Journal of Cooperatives

Volume 22 *2009* *Page 22-44*

Cooperative Financial Performance and Board of Director Characteristics: A Quantitative Investigation

Jennifer Keeling Bond

Contact:
Jennifer Keeling Bond
Clark B-329
Department of Agricultural and Resource Economics
Colorado State University
Phone: 970 491-3299
Email: jennifer.bond@colostate.edu

Assistant Professor, Colorado State University

Cooperative Financial Performance and Board of Director Characteristics: A Quantitative Investigation

Jennifer Keeling Bond

Abstract

This article empirically tests the hypothesis that cooperative boards of directors and board size, specifically, can influence firm performance. Most existing studies of cooperative governance rely on qualitative data to draw inferences; however, this chapter uses several USDA data sets and a survey of co-op managers to determine whether above-average board size has a negative impact on co-op performance. This approach is comparable to those found in the corporate governance literature; however, it contributes to the cooperative literature by providing statistically-based findings on optimal board size. Specifically, this study finds that additional board members do eventually reduce some measures of performance; however, board size must be quite large.

Introduction

The recent rash of corporate scandals has diminished investor confidence in boards of directors that are responsible for monitoring executive performance and representing the interests of shareholders (Kim and Nofsinger, 2005).[1] In the aftermath of these incidents, investors are looking with renewed interest for ways to improve the accountability and effectiveness of corporate boards (Rauterkus, 2003). By comparison, in agricultural circles, little discussion of cooperative governance reform has occurred, despite the fact that cooperatives operate and compete in the same business environment as public corporations and are guided by comparable internal control systems.

Like corporate boards, cooperative boards play an essential role in linking the managers' actions to the members' and patrons' interests. Both corporate and cooperative boards are responsible for monitoring the performance of management, forming long-term strategic plans, evaluating proposals presented by management, and understanding financial and strategic actions undertaken by the firm. To function effectively in this capacity requires that directors have basic literacy in finance and have some comprehension of business strategy. For

Jennifer Keeling Bond is Assistant Professor, Colorado State University

[1] Throughout this paper, the term corporation refers to a business that is operated on a for-profit basis and is governed by an elected board of directors.

corporations whose boards are largely staffed by officers of other corporations, industry experts, firm management, and wealthy shareholders, meeting minimal director competency recommendations is not difficult (Kim and Nofsinger, 2004). However, members of agricultural cooperative boards are often professionals in agricultural production management or community leaders. These positions are less likely to prepare the individual for the role of a director (Dunn, et al., 2002; Lang, 2000; Rhodes, 1978; Staatz, 1983). As a result, agricultural cooperatives' boards may suffer from more severe governance problems than their corporate counterparts.

The goal of this paper is to examine the relationships between cooperative performance and board characteristics. A better understanding of governance and performance dynamics may aid cooperatives in creating more effective boards. Previously, the cooperative governance literature has relied on qualitative data to recommend change (Dunn, et al., 2002; Lang, 2000; Keeling, 2004). The anecdotal findings of this research (that boards' members need more financial and managerial training, and outside or "expert" directors may enhance the skill set of the board) often echoes the econometrically supported conclusions found in the corporate governance literature. However, statistical methods have not been used to study how board characteristics affect agricultural cooperative performance. To fill this gap in the literature, three USDA-Rural Business and Cooperative Services Agency (RBS) data sets are combined with data collected from a survey of cooperative managers. Econometric methods and lessons learned from both the corporate governance literature and the Rice Growers Association (RGA) case study are used to investigate the relationship between U.S. agricultural cooperative performance and board of director characteristics.

Literature Review

The collapse of Enron in late 2001 was the first in a series of corporate scandals that gained national media attention. Additional scandals at WorldCom, Tyco, Adelphia, and other troubled corporations demonstrated an immediate need to study and improve corporate governance and oversight (Kim and Nofsinger, 2004). With the goal of understanding interactions between firm performance and board characteristics, the empirical governance literature has focused on determining an optimal size and the ideal number of directors (including outside members) (Dehaene, V. De Vuyst, and H Ooghe, 2001; Gilson, 1990; Jensen, 1993; Lipton and Lorsch, 1993).[2] Anecdotal evidence suggests that research on board size and performance may be especially helpful in understanding

[2] Outside or external directors are those directors who are neither members of management nor shareholders in the firm they are governing. Frequently, these are individuals hired to sit on the board for their financial or managerial expertise.

performance issues associated with cooperatives (Dunn, et al., 2002; Lang, 2000; Reynolds, 2003).

When firm performance suffers, the board size may be altered in an effort to correct the problem. In the case of RGA, the board was decreased from 25 to 15 members during a period of financial difficulty in 1986. On the other hand, the Tri-Valley Growers (TVG) board increased in size from 11 to 13 to enhance performance when the cooperative underwent restructuring in the late 1990s (Hariyoga, 2004).

Several authors have studied the question of what board size maximizes firm performance. Applying conclusions from the corporate literature is appropriate as cooperatives are a form of a corporation, though cooperatives are differentiated by the requirement that they operate on a non-profit basis. In fact, board members of both firm types perform similar duties and share in upholding similar responsibilities such as looking out for the member/owner's (shareholder's) best interests.

Lipton and Lorsch (1993) suggest that the maximum board size should be limited to 10 directors, smaller than the RGA or TVG Boards. A board size of eight to nine is favored, since a smaller board is less likely to be manipulated by the elected chairman and to reach a true consensus from its deliberations (Lipton and Lorsch, 1993). For similar reasons, a board size of eight is recommended by Jensen (1993), who finds that larger boards have greater difficulty reaching a quorum. This inability to make decisions may make the firm less able to take preemptive action to avoid failure (Jensen, 1993). Rauterkus (2003) appeals to Jensen (1993) in her argument that eight is an ideal board size and uses logistic regression analysis to find evidence that larger boards are more likely to file for Chapter 11 restructuring. Lang (2000) reports that cooperative leaders believe smaller boards may make it possible for members to be more selective in voting for directors and lead to greater accountability, less anonymity, and more efficient meetings.

Free rider problems typically increase with board size. The larger the board, the easier it may be for an individual member to reduce his contribution and involvement. In the case of directors, shirking may be expressed as reduced monitoring and lack of participation in the decision making process. If enough directors evade their oversight duties, firm performance may suffer. Yermack (1996) finds that a large board size has a small, significant, and negative effect on "Tobin's q", a measure of firm worth calculated as the ratio of the market value of firm assets over the replacement costs of the firm's assets. Decreases in "Tobin's q" represent a reduction in excess firm profits. The results of Yermack's (1996) study are consistent with the board size recommendations of Lipton and Lorsch (1993); and Jensen (1993), and are supported by results of a study of Finnish corporations by Mikkelson, Patch, and Shah (1997).

Contrary to findings in the corporate literature, the authors of a recent study of non-profit boards of directors argue that a larger board size may allow for specialized division of labor across the various board tasks and functions (Oster and O'Regan, 2005).[3] In this manner, the negative effects of free-ridership that stem from large board size may be offset by gains from specialization. Cooperative and corporate boards may also benefit from specialization, but because there are fewer board functions relative to non-profit boards, benefits from specialization are less obvious.

In Reynolds' 2003 survey of 437 cooperative boards of directors, a board size of seven was most commonly observed. Comparatively, Hanson and Song (2000) found that the average board size at American corporations in the 1990s was slightly less than 12, down from an average of over 13 in the 1980s. Although different board sizes clearly characterize the business environment, little information on how size and performance are related can be gleaned from the cooperative literature.

In addition to determining overall size, voting stakeholders (such as owners, members, and other directors) must determine who will sit on their firm's board. Hanson and Song (2000) conclude that the current corporate scandals may be influencing boards to act more independently and to take on more outsiders. Recently, some cooperative managers have expressed interest in the use of outside directors, while other cooperatives have taken action and designated positions for "non-member" directors (Reynolds, 2003). The employment of full-time, professional board members is also recommended by Gilson (1990). Potentially, these expert directors could work for several firms, and when boards are comprised entirely of professional directors, optimal size may be quite small (Gilson, 1990).

Participants in the Dunn, et al. (2002) study, which included cooperative managers and directors, voiced concern that owner-directors too often make decisions based on internal politics rather than on sound economics. These participants believed that, on occasion, cooperative directors may be motivated to make decisions that benefit the individual at the expense of the cooperative. This insight may help explain why governance issues are exaggerated at cooperatives relative to corporations. Unlike shareholders, cooperative's members' preferences are not necessarily homogeneous (Staatz, 1983). Shareholders simply want to maximize the value of their corporation's stock while goals from patronage can differ from member to member at a cooperative and may include maximizing returns, utilizing cooperative services, or finding a home for their

[3] Non-profit boards are generally thought to have three functions: monitoring, contributing financially to the organization, and volunteering on behalf of the non-profit. These functions are commonly referred to as the Three W's: Wealth, Wisdom, and Work in the board literature (Rauterkus).

production. In addition, members may have varied demands for location of facilities, the choice of products and services the cooperative offers, and the allocation of overhead costs, among other items (Staatz, 1983).

Recent corporate scandals have revealed instances in which directors have, in fact, violated the trust of members and shareholders (U.S. Congress, Senate Report 107-70 "Power's Report", 2003). Perhaps the most damaging misrepresentations by board members occur when the "duty of care" is not exercised. The duty of care requires directors to act in good faith, apply their best judgment, and implicitly exercise due diligence. In the 2003 "Power's Report", Enron's Board was accused of carrying out its duties in a cursory manner and of failing to safeguard Enron shareholders (U.S. Congress, 2003). Similarly, several former managers stated that the RGA Board acted passively and generally supported the recommendations of management with limited criticism (Keeling and Carter, 2005). Further evidence of failure to uphold the duty of care is found in the case of TVG when directors allowed a severe depletion of the cooperative's equity stemming from excessive payments to growers in the amount of 129 percent of established value when just 90 percent was guaranteed (Sexton and Hariyoga, 2004).

Rhodes (1978) finds that a board's failure to adequately oversee and discipline management, such as is hypothesized to have occurred in the RGA case, may stem from cooperative free-rider problems:

> "Seldom does any cooperative member (including board members) have an economic self-interest for trying to discipline management. His potential costs exceed his potential benefits. While all members together may have an economic incentive, the rational choice is for each individual to hope the others make the effort while he reaps the benefits." p.223

One force working against free-ridership is that board members typically wish to retain their positions. Biggs (1978) finds that 87.3% of directors would be at least "quite pleased" to be re-elected or re-appointed for another term of office. Staaz (1983) determines that reputations do matter in cooperatives, since uncooperative members and directors may be expelled or penalized for lack of participation. To facilitate their re-election, board members need to create a reputation for effective governance. Indeed, Fama and Jensen (1983) point out that directors may seek to protect their own reputations for rigor and thoroughness. As such, most board members will have some motivation to oversee management to at least a small degree.

Despite having partial incentives to evaluate management, boards sometimes fail to satisfactorily carry out this task, as individual members have a

considerable incentive to either slack off or get along with managers running the organization (Holmstrom, 1999). Consequently, a director's objectivity may be reduced when performing monitoring tasks (Holmstrom, 1999). Lang found evidence that poor supervision and oversight may be attributed to directors lacking confidence in carrying out an evaluation of the CEO and other top management. Directors may additionally feel uncomfortable offering minority viewpoints and scrutinizing the weaknesses of the cooperative.

Board members may lack confidence in performing their monitoring duties, in part due to confusion over what metric to use when evaluating managers (Richards, Klein, and Wallburger, 1998). The objective of cooperatives is not necessarily to generate profit, and it may be necessary to evaluate the performance of cooperatives using additional methods including valuation of non-market benefits (Sexton and Iskow, 1993; Parliament, Lerman, and Fulton, 1990). This type of evaluation may be confusing to directors and may complicate the board's efforts to design compensation schemes that align the objectives of management with those of the membership. If the board is unsuccessful in its monitoring and evaluation duties, principal-agent problems can arise that inhibit the cooperative's success (Staatz, 1983).

Parliament, Lerman, and Fulton (1990); as well as Royer, Wissman, and Kraenzle (1990); Babb and Boynton (1981); and Schradar, et al. (1985) have all used traditional or classical financial ratio analysis to evaluate individual and relative cooperative performance. However, Sexton and Iskow (1993) argue that ratio analysis may be biased and lack a solid foundation in economic theory when applied to cooperatives. Specifically, financial ratio analysis fails to take into account that a cooperative is part of a vertically integrated entity that includes the membership and their businesses. It also does not account for the benefits of government support and the value of non-market benefits provided by the cooperative to the membership and greater community.[4] Success ought to be measured in terms of the benefits members receive from the cooperative as opposed to the performance of the cooperative alone.

To address limitations of ratio analysis, Sexton and Iskow (1993) encourage the use of technical, allocative, and scale efficiency measures of performance. The greater accuracy of efficiency measures makes them an appealing alternative to ratio analysis; however, large data demands make these measures challenging to estimate. Confidential data, such as information on input quantities and output(s) are required to determine cooperative efficiency (Sexton and Iskow, 1993). In addition, evaluation of relative efficiency requires data from an industry that is comprised of comparable cooperatives and investor-owned-

[4] Examples of government support include access to research, technical and developmental assistance, grants, and educational training programs.

firms (IOFs). These complications make it infeasible to apply efficiency-based evaluation methods to the present study.

Other researchers have faced similar data limitations in attempting to measure cooperative performance. In these instances, many authors have chosen to use ratio-based performance measures (Parliament, Lerman, and Fulton, 1990; Royer, Wissman, and Kraenzle, 1990; Babb and Boynton, 1981; and Schradar, et al., 1985). Noting both the superiority of efficiency measures and the precedent for using ratio analysis when data limitations exist, I proceed with the measurement of firm performance by calculating various, widely-accepted, classical financial ratios.

Data and Methodology

Three of the four data sets used in this study were provided by the USDA-RBS. The first contains information such as board size and number of outside directors from a 2003 survey of 437 cooperatives by Reynolds (2003). The second data set combines 2003 annual cooperative financial information from the National Bank for Cooperative's Top 100 Cooperatives and the Farm Supply Cooperatives Database. An index of cooperative type as a function of farm supply receipts comprises the third USDA data set.

A fourth set of data was collected between December 2004 and June 2005. The survey solicited information from top managers at cooperatives who responded to the initial Reynolds board of director survey. Managers from 176 (40.2%) of the sampled cooperatives responded to a request for information on their educational and managerial background, and a summary of relevant survey results appears in the Appendix to this paper. Data obtained from this study were utilized to create a broad-based index of cooperative manager skills that serves as a proxy for top manager abilities in the regressions below.

Financial, governance, and managerial information is combined into one data set for 44 of the 176 (25%) cooperatives in this study. This smaller sample size is the result of limited comparable financial data and the need to drop surveys that were submitted by middle or lower managers. No outside directors were present in the 44 cooperatives represented in this data set, although several were observed in the larger Reynolds (2003) and top manager survey data sets. Nonetheless, this sample affords the opportunity to explore whether board size and other variables influence cooperative financial performance.

A varied cross section of cooperatives and industries are represented in the sample. In order to compare performance measures across this diverse group and control for industry influence, financial ratios are transformed by the corresponding industry median. This approach is similar to that of Dehaene, De Vuyst, and Ooghe (2001); and Platt and Platt (1991), who transformed financial

data by industry ratios. In the present paper, the use of industry median ratios is applied as opposed to mean ratios following the recommendation of Royer, Wissman, and Kraenzle (1990). They argue that this technique limits the influence of outliers. The financial ratios used in this paper are transformed as follows:

$$Y_{aj} = \frac{Y_j}{\overline{Y}_a}, \tag{1}$$

where Y_{aj} represents the transformed performance variable of choice, j denotes an individual cooperative, a indicates the sector, and $\overline{Y}_a$ is the sector median financial measure. To ensure consistency with board of director and financial data sets, industry sector medians were obtained from the 2003-2004 Study of Annual Statements and Financial Ratio Benchmarks (SASFRB) published by the Risk Management Association (2004). Cooperatives in the study are matched with their corresponding six-digit North American Industry Classification System (NAICS) codes to ensure transformation by values from the correct industry.

Past corporate research has used statistical methods to test for relationships between particular governance features and firm performance. One such study by Dehaene, De Vuyst, and Ooghe (2001) is of particular interest, since the relationship between several board characteristics and the performance of 122 Belgium corporations is estimated. Given the similarities between the goals of the Dehaene, De Vuyst, and Ooghe (2001) corporate governance study and the objectives of the present work on cooperatives, their model serves as a point of departure.

Returns on assets, profits, and equity are used by Dehaene, De Vuyst, and Ooghe (2001) to measure corporate performance. In the current investigation, dependent variables include the current ratio (*CA/CL*), which measures current assets relative to current liabilities, earnings before interest and taxes divided by interest *(EBIT/I)*, the total asset turnover ratio (*S/TA*), the fixed asset turnover ratio (*S/FA*), the inventory turnover ratio (*INV*), and the accounts receivable turnover ratio (*ART*). The inventory turnover ratio is calculated as the cost of goods sold divided by the average value of inventory, and the accounts receivable turnover ratio is found by dividing net sales by average accounts receivable. Because the asset turnover ratios are most closely related to unobserved firm efficiency, they are referred to as “efficiency measures” in the financial literature (Harrington, 1993). The fixed and total asset turnover ratios are considered to be the most important performance measures that are studied in this paper.

Older cooperatives are expected to have facilities and equipment that are more fully depreciated, resulting in a lower asset base. For this reason, these firms will have higher *S/FA* and *S/TA* ratios (Harrington, 1993). In general, the higher these ratios, the better the firm is said to be performing. Older firms may

also have less sophisticated equipment or facilities than newer firms, possibly increasing the relative cost of goods sold (*COGS*) and consequently the inventory turnover ratio, *INV*. If an older cooperative's *COGS* measure is high, it follows that earnings may be smaller, resulting in a lower *EBIT/I* and *ART* compared to a younger firm with lower *COGS*. For the above reasons, firm age (*AGE*) is included as an explanatory variable in all but the *CA/CL* regressions.

A high inventory turnover ratio generally indicates that a company is using its financial assets efficiently by maintaining low inventories (Harrington, 1993). However, not all industries have the same optimal inventory turnover ratio. Agricultural firms, particularly those that market highly perishable goods, are expected to have high inventory turnover ratios. Cooperatives in the sample produce and/or market a fairly wide range of goods and as a result, controlling for product perishability is necessary. Following Krider and Weinberg (2000), who described items in a convenience store as either perishable or non-perishable, the dummy variable *PER* is included in the model, where *PER*=1 when the cooperative's primary output is perishable and 0 otherwise.

Explanatory variables include the total number of board members at a cooperative (*DIRCT)*, the board size variable squared (*DIRCTSQR)*, and number of members (*MEM)*. Other explanatory variables include an instrumental variable that accounts for the influence of top manager ability (*SKILL*) on individual firm performance. Summary statistics of these variables appear in Table 1.

Table 1: Regression Variable Summary Statistics

	Average	Minimum	Maximum	Standard Deviation
CA/CL	1.04	0.52	2.48	0.31
EBIT/I	2.51	-11.07	35.48	6.52
S/TA	0.88	0.21	1.99	0.43
S/FA	0.88	0.34	1.89	0.40
INV	1.35	0.08	4.42	1.10
ART	1.51	0.05	5.55	1.12
AGE	64.07	5.00	101.00	28.74
DIRCT	9.74	5.00	33.00	5.34
DIRCTSQR	122.82	25.00	1089.00	192.08
MEM	3358	210	30000	4925
SKILL	55.12	27.55	74.88	10.51

Source: Reynolds, National Bank for Cooperative's Top 100 Cooperatives, and the USDA-RBS Farm Supply Cooperatives Database

Ideally, the measure of top manager ability would have been linked to compensation. Since salary data is confidential and largely unavailable, conducting a survey of top managers in order to gather non-salary variables that

were hypothesized to relate to ability is necessary. The instrumental variable *SKILL* is an index that serves as a proxy for the unobserved top manager ability and is constructed using observable attributes including degree(s) earned, rank of school(s) the top manager attended, number of years of cooperative and total management experience, and whether and how often the individual receives management training.[5] In the corporate realm, boards may compensate top managers with stock options so that managers have additional incentives to improve firm financial performance. This example points out that top managers are expected to positively affect a firm's performance. Therefore, to not include the *SKILL* variable in the regressions would result in omitted variable bias.

The influence of cooperative type on performance measures is captured with a series of dummy variables that refer to the percentage of farm supply sales to total sales in 2003. Sales information was collected from the Farm Supply Database and is based on Eldon Eversull's method of cooperative identification. Eversull's classification method defines a cooperative as Type 1 when less than 25% of sales are farm supply with the other 75% or more being from marketing sales. Type 2 cooperatives have between 25-49% of their revenue sourced from farm supply sales, and Type 3 firms have 50-99% farm supply sales. Cooperatives with 100% of sales in farm supply are classified as Type 4. In the present study, the dummy variables: *FS1*, *FS2*, and *FS3* are created to identify cooperatives as Type 1, 2, or 3 respectively. As such, Type 4 cooperatives are the base case.

The individual regression equations used to test industry-adjusted performance measures against board characteristics and cooperative-specific variables are of the following form, except in the current ratio equation in which it is not obvious why cooperative age would be influential:

$$\begin{aligned} Y_{aj} &= \alpha + \beta_1(DIRCT_{aj}) + \beta_2(DIRCTSQ_{aj}) + \beta_3(SKILL_{aj}) + \beta_4(PER_{aj}) + \beta_5(MEM_{aj}) \\ &\quad + \beta_6(AGE_{aj}) + \beta_7(FS1_{aj}) + \beta_8(FS2_{aj}) + \beta_9(FS3_{aj}) + \varepsilon_{aj} \end{aligned} \tag{2}$$

where Y_{aj} is the transformed performance variable of choice and the subscripts represent sector *a* and the individual cooperative *j*. Board size is represented by the *DIRCT* variable and board size squared by *DIRCTSQR*. Equation (2) is estimated by ordinary least squares in STATA.

Empirical Analyses

Regression results provide the basis on which to determine whether board of director members influence measures of firm performance. Noting that better

[5] Sixty percent of the *SKILL* proxy is based on twenty percent each of indices of education, title, and training and the remaining forty percent on an index of cooperative and general business experience.

cooperative financial performance is associated with increases in all six ratios studied herein, a concave relationship is expected to exist between board size and the financial performance ratios of interest. In regressions where the coefficient on the squared director term is negative and significant, a concave relationship is supported by the data, indicating that a ratio-maximizing optimal board size is possible. If, however, the coefficient is found to be positive and significant, a convex relationship is supported by the data, and the ratio-minimizing board of director size may be determined. When the director coefficient is significant and the squared director coefficient is not, a linear relationship is supported between board size and the financial ratio in question. Prior to the analysis, each regression equation was tested for heteroskedastic errors using the Breusch-Pagan/Cook-Weisberg test. When the resulting p-value was found to be small (<0.05), the null hypothesis of homoskedastic errors was rejected and White-adjusted standard errors were used to calculate t-statistics and other tests of significance (Table 2).

Table 2: Performance Ratio Equation Results

	Dependent Performance Measure					
	Current Ratio$^{\Delta}$	EBIT/ Interest$^{\Delta}$	Fixed Asset Turnover	Total Asset Turnover	Inventory Turnover	Accounts Receivable$^{\Delta}$
Constant	1.47 (3.45)**	3.099 (0.24)	.425 (1.02)	-.519 (-1.40)	-2.785 (-2.34)**	1.101 (1.12)
Board size	-.072 (-1.82)*	.371 (0.39)	.043 (0.98)	.108 (2.78)**	.309 (2.47)**	.0678 (0.65)
Board size squared	.002 (1.43)	-.009 (-0.41)	-.001 (-0.70)	-.002 (-1.67)*	-.008 (-2.34)**	-.001 (-0.44)
Top manager skill index	.003 (0.96)	-.037 (-0.35)	-.004 (-0.86)	.007 (1.48)	.024 (1.71)*	.004 (0.30)
Perishability dummy	.110 (0.74)	-2.271 (-0.92)	.189 (0.73)	-.554 (-2.42)**	-1.305 (-1.77)*	-2.125 (-2.71)**
Number of cooperative members	8.77e-06 (1.04)	-6.36e-04 (-0.55)	-4.94e-06 (-0.44)	9.59e-07 (0.10)	1.40e-04 (-0.44)	2.32e-04 (-0.86)
Type 1 dummy	-.122 (-.87)	-.106 (-0.03)	.497 (2.79)**	.434 (2.74)**	.854 (1.68)*	1.401 (2.01)**
Type 2 dummy	-.271 (-1.93)*	-3.403 (-0.88)	.309 (2.03)**	.366 (2.70)**	1.163 (2.68)*	.540 (1.46)
Type 3 dummy	-.284 (-1.76)*	-1.435 (-0.39)	.560 (3.95)**	.425 (3.37)**	.889 (2.20)*	.190 (0.51)
Cooperative age		.008 (0.33)	.001 (0.27)	-.002 (-0.93)	.006 (0.12)	-.0112 (-1.66)*
R^2	.2724	.0476	0.465	.6245	.3764	.3343
Breusch-Pagan p-value	0.0002	0.0001	0.1492	0.5815	0.162	0.013

Note: $^{\Delta}$ denotes regressions run with White-adjusted standard errors
*Significant at 90% level **Significant at 95% level, t-stats are in parentheses.

The hypothesis that the squared board size coefficient is negative and that a concave relationship between board size and cooperative financial performance exists is tested by calculating the p-value of a one-tailed t-test of the coefficient. If the sign of the coefficient is negative, as expected, the p-value reported for the two-tailed test of the coefficient is divided by two to calculate the p-value for the one-sided test. If the coefficient is positive, contrary to expectations and indicative of a possible convex relationship, the reported p-value is again divided by 2 but then subtracted from 1 to indicate that the null hypothesis is rejected. Calculation results appear in Table 3.

Table 3: One-tailed test for negativity of squared director coefficient

	Current Ratio	EBIT/ Interest	Fixed Asset Turnover	Total Asset Turnover	Inventory Turnover	Accounts Receivable
t-Test	2.11	0.17	0.48	2.70	5.47	.20
p-Value	0.9231	0.3404	0.2478	0.5460	0.0126	0.3334

Optimal board size may be determined by setting the first derivative of a given regression equation with respect to the number of directors equal to zero:

$$\frac{\partial Y_{aj}}{\partial DIRCT_{aj}} = \beta_1 + 2\beta_2(DIRCT_{aj}) \quad . \tag{3}$$

In both the total asset and inventory asset turnover ratio regressions, the board size coefficient is positive and significant while the squared director coefficient is negative and significant, as anticipated. In these cases, determining the ratio-maximizing board size is possible, as in (3), by setting the derivative equal to zero and solving. Applying this method suggests these ratios are maximized when board size is 27 and 19 respectively, a number much larger than the ideal board size of eight that is recommended by Jensen (1993) and others. This finding implies that cooperatives with relatively large boards may more efficiently use their financial, short-term, and long-term assets to maintain low inventories and to generate revenue.

When these results are compared to what is observed in the data, I find that the two cooperatives with more than 27 directors have above average total asset turnover ratios. The largest board in the sample with 33 directors is also the cooperative that reports the highest total asset turnover ratio. Because a number of cooperatives in the data set have large boards, dropping the three observations with the largest boards from the data set has a minimal impact on regressions results. Furthermore, cooperatives with a total asset turnover ratio that is more than one standard deviation greater than the mean are found to have an average

board size that is double that of the full sample. Results from a closer look at the inventory turnover ratio data are somewhat mixed as only two of three cooperatives with boards of 18 or more directors are found to have above average inventory turnover ratios. In addition, cooperatives associated with the largest inventory turnover ratios have only slightly larger boards than the average observed in the full sample.

In the current ratio regression, the squared board size coefficient is significant and positive. The existence of a convex relationship is contrary to expectations. Like the total asset and inventory turnover ratio regressions, the board size coefficient is significant, though in this case, the coefficient is negative. Using formula (3), the current ratio-minimizing board size is 18. This result implies that firms with less or more than 18 directors have greater current ratios while cooperatives with 18 directors may experience less financial liquidity.

Director-related variables are found to have no significant influence in the earnings before interest and taxes, fixed asset turnover ratio, and accounts receivable turnover ratio regressions. These findings indicate that board size exerts a collectively limited influence on the cooperative financial performance measures evaluated in this study. Results of this investigation are similar to those of Yermack (1996), who finds that when less-aggregated measures of firm profitability and efficiency are used, the influence of board characteristics on the dependent variable is dampened and is less significant relative to when more aggregate measures such as firm profits or sales are used as dependent variables.

Based on the contradictory regression results, drawing concrete conclusions regarding the relationship between board size and performance and identifying an optimal board size is difficult. In the two turnover regressions where director-related coefficients are significant and of the expected signs, the ratio-maximizing board size is much larger than expected. Thus for some measures of financial health, larger boards are associated with better performance for cooperatives in the sample. Complicating a general interpretation is the finding that 19 directors maximize the inventory turnover ratio, where in the current ratio regression, a board of near equivalent size has the poorest performance, ceteris paribus. Individually and collectively, these three measures cannot paint an all-encompassing portrait of a cooperative's financial health; they are simply measures on which board size is found to have a statistically significant influence.

Cooperative Maturity:

The effect of control variables on cooperative performance in considered next. The *AGE* variable, which is *a priori* thought to influence the value of firm assets and earnings, is significant and negative only in the accounts receivable turnover regression. Firm age is expected to influence the value of assets and

earnings through depreciation. Since no asset values are used in the calculation of the accounts receivable turnover ratio, reasons for the statistically significant relationship are not immediately clear. A possible explanation is that older farm supply cooperatives with well established memberships are more likely to allow sales on credit than younger firms.[6]

Older-than-average cooperatives are also found to have relatively smaller memberships compared to younger cooperatives, and older cooperatives are more likely to have a higher percentage of farm supply sales.[7] Particularly with respect to Type 3 and Type 4 cooperatives, which generate the majority of their revenue from farm supply sales, having a smaller membership may facilitate greater trust and familiarity, thereby increasing the likelihood that credit will be extended to members and patrons. Furthermore, a number of Type 3 and Type 4 cooperatives in this study have gas station facilities, and many offer credit cards for gasoline purchases to members.[8] Considered together, these features may help explain the observed linkage between *AGE* and the accounts receivable turnover ratio.

Cooperative maturity is not found to significantly influence either the fixed or total asset turnover ratios. One reason for this finding is that many cooperatives in our study are over 50 years old and, during that tenure, have likely had the opportunity to build, purchase, and remodel equipment and facilities. As such, age would not necessarily be representative of the level of depreciation of an older cooperative's assets. In fact, a relatively younger cooperative may have more fully depreciated assets than an older cooperative that has recently upgraded. Information on facility updating and specific equipment purchases is not available for each cooperative. Consequently, determining to what extent older cooperatives have remodeled relative to younger cooperatives is not possible and, as a result, asset values cannot be adjusted for more precise levels of depreciation.

Perishability:

Firms, whose primary outputs are perishable, such as dairies and fresh fruit cooperatives, are found to have significantly lower total asset, inventory, and accounts receivable turnover ratios. These ratios are also known as efficiency measures and are reflective of profit margins (Harrington, 1993). It follows that cooperatives specializing in the sale of perishable goods may experience

---

[6] The majority of cooperatives in this study (60%) earn most of their revenue through farm supply sales activities.

[7] The average age of cooperatives in the sample is 65. Cooperatives that are older than 65 years are found to have an average of 256.16 fewer members than cooperatives that are 65 or fewer years old.

[8] Twenty-eight of 44 cooperatives in the sample have gas stations facilities available for member use.

relatively lower profit margins, resulting in a lower level of financial performance.

Cooperative Type:

In five of six ratio regressions, at least one of the cooperative-type dummy variables is found to be significant at the 10% level. Because these dummy variables represent the percentage of net sales derived from farm supply activities, the significance of these coefficients implies that the proportion of farm supply to marketing sales influences several measures of financial performance.

Top Manager Skill:

Cooperative top manager ability, as measured by the created *SKILL* index, is significant and positive in the inventory turnover ratio regression. Because increases in the inventory turnover ratio are generally associated with improved firm performance, the sign and significance of the coefficient in this regression is as anticipated. Top executives are compensated partially based on the notion that good managers and executives can positively influence or maintain performance at the firms they are hired to manage. The lack of significance of the *SKILL* coefficient in other regressions likely stems from small sample size issues and the possibility that the proxy variable does not accurately capture top manager skill.

Members:

The variable *MEM* serves as a proxy for unobserved cooperative size as measured by sales revenue. Since data on sales volume are not available, sales-related ratios cannot be decomposed into individual components. As such, transforming the performance measures by the median measure is necessary for all firms in the associated industry instead of the median measure for just those firms that correspond to the sales volume cohort to which individual cooperative's belong. Finding that the proxy is not statistically significant in any regression provides a measure of confidence that the analysis is not severely limited by an inability to transform performance by more specific measures.

Conclusions and Extensions

In the wake of corporate failures attributed to poor governance and the closure of several large agricultural cooperatives, this paper investigates how board size contributes to firm performance. Econometric methods are used to estimate statistical relationships between six measures of financial health, board size, and firm-specific variables for a sample of forty-four agricultural cooperatives in 2003.

An overview of the regression results presented in this paper suggests that the explanatory power of the econometric investigation is fairly low. The small sample size contributes to the lack of significant findings by reducing the amount of heterogeneity across observations and, consequently, the precision with which coefficients could be estimated.

Econometric weaknesses aside, the results do contribute to a greater understanding of the relationship between board and cooperative type-related variables and several measures of performance. In particular, board size appears to have a net ambiguous effect on firm financial health. For two measures (total assets and inventory asset turnover ratios), a large board size is associated with maximizing the performance ratio, while for a third measure (current ratio), it is associated with a minimum level of performance. In other cases, board size is not found to have a statistically significant relationship with the dependent financial performance variable. These findings imply that the number of directors is a fairly weak predictor of cooperative performance. Given that the existing corporate literature also fails to reach a consensus on the relationship between board size and performance (larger boards are thought to impose both cost in terms of increased potential to free-ride and generate additional benefits in terms of increased ability to specialize), not surprising is the fact that the nature of the relationship between cooperative governance characteristics and performance remains uncertain. What is clear, however, is that if managers and boards are seeking ways to increase firm prosperity and success, based on the findings of this research, examination of non-governance factors may yield greater potential for improvement.

References

Babb, E.M., and R.D. Boynton. (1981). "Comparative Performance of Cooperative and Private Cheese Plants in Wisconsin." *North Central Journal of Agricultural Economics* 3:157-164.

Biggs, G.W. (1978). "Farmer Cooperative Directors: Characteristics, Attitudes." Farmer Coop. Service Research Rep. 44.

Dehaene, A., V. De Vuyst, and H. Ooghe. (2001). "Corporate Performance and Board Structure in Belgian Companies." *Long Range Planning* 34:383-98.

Dunn, J.R., A.C. Crooks, D.A. Frederick, T.L. Kennedy, and J.J. Wadsworth. (2002). "Agricultural Cooperatives in the 21st Century." U.S. Department of Agriculture, Rural Bus. Coop. Service Cooperative Information Rep. 60, Nov.

Fama, E., and M. Jensen. (1983). "Separation of Ownership and Control." *Journal of Law and Economic*s 26:301-325.

Gilson, S. (1990). "Bankruptcy, Boards, Banks and Blockholders." *Journal of Financial Economics* 27:355-88.

Hanson, R.C., and M.H. Song. (2000). "Managerial Ownership, Board Structure, and the Division of Gains in Divestiture." *Journal of Corporate Finance* 6:55-70.

Hariyoga, H. (2004). "An Economic Analysis of Factors Affecting the Failure of an Agricultural Marketing Cooperative: The Bankruptcy of Tri Valley Growers." Ph.D. Dissertation, University of California, Davis.

Harrington, D.R. (1993). *Corporate Financial Analysis: Decisions in a Global Environment*, 4th ed. Homewood, IL: Irwin.

Holmstrom, B. (1999). "Managerial Incentive Problems: A Dynamic Perspective." *Review of Economic Studies* 66:169-182.

Jensen, M.C. (1993). "The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems." *Journal of Finance* 48:831–80.

Keeling, J. J. (2004). "Lessons in Cooperative Failure: The Rice Growers Association Experience." *ARE Update* 7:1-5.

Keeling, J. J., and C.A. Carter. (2005). "Trading Places: Fortunes of California Rice Cooperatives Took Opposite Trajectories: As RGA Faded, FRC Ascended." *Rural Cooperatives* May/June:32-40.

Kim, Kenneth A., and J.R. Nofsinger. (2004). *Corporate Governance*, 1st ed. Pearson/Prentice Hall, Upper Saddle River, NJ.

Krider, R. E., and C.B. Weinberg. (2000). "Product Perishability and Multistore Grocery Shopping." *Journal of Retailing and Consumer Service* 7:1-18.

Lang, M.G. (2000). "Strengthening Agricultural Cooperatives: An Inquiry into Expert Beliefs." Center for Cooperatives, University of California, Davis. Rep. 43, Feb.

Lipton, M., and J.W. Lorsch. (1993). "A Modest Proposal of Improved Corporate Governance." *The Business Lawyer* 48:59-77.

Mikkelson, W.H., M.M. Partch, and K. Shah. (1997)."Ownerships and Operating Performance of Companies that Go Public." *Journal of Financial Economics* 44:281-307.

Oster, S.M., and K. O'Regan. (2005). "Does the Structure and Composition of the Board Matter? The Case of Nonprofit Organizations." *Journal of Law, Economics, and Organization* 20:205-227.

Parliament, C., Z. Lerman, and J. Fulton. (1990). "Performance of Cooperatives and Investor-Owned Firms in the Dairy Industry." *Journal of Agricultural Cooperation* 5:1-16.

Pfeffer, J. (1972). "Size and Composition of Corporate Boards of Directors: The Organization and Environment." *Administrative Science Quarterly* 17:218-29.

Platt, H., and M. Platt. (1991). "A Note on the Use of Industry-Relative Ratios in Bankruptcy Prediction." *Journal of Banking and Finance* 15:1183-94.

Rauterkus, S.Y. (2003). "Do Weak Internal Corporate Control Systems Lead to Failure?" White Paper, Department of Finance, Louisiana State University, Aug.

Reynolds, B. (2003). "Recruiting and Selecting Cooperative Directors-Survey Summary." Washington DC: U.S. Department of Agriculture, Rural Bus. Coop. Services, Unpublished Report, Jan.

Rhodes, V. J. (1978). *The Agricultural Marketing System*, 1st ed. Grid Publishing, Columbus, Ohio.

Richards, T.J., K.K. Klein, and A. Wallburger. (1998). "Principal-Agent Relationships in Agricultural Cooperatives: An Empirical Analysis from Rural Alberta." *Journal of Cooperatives* 13:21-34.

Risk Management Association. (2004). "Annual Statement Studies: Financial Benchmarks 2003-2004." Philadelphia, PA.

Royer, R.S., R.A. Wissman, and C.A. Kraenzle. (1990). "Farmer Cooperatives' Financial Profile." U.S. Department of Agriculture, Agricultural Cooperative Service. Rep. 91, Sept.

Sexton, R.J., and H. Hariyoga. (2004). "The Canning of Tri Valley Growers: What Went Wrong at Tri Valley Growers and What Can Other Cooperatives Learn From It"? *Rural Cooperatives* Sept/Oct: 20-24.

Sexton, R.J., and J. Iskow. (1993). "What Do We Know About the Economics Efficiency of Cooperatives: An Evaluative Study." *Journal of Cooperatives* 8:15-27.

Schrader, L.F., E.M. Babb, R.D. Boynton, and M.L. Lang. (1985). "Cooperative and Proprietary Agribusinesses: Comparison of Performance." Purdue University Agricultural Experiment Station Bulletin 982.

Staatz, J.M. (1983). "The Cooperative as a Coalition: A Game-Theoretic Approach." *American Journal of Agricultural Economics* 65:1084-89.

U.S. Congress, Senate Committee on Governmental Affairs, Permanent Subcommittee on Investigations. (2003). "The Role of the Board of Directors in Enron's Collapse." Washington DC: Senate Report 107-70, 107th Cong., 2nd sess., 8 July, p. 3.

Yermack, D. (1996). "Higher Valuation of Companies with a Small Board of Directors." *Journal of Financial Economics* 40:185-212.

Appendix: Summary of Cooperative Top Manager Survey

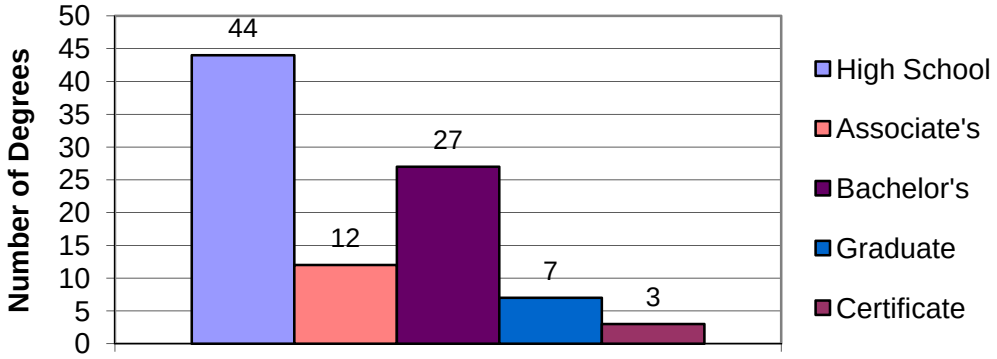
U.S. agricultural cooperative top managers were surveyed by mail and phone between December of 2004 and March of 2005 and in some cases re-sampled between May and June 2005. Addresses and contact names were provided by the USDA-Rural Business and Cooperative Service Agency (RBS). Telephone numbers were also obtained from the 2004 Web Address and Phone Directory of Farmer Cooperatives, published by the USDA. From the first round of the survey, a total 176 responses were collected; however, once responses were matched with available financial data, just 31 of the surveys remained useable. Upon re-sampling, the useable survey size grew to include 44 top managers and their associated cooperatives' board of directors, age, and financial data.

This appendix provides details about the 44 top managers whose responses were used to create indices of skill. These indices served as instrumental variables in the empirical investigation into cooperative performance and board of director characteristics.

Education

The following education statistics describe the number of each type of degree held by the sample set of cooperative top managers. All survey respondents reported having received at least a high school degree, and more than half (61.4%) held a bachelor's degree. Slightly more than twenty percent (20.5%) have earned a graduate degree or program certification such as a certified public accountant (CPA) or certified management accountant (CMA). A nearly equal percent of respondents (18.2%) have only a high school degree, while one quarter held at least an associate's degree (Figure 1).

Figure 1: Total Number of Degree Holders by Type

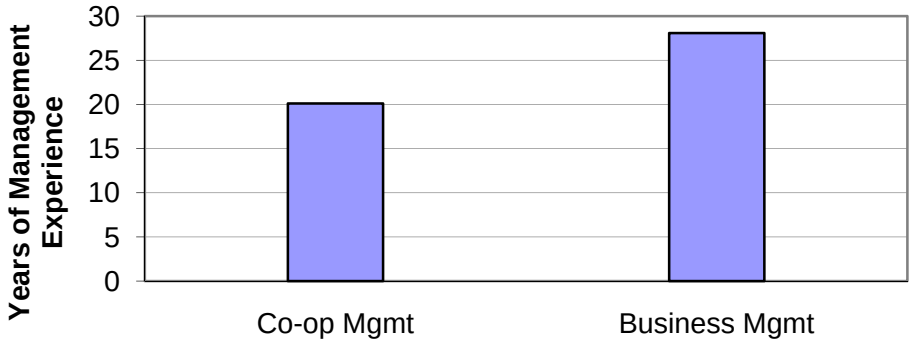


Source: Cooperative Top Manager Survey

Experience

Top managers were asked how many years of cooperative and general business management experience they had (Figure 2). On average, respondents reported cooperative management experience of 20.9 years and average total business management experience of 29.1 years. Years of cooperative management are included in the calculation of years of general business management experience. Because average total management experience is greater than years of cooperative-specific management experience, most top managers have held non-cooperative management positions prior to their current employment at a cooperative.

Figure 2: Average Years of Cooperative and Business Management Experience

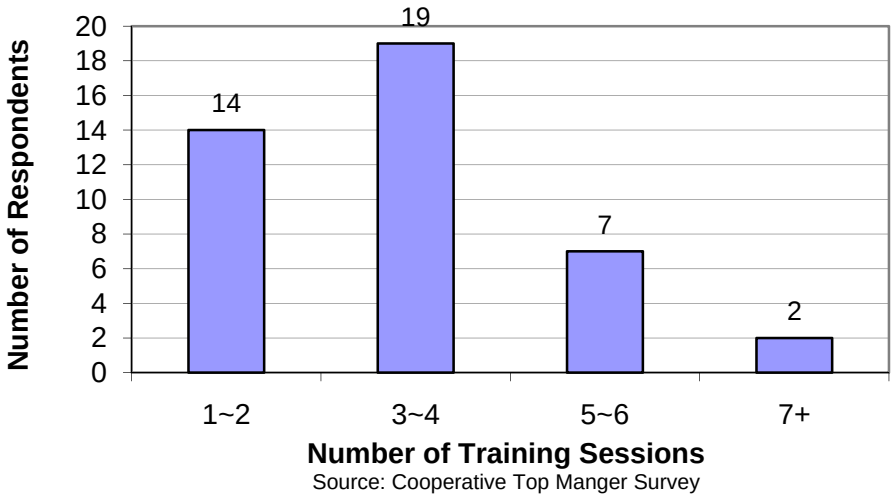


Source: Cooperative Top Manager Survey

Training

All but one manager in the sample reported attending some form of additional managerial-related training during a typical fiscal year. Of those who attended seminars, the largest percent (45.2%) received training on 3-4 separate occasions. Thirty three percent attended 1-2 training sessions while 21.4% participated in 5 or more (Figure 3). Relative to the greater sample population which included Vice-Presidents, Treasurers, and other cabinet level respondents, top managers generally received more training.

Figure 3: Number of Training Sessions Top Manger Attends During Typical Fiscal Year



Title

A number of survey respondents listed their primary title as General Manager while the second most common primary title was CEO. This finding is consistent with efforts to target the survey at cooperative top managers. About one in five respondents held more than one management position at their cooperative (20.7%). Table 4 breaks down observations of secondary titles with their primary title pair. From this table, we can see that on a numbers basis, General Managers held the most secondary titles. However, on a percentage basis, Presidents (83.3%) are more likely to receive a second title and most often that title is CEO.

Table 4: Breakdown of Secondary Title by Primary Title

	Secondary Title					
	GM	CEO	President	Vice-Pres.	COO	Treasurer
Primary Title						
General Manager	0	2	1	2	1	1
CEO	2	0	2	0	0	0
President	1	3	0	0	0	0

Summary

In reviewing the survey summary, several findings stand out as noteworthy. First, nearly all cooperative managers have more years of general business experience than specific cooperative management experience. This finding implies the most respondents have worked in a management capacity at non-cooperative businesses prior to attaining their current cooperative management positions. Second, all top managers but one sought out additional management training and most (68.2%) attended 3 or more sessions per fiscal year. In the past, a number of cooperative researchers have recommended that cooperative managers and boards seek additional strategic management and financial training. As such, it is encouraging that the present survey finds wide-spread evidence of continued education.

The survey analysis is intended to educate the reader about the executives who participated in the top manager study. The summary describes the average ability-related characteristics of the sample. Based on this summary and information provided by the participants, an index of top manager skill was created. This index takes into account manager education and rank of schools attended, whether the manager has a second title, amount of annual training, and number of years of cooperative and business management experience. Because it is not possible to monitor top manager ability directly, it is the aim of this study to create, through research and analysis, an estimate of this unobservable variable and input into cooperative success.