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of Agricultural Cooperatives: A Partial
Adjustment Model**

by

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Management Practices and Financial Performance of Agricultural Cooperatives: A Partial Adjustment Model

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This paper uses the Nerlovian partial adjustment model to test the hypothesis that the rate of a cooperative's adjustment to a desired financial position is partially determined by its management practices. The results indicate that management practices that are board responsibilities are not contributing to the speed of adjustment in reaching the desired financial performance, which is the responsibility of the board of directors. But management, when independently pursuing management's responsibility or when working with that board on shared responsibility, does contribute to the speed of adjustment toward the desired financial goal.

Introduction

It is generally agreed that the success of retail agricultural cooperatives, like that of other business ventures, depends in large part on management practices. Experience from more than 100 years of operation in this country suggests that cooperatives have identified management practices that contribute to business success. In addition, an abundance of management models and experience from investor-owned corporations is also available to cooperatives. Although there are no guarantees of success in any form of business, it seems reasonable to conclude that appropriate application of proven management practices would contribute to positive business performance. Appropriate application is more than awareness. It also includes implementation of management practices, monitoring progress, and taking corrective actions (management controls).

On the basis of this premise, the purpose of this study is to determine if implemented management practices are statistically associated with the cooperative's financial performance. The underlying hypothesis is that the rate of a cooperative's adjustment to a desired financial position is partially determined by its management practices.

To test the hypothesis, we synthesize the partial adjustment model (Nerlove) and the role of management performance in decision making. The synthesis is

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similar in spirit to other work (Lin; Phelps) where the speed of adjustment is not assumed constant but is determined by economic and noneconomic conditions. In this study, we postulate that the speed of adjustment is determined by management practices.

The plan for the paper is as follows. The conceptual model and statistical hypotheses are outlined in the next section. The third section includes sources of data and definitions of variables. The empirical results and conclusions are given in the final two sections.

Conceptual Model

The Nerlovian partial adjustment model was originally used to rationalize the specification of distributed lags in demand and supply analysis for agricultural products. Its essence is represented by the following relationship:

$$Q_t - Q_{t-1} = k(Q_t^* - Q_{t-1}) \quad (1)$$

In a supply model, for example, Q would be output; t , a time index; Q^* , desired output; and k , the speed (coefficient) of adjustment. The logic behind the relationship in equation (1) is that, because of technological rigidities, habit, inertia, a dynamic business environment, and resource and institutional constraints, it is not always possible for a firm to adjust the actual values of output to its desired level.

If we postulate that the mechanism described in equation (1) is applicable to describing the gap between a firm's actual and desired financial performance, we may write (1) as:

$$R_t - R_{t-1} = k(R_t^* - R_{t-1}) \quad (2)$$

where R_t and R_t^* are actual and desired financial performance, respectively, and may be represented by some financial measure (e.g., debt-to-asset ratio).

Explicit in relationships in equations (1) and (2) is the assumption that the rate at which firms adjust the actual level of a decision variable to its desired level is constant. Important as the Nerlovian model may be, the assumption of a constant speed of adjustment is questionable. Indeed, it has been shown in various studies that models with static speed of adjustment are inadequate in explaining firm behavior (Lin; Petzel; Phelps).

The choice of variables affecting the speed of adjustment depends on the hypothesis being tested. Petzel, for example, postulated that the level of education was responsible for differential rates of adjustment across firms. In Lin's and Phelps' studies, the speed of adjustment was determined by monetary and fiscal policy. In this study, the hypothesis is that the determinants of the speed of adjustment in financial performance are firm-specific management practices (to be defined below).

Formally, let management practices be denoted by the vector z , then equation (2) can be rewritten as:

$$R_t - R_{t-1} = k(z)(R_t^* - R_{t-1}) \quad (3)$$

Let $k(\cdot)$ take the explicit form:

$$k(z) = \alpha_0 + \sum_i^N \alpha_i z_i \quad (4)$$

where the α_i 's are parameters, and z_i is the i th management practice. By substituting equation (4) into equation (3), we arrive at the estimating model:

$$\Delta R_t = \alpha_0(R_t^* - R_{t-1}) + \sum_i^N \alpha_i z_i (R_t^* - R_{t-1}) \quad (5)$$

where

$$\Delta R_t = R_t - R_{t-1}$$

A necessary condition for testing whether the underlying speed of adjustment is a constant, i.e., $k = \alpha_0$, is to test the null hypothesis $H_0: \alpha_0 = \dots = \alpha_N = 0$. The alternative hypothesis is that k is variable and shifts with management practices. However, to test whether k itself is statistically significant we need the sufficient condition that the value of k , using equation (4), is statistically different from zero with the standard errors evaluated at the observed levels of the z_i 's.

Data

The data were obtained from a random sample of 100 cooperatives in Iowa, Nebraska, and South Dakota. The sample was drawn from the list of 503 local retail and farm supply cooperatives who were borrowers of the Omaha Bank for Cooperatives (OBC). These organizations are a part of a federated cooperative system. Boards of directors are elected from the membership and have complete authority over selection of management and all operations. Assets of these companies are capitalized and owned by local farmer-members.

Each cooperative was sent a questionnaire consisting of 58 questions related to its management practices. The 58 questions were categorized into the following 10 distinct sets of management practices: (1) personnel management; (2) member/customer public relations; (3) marketing programs and activities; (4) board training, development, and succession; (5) management performance, evaluation, and succession; (6) strategic planning; (7) industry planning; (8) operational planning; (9) financial management; and (10) board/management controls. These questions were developed in cooperation with loan officers from OBC and reflect the knowledge and experience of both the researchers and the loan officers who have a close working relationship with these firms. The questions under each set of management practices are listed in appendix 1.

The 63 cooperatives that responded to the questionnaire agreed to release five years (1981–85) of annual financial audits. The audits were used to calculate various financial indicators (ratios). The information was then merged with the results of the questionnaire. The total number of observations in the sample was 315.

Eleven financial ratios were derived from the audit information: Four operating statement ratios, four balance sheet ratios, and three operating statement and balance sheet ratios. Explanation of these ratios is in appendix 2. Appendix 2 also lists what the industry considers as guidelines for the financial health for cooperatives as indicated by the percentage for each financial ratio (*Analyzing a Cooperative Business*). In this study, we use these guidelines as proxies for the desired level of financial performance (R_t^*).¹ In actual practice, managers of local cooperatives, and particularly board members, rely on lenders and other

professionals to assist with financial analysis. These ratios are received and used by the local management team as industry standards.

Empirical Results and Discussion

Because the data consisted of cross-section units over time, we first estimated equation 5 as a covariance model (Pindyck and Rubinfeld). The null hypothesis of equal intercepts and slopes could not be rejected and the data were pooled. A summary of the hypothesis tests is presented in table 1. Each cell in the table indicates, from top to bottom, the F test for the overall significance of the α_i 's, the value of the adjustment coefficient k calculated at the mean values of the independent variables, and the t statistic associated with each k . The empty cells represent those relationships where the necessary and sufficient conditions were not met.

Do management practices lead to improved financial performance? In the case of cooperatives, that question must be posed within the context of a management team composed of a board of directors and a manager. The board of directors has the job of determining which responsibilities will be retained and which are to be delegated to management. In keeping with sound management practices, the manager's responsibilities center on short- to intermediate-term operations (within the year). These responsibilities deal with ongoing operational issues. These decisions must be made on a daily or weekly basis and cannot be delayed for a monthly board meeting. As a result, it is appropriate for boards of directors to delegate operational responsibilities to management while retaining for the board those responsibilities described in the articles of incorporation and bylaws, i.e., to protect the members' equity investment in the cooperative and to perpetuate operations over time (one year or longer). The distinction between board and management decisions is not always clear. As a result, some management decisions are considered shared responsibilities.

In view of these relationships, management practices are organized into three categories: those that are the responsibility of management, those that are the responsibility of the board of directors, and those that are shared responsibilities. Rows 1-4 and columns 1-3 in table 1 identify management practices and related financial ratios that apply to managers. Rows 5-7 and columns 4-7 apply to boards of directors. Rows 8-10 and columns 8-11 are management practices and financial ratios that are shared responsibilities.

The results show that, in six out of 12 cases, the hypothesis that management practices that are the responsibility of management did not affect the speed of adjustment toward the desired financial ratios was soundly rejected. In five out of 12 cases, the same management practices that are the responsibility of management were also related to the speed of adjustment toward the desired level of financial performance, which is the responsibility of the board of directors. However, in the case of shared responsibilities, the hypothesis was rejected in nine out of 12 cases.

Management practices that are the responsibility of the board did not contribute to improvements in any financial ratios that are the responsibility of the board but contributed significantly when the responsibilities were shared. Overall, the best record of contribution of management practices to the speed of adjustment is the shared responsibilities, 24 out of 30 cases.

Table 1.—Statistical Results^a

		Financial Ratios (Dependent Variables)										
		Management	Management	Management	Board	Board	Board	Board	Shared	Shared	Shared	Shared
Set of Management Practices (Independent Variables)	F ^b	LSTS	TETS	TPGR	ASLI	TLTM	TLNF	TMTA	LIIE	LSCN	WCTS	LDLT
Personnel Management (Management)	2.5	$\frac{F}{k}$ 3.26 .28 (4.6)	2.71 .26 (5.0)							4.57 .24 (4.2)	8.26 .25 (4.1)	33.03 .38 (3.93)
Marketing Programs/ Activities (Management)	3.02	$\frac{F}{k}$.55 .26 (4.4)	6.45 .37 (6.41)	3.85 .28 (6.1)	6.28 .40 (2.11)			3.11 .094 (2.11)			12.1 .33 (4.9)	
Industry Planning (Management)	3.78	$\frac{F}{k}$ 4.69 .97 (4.8)				24.87 .34 (6.12)				8.28 .23 (4.6)	12.1 .40 (6.5)	
Operational Planning (Management)	3.32	$\frac{F}{k}$	4.5 .27 (5.0)		4.14 .38 (3.65)	13.11 .39 (6.7)				3.60 .26 (4.5)	15.2 .21 (3.0)	13.9 .33 (3.6)
Board Training/ Development/Succession (Board)	3.32	$\frac{F}{k}$								4.01 .28 (5.1)	4.53 .161 (3.4)	71.8 .46 (4.5)
Management Performance/Evaluation/ Succession (Board)	2.80	$\frac{F}{k}$	3.45 .26 (4.8)							3.13 .21 (4.1)	11.33 .37 (4.9)	
Strategic Planning (Board)	2.80	$\frac{F}{k}$	3.54 .41								10.8 .27 (4.4)	6.13 .41 (3.2)

Member/Customer/ Public Relations (Shared)	$\frac{F}{k}$ 3.32		9.27 .35 (6.6)	3.47 .26 (4.8)		11.67 .27 (4.1)	20.46 .32 (3.2)
Financial Management (Shared)	$\frac{F}{k}$ 3.02	4.35 .31 (5.0)	3.16 .24 (4.8)		4.99 .26 (4.5)	9.79 .33 (5.3)	42.0 .21 (2.36)
Board/Management Controls (Shared)	$\frac{F}{k}$ 2.32		2.59 .39 (5.6)		2.67 .23 (3.8)	5.05 .24 (2.5)	3.40 .28 (2.1)

^a*F* test for the null hypothesis that the management's variable in each set of management practices is not significantly different from zero. *k* represents the estimated value of *k* using (4) in the text. Numbers in parentheses are *t* ratios for the estimated *k*'s. Responsibilities of managers, board, and shared are indicated in **Bold**.

^bCritical *F* value at the 1% level.

In light of model specification and statistical results, the speed of adjustment in reaching financial ratios as defined by industry standards is significantly related to management practices. However, those management practices that are board responsibilities are not contributing to the speed of adjustment in reaching the desired financial performance, which is the responsibility of the board of directors. But management, when independently pursuing management's responsibility or when working with that board on shared responsibility, does contribute to the speed of adjustment toward the desired financial goal.

Conclusions

What does this imply about boards of directors? It would be a mistake to conclude that boards of directors of local cooperatives make no contribution to the financial success of their cooperatives. Instead, these results suggest that both management and the board of directors tend to focus on short-term operational dimensions of the cooperative. This is consistent with the management experience and predisposition of directors who are managers of their own farming and ranching business.

It also indicates that neither the board nor management is giving the same attention to management practices or improvements in financial ratios that most directly influence the longer-term welfare of their cooperative business. This may be one of the greatest threats faced by local cooperatives as we enter a very dynamic business environment of the 1990s. Although attempts have been made at strategic business planning, including board retreats, more education and technical assistance will be required to accomplish this goal. Strong leadership on the part of board officers and general managers will be necessary to reverse this lack of emphasis on strategic planning and management of these companies.

Note

1. These financial ratios are used as guidelines and reflect the product mix and services common to agriculture and local cooperatives that operate in this three-state area. The ratios represent "desired" performance, not industry averages. A reviewer also pointed out that banks are known for setting conservative standards that are higher than those to which their clients aspire.

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Appendix 1

List of Questions on Management Practices by Category

1. Personnel Management
 1. Does your organization hold regularly scheduled employee meetings?
 2. Does your organization involve employees in continuing education opportunities?
 3. Does your organization provide employees a policy handbook?
 4. Has your organization developed a formal organizational chart?
 5. Does your organization have written job descriptions for each position?
 6. Does your organization have written performance standards for each position?
 7. Does your organization conduct a formal performance evaluation of each employee on a scheduled basis?
 8. Does your organization use a salary survey of similar companies in determining salary scales for employees?
2. Member/Customer Public Relations
 9. Does your organization publish a newsletter?
 10. Does your organization meet with community leaders and other such groups to improve/maintain public relations? (Including membership in civic organizations)
 11. Does your organization hold an appreciation day for its customers/members?
 12. Does your organization conduct meetings to inform or introduce new products and/or services to customers/members?
3. Marketing Programs/Activities
 13. Does your organization have market advisory committees?
 14. Does your organization offer grain contracting opportunities for producers?
 15. Does your organization employ retail field persons in agronomy, feed, etc.?
 16. Does your organization practice volume-based pricing on retail sales/grain purchases?
 17. Does your organization provide on-farm pickup of grain?
 18. Does your organization set sales goals?
4. Board Training/Development/Succession
 19. Does your organization have associate or junior board members?
 20. Does your organization provide a handbook for its Board Members?
 21. Does your organization have a limit on the number of consecutive terms a Board Member may serve?
 22. Does your organization utilize training programs available to Board Members?
5. Management Performance/Evaluation/Succession
 23. Does your organization have a job description for the General Manager?
 24. Does your organization have performance standards for the General Manager?
 25. Does the Board of Directors formally evaluate the General Manager's performance on a regular basis?
 26. Does the Board of Directors use a survey of comparable firms in setting a salary for the General Manager?
 27. Does the organization provide for compensation based on the General Manager's job performance compared to performance standards?
 28. Does your organization have a plan for management succession?
6. Strategic Planning
 29. Has your organization developed a mission statement?
 30. Has your organization established business objectives to be reached?
 31. Do your organization's employees participate in formulating goals and objectives for the firm?
 32. Does the Board of Directors participate in your 3-5 year facility planning?
 33. Does management participate in 3-5 year facility planning?

34. Does your organization use source and application of funds projections in its planning process?

7. Industry Planning

35. Does your organization consider the strengths and weaknesses of competitors when making planning decisions?

36. Does your organization use trade area data to evaluate market potential?

37. Does your organization consider business conditions at local, state, national, and international levels when making planning decisions?

8. Operational Planning

38. Does your organization incorporate industry trends in making planning decisions?

39. Has your organization made an analysis of each department's performance, i.e., cost and returns?

40. Has your organization developed plans for the use and maintenance of its facilities?

41. Has your organization analyzed its work force in terms of current/future needs and skills required?

9. Financial Management

42. Does your organization prepare an annual budget?

43. Does your organization prepare separate budgets for each department, i.e., grain, fuels, and feed?

44. Is a monthly balance sheet made available to the Board of Directors?

45. Is a monthly operating statement made available to the Board of Directors?

46. Is a monthly source and application of funds statement made available to the Board of Directors?

47. Is a monthly budget made available to the Board of Directors?

48. Does your organization use financial ratios in setting its performance standards?

10. Board/Management Controls

49. Does your organization's monthly financial statement reflect the aging of accounts receivable?

50. Does your organization have someone other than the General Manager review retail credit status?

51. Is your Board of Directors supplied with a summary of grain futures marketing transactions?

52. Does your organization have established policies which place limits on open grain position?

53. Does your organization have established policies to deal with condition of stored grain?

54. Is the quality of the grain inventory checked monthly?

55. Is the quantity of the grain inventory measured monthly?

56. Do you have an unqualified audit?

57. Do department heads and/or branch managers attend board meetings?

58. Do you review the loan covenants with lenders?

Appendix 2

Code, Definition, and Target Financial Ratios Used in the Analysis

	Code	Definition	Target (Dollars)
Operating Statement Ratios	LSTS ^a	Local Savings/Total Sales	2:1
	TETS ^b	Total Expenses/Total Sales	.10:1
	TPGR ^b	Total Personnel Expenses/Gross Reserve	.35:1
Balance Sheet Ratios	LIIE ^c	(Local Savings & Interest Expense)/Interest Expense	4:1
	ASLI ^c	Current Assets/Current Liability	1.80:1
	TLTM ^d	Total Long-Term Debt/Total Member's Equity	.70:1
	TLNF ^d	Total Long-Term Debt/Net Fixed Assets	.60:1
Operating Statement and Balance Sheet Ratios	TMTA ^d	Total Members' Equity/Total Assets	.50:1
	LSCN ^a	Local Savings/(Current Assets & Net Fixed Assets)	.08:1
	VCTS ^c	Working Capital/Total Sales	.07:1
	LDLT ^c	(Local Savings & Depreciation Expense) Long-Term Debt	.20:1

Source: *Analyzing a Cooperative Business*.

^aA profitability ratio

^bAn efficiency ratio

^cA liquidity ratio

^dA solvency ratio