The Relative Capital Structure of Agricultural Grain and Supply Cooperatives and Investor Owned Firms

Ziran Li*, Keri Jacobs, and Georgeanne Artz

Department of Economics

Iowa State University

Poster prepared for presentation at the Agricultural & Applied Economics Association's 2012 AAEA Annual Meeting, Seattle, Washington, August 12 – 14, 2012

*Corresponding author. Contact: ziranl@iastate.edu

IOWA STATE UNIVERSITY
Economics Department

Agricultural and Applied Economics Association Annual Meeting
August 12-14, 2012

Ziran Li, Research Assistant; Keri L. Jacobs, Assistant Professor; Georgeanne Artz, Visiting Assistant Professor

The Relative Capital Structure of Agricultural Grain and Supply Cooperatives and Investor Owned Firms

Background and Motivation

Capital accumulation along with the distribution of profits represents a unique challenge for cooperatives (coops) as compared to investor owned firms (IOFs) because cooperatives:

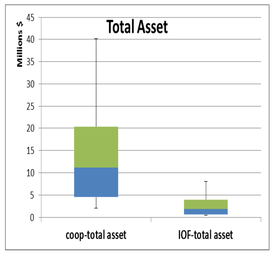
- rely on owner equity and retained patronage as primary sources of capital funding; and
- have limited access to outside sources of capital.

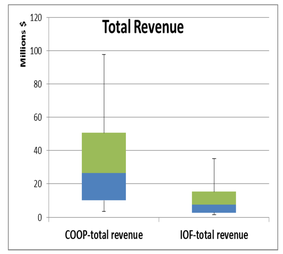
Our objectives are two:

1. explore empirically whether **firm type gives rise to a capital structure for agricultural coops that is fundamentally different from IOFs,** and
2. identify the relevant **financial determinants** which may contribute to differences in **capital structure.**

Data and Empirical Strategies

- Panel data of 100 agricultural grain and supply coops and 50 IOFs in Iowa from 1992 – 1995 containing annual accounting information.
- A box-plot comparison of sizes of coops and IOFs in our data shows coops in our study are larger

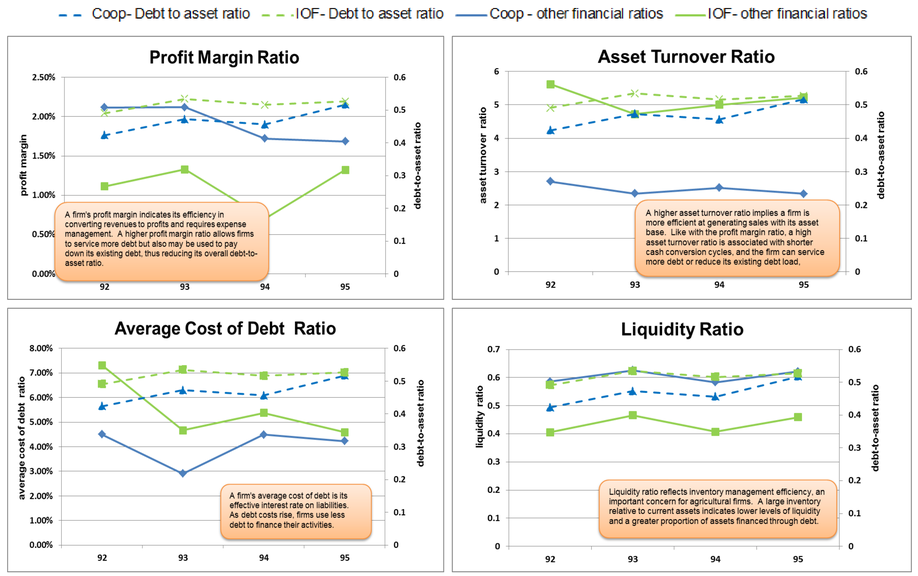




- Utilizing DuPont Analysis techniques, we construct financial ratios that describe a firm's profitability and operational and management efficiency.
- We regress a firm's capital structure on these ratios to estimate and compare the marginal impact each has on capital structure.

How Do Coops and IOFs Compare Financially?

The charts below compare, for IOFs and coops, key financial ratios to the debt-to-asset ratio.



Empirical Model

$$\text{Debt-to-asset ratio}_{i,t} = \alpha_{i,t} + \delta_{it}\,\text{coop}_i + \beta_1\,\text{margin}_{i,t-1} + \beta_2\,\text{assetturnover}_{i,t-1} + \beta_3\,\text{avg.debt cost}_{i,t-1} + \beta_4\,\text{liquidity}_{i,t} + \gamma_1\,\text{coop}_i\,\text{margin}_{i,t-1} + \gamma_2\,\text{coop}_i\,\text{assetturnover}_{i,t-1} + \gamma_3\,\text{coop}_i\,\text{avg.debt cost}_{i,t-1} + \gamma_4\,\text{coop}_i\,\text{liquidity}_{it} + \varepsilon_{i,t}\ ;\quad i:\ \text{firm i, i=1, 2, …, 150};\quad t:\ \text{fiscal year, t=1993, 1994, 1995}$$

Where,

- $\text{margin}_{i,t-1}$=pretax $\text{profit}_{i,t-1}$ / $\text{revenue}_{i,t-1}$
- asset $\text{turnover}_{i,t-1}$=$\text{sales}_{i,t-1}$ / total $\text{assets}_{i,t-1}$
- coop_i : equal to 1 if firm i is coop; 0 otherwise
- $\text{liquidity}_{i,t}$=$\text{inventory}_{i,t}$ / current $\text{asset}_{i,t}$
- avg.debt $\text{cost}_{i,t-1}$ = int.$\text{expense}_{i,t-1}$ / long term $\text{liabilities}_{i,t-1}$

Empirical Results and Key Findings

Estimated Marginal Effects on Capital Structure from a Random Effects Model by Firm Type
Dependent variable: debt-to-asset ratio

Impact on debt ratio of different organizational structures		avg. debt cost	liquidity	margin	asset turnover
Cooperatives	est.	0.002	0.375***	-1.551***	0.101*
	(p-value)	(0.327)	(0.000)	(0.002)	(0.019)
Investor Owned Firms	est.	-0.035***	0.159***	-0.939	0.004
	(p-value)	0.001	0.006	0.127	0.583
Difference in effects between coops and IOFs	est.	0.037***	0.216***	-0.613	0.097
	(p-value)	(0.001)	(0.007)	(0.437)	(0.873)

legend: * p<0.1; ** p<0.05; *** p<0.01

- On average, coops are less leveraged – have a smaller debt-to-asset ratio – than IOFs.
- Unlike IOFs, the average cost of debt does not have a significant impact on a coop's capital structure. This may result from the coop's larger portion of current liabilities relative to long term liabilities, and may reflect the horizon problem faced by coops.
- The coop's debt ratio is more sensitive to inventory-related changes in liquidity ratio than the IOF's. This suggests that for additional units of inventory per unit of current assets, coops borrow more to finance the inventory than do IOFs.
- A higher profit margin results in deleveraging activities for coops.
- Coops appear to increase debt usage as they become more efficient in managing sales generated from their assets.

Conclusion & Future Research

Utilizing panel data of agricultural grain and supply firms in Iowa, we find that ownership structure does impact the operating capital structure of a firm. Coops operate with a lower total debt relative to their asset base than do IOFs. We also find that the difference in capital structure is driven by operational and management efficiencies. It appears that coops' debt usage is more sensitive to inventory management (liquidity) and profitability than for IOFs.

Interest rates are generally considered to be a key determinant of the amount of debt a firm borrows. However, our results suggest that interest rates may play a negligible role in the liability structure of coops. This is explained by the horizon problem coops face and because coops tend to primarily rely on short term debt financing instead of carrying longer term debt.

We are currently working on a theoretical model to identify the optimal capital structure of coops by incorporating the coop's value function. If coops are generally under-capitalized, it suggests managers of the coop may need to relax the restrictions on residual claims.