45. doi:10.22004/ag.econ.316752

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