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PERFORMANCE OF COOPERATIVES AND INVESTOR OWNED FIRMS IN THE DAIRY INDUSTRY

by

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PERFORMANCE OF COOPERATIVES AND INVESTOR OWNED FIRMS IN THE DAIRY INDUSTRY

A comparison of regional dairy cooperatives with investor owned dairy firms for the period 1976-1987 produced empirical findings that are at variance with the hypotheses suggested by the theory of cooperatives. The cooperatives in the sample performed significantly better than the IOFs when compared by leverage, asset turnover, and coverage ratios, while the rate of return to equity was not found to be significantly different. Techniques are also proposed for valuing the nonmarket aspects of cooperatives that are not captured by financial ratio analysis.

1. Introduction

Cooperatives are regarded as a separate form of business organization, extending the conventional classification of single proprietorships, partnerships, and stockholder-owned firms. Like other firms, cooperatives buy, sell, and produce goods and services. However, unlike other firms, cooperatives are owned by their member patrons and exist to serve their members; they distribute profits or surpluses according to patronage and not according to investment. In addition to their business activity, cooperatives also provide goods and services for which no market values are available: they are active in community development and are often regarded as a training ground for participatory management and democratic governance. The specific features of the cooperative form of organization are sufficiently distinctive to suggest that cooperatives may pursue different objectives from investor owned firms (IOFs).

According to a survey performed by Purdue University in the late 1970's and early 1980's (Schrader et al.), policy makers and university economists indeed felt there were significant differences between the goals of cooperatives and investor owned firms. On the other hand, as part of the same survey, Babb and Lang found that managers of cooperatives and proprietary firms ranked their goals essentially the same. Perhaps this difference in opinion is due to the absence of generally accepted performance criteria for cooperatives, which may be caused by disagreements over the role or function of cooperatives in society.

In order to capture possible economic differences between the two forms of business organization, this paper compares the financial performance of cooperative and investor owned dairies, using performance measures that are conventionally accepted for investor owned firms. Yet it is recognized that complete evaluation of cooperative performance requires consideration of the nonmarket dimensions of cooperatives, which are not captured by conventional economic analysis based on financial performance measures.

The paper is organized as follows. The next section presents a theoretical framework for comparative performance analysis of cooperatives and investor owned firms. Section 3 compares the performance of dairy cooperatives and investor owned dairy manufacturers over the period from 1970 to 1987, using financial ratio analysis. Nonmarket dimensions of cooperative performance are identified in Section 4, along with some methods that could be applied to their evaluation. Concluding remarks are given in the final section.

2. Theoretical Basis for the Comparison of Cooperatives and IOFs

Cooperatives are a form of collective action in which individuals join together to accomplish what would be more costly or impossible to achieve individually (Zusman). Farmers and other small operators, for example, have formed cooperatives to ameliorate their disadvantage in the market system. Yet economists and managers frequently view cooperatives simply as a variant of an investor owned firm, modeling them with an objective function that reflects the specific features of cooperative organization. For example, an appropriate objective function of a cooperative, as originally suggested by Enke, may be to maximize the sum of producer surplus (profits) and consumer surplus (lower prices). Cooperatives also have been modeled as having a zero-profit objective and as maximizing average per unit surplus or price received by members (Helmberger and Hoos).

With cooperatives viewed as a variant of investor owned firms, cooperatives and IOFs can be compared using standard techniques of financial performance evaluation, such as financial ratio analysis. Financial ratios reflect the effect of corporate strategic decisions. The theory of cooperatives and the accepted views of cooperative behavior suggest fundamental differences of business strategy that may result in differences of financial ratios between cooperatives and IOFs. Four financial ratios

that have a direct link to corporate objectives and thus can be expected to reveal differences between cooperatives and IOFs were selected for this study: these four ratios measure profitability, leverage, solvency, and efficiency.

Profitability is usually measured by the rate of return to investors' equity. An IOF whose overall objective is maximization of the value of the firm will strive to maximize the rate of return to equity at a given risk level (Copeland and Weston). Cooperatives, on the other hand, are seldom regarded as rate-of-return maximizers and are generally expected to have a lower rate of return than comparable IOFs for at least two reasons.

First, following Helmberger and Hoos, cooperatives have often been modeled as having a zero-profit objective, with prices and charges adjusted so that no surplus is generated. This assumption will be reflected as a zero rate of return to equity, which, while highly undesirable for IOFs, should not be particularly harmful to cooperatives: the members of a zero-profit cooperative receive their payoff in the form of higher product prices or lower costs.

Second, while shareholders in an investor owned firm expect to earn a rate of return on their investment, cooperative members mainly expect to receive benefits through services provided by the cooperative, such as lower input prices or better marketing channels. Members rely on being able to get back their investment after a certain number of years through equity redemption schemes (Cobia et al.) and do not necessarily expect to earn a rate of return on their investment.

Leverage is a measure of outside financing that the firm raises in addition to owners' equity capital. Specifically it can be calculated as the ratio of debt to equity in the firm's capital structure. The higher the leverage ratio, the greater are the risks associated with the probability of default by the firm, while lower leverage generally indicates greater financial security. Value-maximization theory suggests the existence of optimal leverage for a firm (Copeland and Weston), which is determined by the tradeoffs between the benefits of borrowing (e.g., the tax shield on interest) and the associated risks (e.g., bankruptcy).

Corporate growth cannot be sustained entirely by internally generated funds and requires external financing. IOFs distribute their financing needs between raising new debt and issuing new equity so as to maintain the optimal "target" leverage. Cooperatives, on the other hand, are viewed as "equity

bound": they do not issue common stock to nonmembers and their only source of equity, in addition to retained earnings, is membership fees, which are usually very small (Cobia et al.). Cooperatives are accordingly expected to rely more heavily on debt financing than IOFs in order to sustain comparable growth rates.

A second reason to expect cooperatives to be more leveraged than IOFs is their susceptibility to moral hazard behavior due to the cooperative principle of "risk sharing" and mutual responsibility (Zusman). Cooperatives may act as if the cooperative principles provide an "insurance policy" in case of adverse business outcomes, with strong cooperatives expected to bail out their "failing fellow-cooperatives". Evidence of the sense of mutual responsibility in cooperatives is provided by a study of cooperative reorganizations: Parliament and Taitt found that over 70% of cooperative mergers in Minnesota in 1979-1984 involved a partner in a net loss position, compared to only 6% of IOF mergers in the study by Ravenscraft and Scherer. This suggests that cooperative mergers may have been treated as an alternative to bankruptcy. As a result, cooperative decision makers may be influenced by moral hazard and thus willing to assume higher risk than the managers of "uninsured" investor-owned firms. This rationale translates into potentially higher leverage for cooperatives than for IOFs.

Solvency measures a firm's capacity to service debt. It is usually calculated as the ratio of earnings before interest and tax (EBIT) to annual interest expense. When this coverage ratio is high, there is little likelihood of defaulting on debt service payments and the prospect of bankruptcy is remote.

Value-maximizing IOFs attempt to reduce the bankruptcy risk, and this is reflected in relatively high coverage ratios. Cooperatives, on the other hand, can be expected to have lower coverage ratios: first, their debt levels are expected to be relatively high, with a corresponding increase in the annual interest expense; second, if cooperatives operate with a zero-profit objective, they will tend to have a relatively low EBIT and hence a low coverage ratio; third, moral hazard considerations suggest that cooperative managers may not attach as much significance as IOF managers to default risk reduction.

Efficiency can be measured by the ratio of sales to total assets. It indicates how efficiently the organization employs its assets to generate sales. Moral hazard considerations suggest that cooperatives may be less discriminating in undertaking investments than IOFs. As a result, cooperatives may have a tendency to "overinvest" and their asset base may thus be greater than the asset base of

IOFs for the same level of sales. This "overinvestment" should result in lower sales to total assets ratios for cooperatives than for IOFs.

The previous discussion suggests specific hypotheses concerning the expected relative values of the four financial ratios for cooperatives and IOFs, which provide a basis for a comparative performance analysis. Table 1 presents the definitions of the financial ratios used in this study and the expected relationship between the ratios for cooperatives and IOFs.

3. Performance Comparison of Cooperatives and Investor Owned

Firms: Financial Ratio Analysis

Financial ratio values are industry-specific, and the comparative analysis of cooperatives and IOFs in this paper is restricted to the dairy industry. The financial ratios of cooperatives were calculated using financial statements collected from 10 large U.S. dairy cooperatives for the period 1970 to 1987. The comparable ratios for IOFs were obtained from the Dairy Product Manufacturers category as reported in Robert Morris Associates Annual Statements Studies (RMA). The number of IOFs in the RMA studies for the corresponding years varied from 75 to 160. The 10 dairy cooperatives in the sample had up to \$100 million in assets, matching the asset size category of the investor owned dairies in the RMA studies. The dairy IOFs and the cooperatives were also comparable with respect to the scope of operations: firms in both categories produce creamery butter; natural and processed cheese; dry, condensed and evaporated milk; ice cream; and specialty dairy products.

The only statistics published by RMA for the IOF financial ratios are the median and the top and bottom quartiles. Accordingly, for the financial performance comparisons, the median and the interquartile range of each financial ratio of the dairy cooperatives were compared to the corresponding statistics of the same financial ratio for IOFs. The top (bottom) quartile is such that the ratio values for 25% of the sample firms are higher (lower) than the quartile value. The interquartile range accordingly contains 50% of the observed ratio values in the sample of firms.

TABLE 1: Expected Relationships Between Financial Ratio Measures of Performance for Cooperatives and Investor Owned Firms

Performance criteria	Ratio	Definition	Expected relationship
Profitability	Rate of return to equity	$\frac{\text{Profit before tax}^*}{\text{Net worth}^{**}}$	Coop < IOF
Leverage	Debt to equity	$\frac{\text{Total liabilities}}{\text{Net worth}^{**}}$	Coop > IOF
Solvency	Coverage ratio	$\frac{\text{EBIT}}{\text{Interest}}$	Coop < IOF
Efficiency	Asset turnover	$\frac{\text{Sales}}{\text{Total assets}}$	Coop < IOF

* This definition is used in order to ensure consistency with the available data base for IOF. The use of the before-tax rate of return to equity may be justified for the purposes of the present comparison because of possible differences in tax treatment between cooperatives and IOFs.

** The net worth of the dairy cooperatives is the total equity as reported in their financial statements.

The time-series comparisons of cooperatives and IOFs for each of the selected ratios are presented in graphical form. Figure 1 (panels a through d) plots the median financial ratio of the dairy cooperatives and superimposes the interquartile range of the cooperatives on the interquartile range of the IOFs for each financial ratio. The profitability and leverage ratios for IOFs were available for the full period 1970-1987, while coverage and sales-to-assets ratios were not published by RMA prior to 1976. The detailed values of the median ratios and the interquartile ranges are given in the Appendix.

The Wilcoxon rank-sum test was run on the time series of the median financial ratios to detect significant differences between dairy cooperatives and IOFs. The test results are presented in Table 2. The null hypothesis was that the median financial ratios are the same for cooperatives and IOFs. The test ranks the pooled observations of the two samples (the median financial ratios of cooperatives and IOFs in this study) and forms the sums of the ranks for the two samples. If the rank sums, or the average scores, of the corresponding ratios for cooperatives and IOFs are sufficiently close, then the null hypothesis cannot be rejected. If the rank sums, or the average scores, are sufficiently different for the two samples, the test rejects the null hypothesis and establishes, with a certain probability, that cooperatives and IOFs have different median financial ratios. The direction of the difference between the two samples, given the meaning of the financial ratios, indicates whether the corresponding financial ratio is "better" or "worse" for cooperatives than for IOFs.

Profitability (panel a). The interquartile range for cooperatives is within the interquartile range for IOFs in most of the years and the median profitability ratio for cooperatives always lies within the middle 50% of the IOFs. The Wilcoxon test indicates that the median profitability of cooperatives is significantly higher than the median profitability of IOFs over the period 1970-1987. However, the profitability ratio of cooperatives shows a declining trend, and in recent years (1976-1987) the median profitabilities of cooperatives and IOFs are not found to be significantly different by the Wilcoxon test (see Table 2). The decline in the median rates of return may be due to accumulation of equity by the dairy cooperatives and not to decline in the level of earnings: the equity base of the cooperatives in the sample increased between 1970-1987 at an annual average rate of 14.7% as compared to only 7.6% for the IOFs.

FIGURE 1: Selected Financial Ratios for Dairy Cooperatives and Investor Owned Firms.

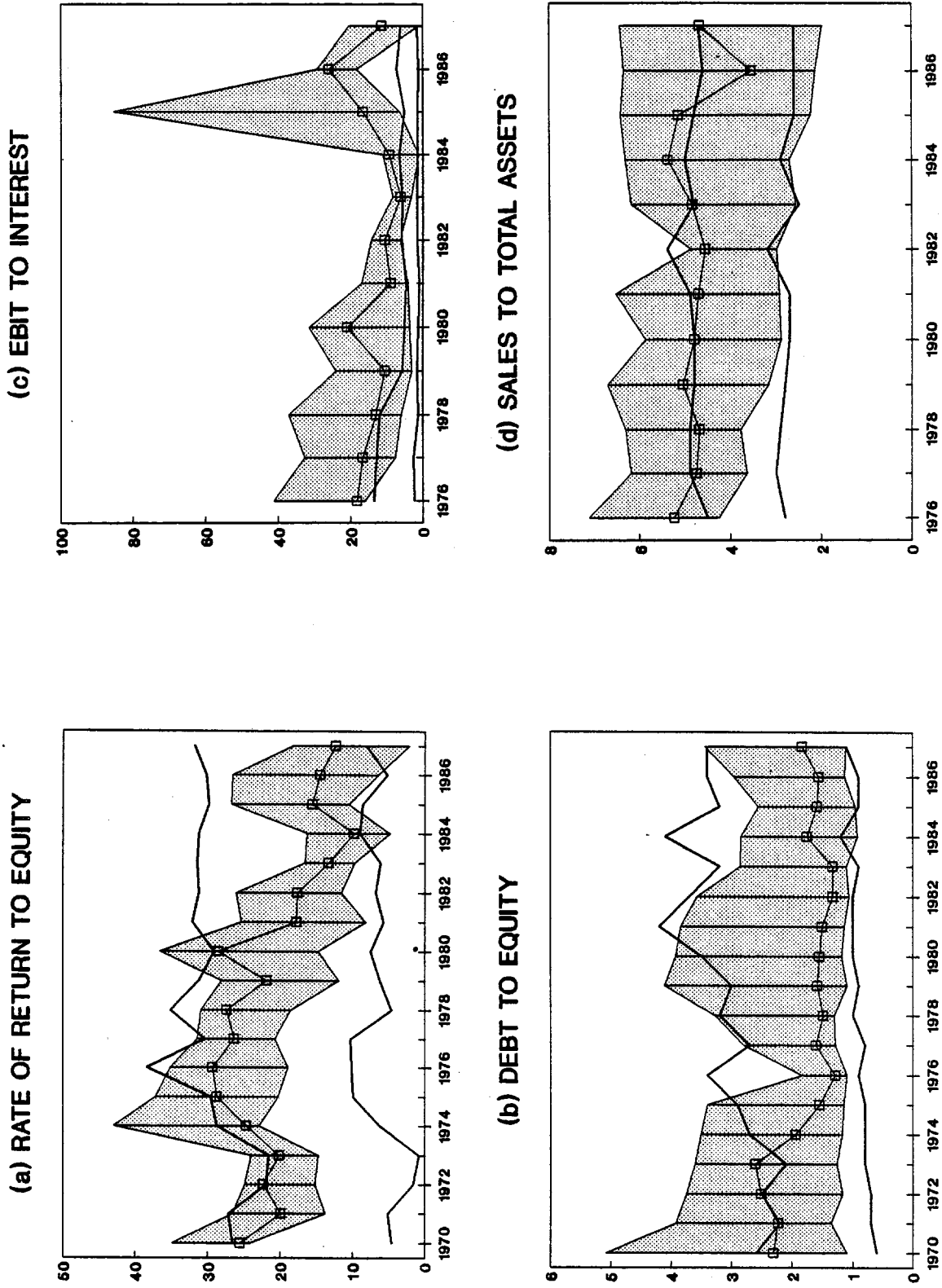


TABLE 2: Wilcoxon Rank-Sum Test of Median Financial Ratios of Cooperatives Against IOFs

Ratio	Mean score		Wilcoxon Z-statistic	Prob > Z *
	Coops	IOFs		
1976-1987				
Return to equity	13.1	11.9	0.38	0.71
Debt to equity	8.0	17.0	-3.10	0.00
Sales to assets	17.7	7.3	3.56	0.00
EBIT to interest	18.5	6.5	4.13	0.00
1970-1987				
Return to equity	22.3	14.7	2.14	0.03
Debt to equity	18.9	18.1	0.21	0.84

* The probability that the Z-statistic exceeds the observed value under the null hypothesis that the median financial ratios for coops and IOFs are equal.

These findings do not support the hypothesis that cooperatives are less profitable than the IOFs. Although their objective may not be to maximize return on equity, these results indicate that, contrary to expectations, dairy cooperatives perform similarly to dairy IOFs with respect to this profitability measure.

Leverage (panel b). The interquartile ranges of cooperatives and IOFs overlap, except in the early years (1970-1975), when the cooperatives tended to have higher leverage ratios. The median leverage ratio of the dairy cooperatives has been within the middle 50% of the leverage ratios for IOFs and the Wilcoxon test indicates that, contrary to the hypothesis, there is no significant difference between the median leverage of cooperatives and IOFs over the period 1970-1987. However, the median leverage of the dairy cooperatives has improved over the years, declining from the top quartile of the IOFs to near the bottom quartile, and in the recent years (1976-1987) it has been significantly better (lower) than for the IOFs (see Table 2).

The initial hypothesis suggesting that the cooperatives would be more leveraged than the IOFs was based on equity undercapitalization and moral hazard behavior. The empirical findings refute the original hypothesis. As noted above, the equity base for cooperatives increased during 1970-1987 faster than for IOFs. Moreover, the equity growth rate for cooperatives (14.7%) was higher than the growth rate of their total assets (11.6%). In this respect, it is hard to view the cooperatives as "equity bound." More detailed analysis of the composition of debt in cooperatives shows that they have generally very little long-term debt and a number of cooperatives in the sample had no long-term debt at all in some of the years. It would appear that the borrowing decisions of cooperatives are quite conservative and the dairy cooperatives are not burdened with higher debt levels than the dairy IOFs.

Solvency (panel c). The interquartile range for cooperatives is almost entirely above that for IOFs. The Wilcoxon test indicates that the median coverage ratio for cooperatives is significantly higher than that for IOFs. The test provides evidence that in general cooperatives are more able than IOFs to make annual interest payments. There is, however, greater variability in the coverage ratio for cooperatives. This may be due to inconsistencies in the treatment of interest expense in the financial statements of cooperatives. While some cooperatives report interest expense and interest income separately, other cooperatives report a single number which apparently represents financing expense net of interest

income. As a result, some cooperatives appear to have exceptionally low interest payments, contributing to the high variability of the coverage ratio.

Efficiency (panel d). The median sales to total assets ratio of cooperatives is shown by Wilcoxon test to be significantly higher than that for IOFs. In fact, the median efficiency ratio for cooperatives consistently straddles the top quartile of this ratio for IOFs. Thus, the dairy cooperatives utilize their assets even more efficiently than IOFs to generate sales, so that there is no evidence to support the "overinvestment" hypothesis.

The results of this study indicate that over the 12-year period 1976-1987 the median performance of cooperatives was significantly better than the median performance of IOFs in terms of leverage, coverage, and efficiency and not worse in terms of profitability. In contrast, Schrader et al. did not detect significant differences between "small" cooperatives and investor owned firms using the same financial ratios for profitability, efficiency, and leverage. In another study, Chen observed substantial differences in leverage and profitability between cooperatives and IOFs, but, contrary to the findings of this study, he observed leverage to be higher for cooperatives and return on net worth lower, consistent with the original hypotheses (see Table 1).

The differing results among these studies of cooperatives and IOFs may be due to differences in the methodology, in the industries analyzed, and in the asset size of the sample firms. Schrader et al. used cross-sectional data of cheese plants, whereas this study uses time-series data of dairy operations. Chen used a diversified sample of 79 "large" agribusiness firms in five different industry groups, while the cooperatives and IOFs in this study were all from the same industry with a mix of asset sizes under \$100 million. The difference in findings between this study and Chen cannot be fully explained by size effects, as an analysis of the subset of 6 dairy cooperatives with between \$10 million to \$50 million in assets did not result in findings different from those reported for the entire sample. Thus, for the dairy cooperatives and IOFs with under \$100 million in assets there is no evidence that performance varies across asset size categories. Future research using cooperatives and IOFs in other industries may reveal that comparative performance varies across industries.

4. Alternative Performance Criteria for Cooperatives

Cooperatives and IOFs are generally viewed as different in a number of nonfinancial dimensions and performance evaluation of cooperatives should not be limited to financial comparisons with IOFs. Cooperatives, in particular, are often thought of as providing a public good. One of the roles that cooperatives play, as suggested by Nourse, is that of competitive yardstick: cooperatives should add enough competition to the system to give farmers a basis upon which to judge the terms offered by investor-owned firms. Staatz (p. 97) notes that:

Farmers, faced with unsatisfactory performance by IOFs, may form a cooperative firm whose purpose is to force the IOFs, through competition, to improve their service to farmers. If successful in enforcing competition, the cooperative generates benefits that it does not capture itself but which accrue to the farmer-stockholders, as well as to other farmers in the area.

Other public good aspects of cooperatives include their ability to correct for market failures by providing services for which a functioning market does not exist and their commitment to participatory management and democratic governance.

Full evaluation of cooperative performance requires methods capable of valuing these nonmarket dimensions. Evaluation of nonmarket goods has received a great deal of consideration in the area of environmental and resource economics, where the two general approaches of evaluating nonmarket goods are: (1) inferring values from observed behavior, and (2) survey-based direct elicitation. Both approaches lend themselves to the evaluation of nonmarket aspects of cooperative performance.

With cooperatives viewed as a form of collective action, cooperative performance can be measured by estimating the incremental value of the cooperative to the members. An appropriate performance measure for an agricultural cooperative could be the profitability of the members' farming operations with and without the cooperative. For example, in the framework of approach (1) above, the incremental value of a marketing cooperative can be inferred from the differences in the prices received by member producers from their cooperative and those received by producers dealing with comparable IOFs. This approach is conceptually similar to hedonic pricing, a technique which values attributes for which no markets exist (see Nelson and Brookshire et al. for the evaluation of air pollution and airport noise).

While the observed price differences between cooperatives and IOFs provide a valuation of all the nonmarket services of a cooperative, members and officers may also be interested in the valuation of specific cooperative attributes, such as training in democratic control or involvement in community development. This can be achieved by the survey-based direct elicitation methods, suggested in approach (2) above, which include contingent valuation, contingent ranking, and factorial survey methods (Cummings et al., Mitchell and Carson, Smith and Desvovges, Goodman). Application of these techniques to empirical evaluation of cooperatives is a subject for future research.

5. Concluding Comments

Using standard financial ratio analysis, the performance of dairy cooperatives was found to be significantly better than the performance of dairy IOFs in terms of leverage, coverage, and efficiency ratios and not worse in terms of profitability over the period 1976-1987. Even without allowing for benefits that are unique to members of cooperatives and for potential public good aspects, the cooperatives appear to meet or exceed generally accepted business standards, at least in the dairy industry. Cooperatives, however, do have objectives which differ from those of IOFs. These results therefore lead one to ask questions such as: Has the standard of financial analysis "forced" cooperatives to adopt the same goals as investor owned firms? Has the emphasis on efficiency and return on investment in the financial community had a determining influence on the behavior of cooperatives?

In order to evaluate performance on cooperative-specific objectives which are not captured by financial ratio analysis, it is necessary to analyze nonmarket aspects of cooperative behavior. Schrader et al. examined some nonfinancial aspects of cooperative performance, but their results were restricted to qualitative information and no attempt was made to value the nonmarket dimensions of cooperatives. The techniques suggested in this paper, such as hedonic pricing and contingent valuation, can be used to assign values to nonmarket attributes of cooperatives. The expanded evaluation framework should improve our understanding of the performance of cooperatives and provide decision and policy makers with new tools for assessing cooperative behavior.

References

- Babb, E.M., and M.F. Lang. 1985. "Implication of Comparative Performance of Cooperatives and Investor Owned Firms." Farmer Cooperatives for the Future: NCR-140 Research on Cooperatives and Extension Committee on Organization and Policy Published Proceedings. Department of Agricultural Economics, Purdue University, West Lafayette, IN.
- Brookshire, D.S., M.A. Thayer, W.D. Schulze, and R.C. D'Arge. 1982. "Valuing Public Goods: A Comparison of Survey and Hedonic Approaches." American Economic Review, 72, 165-177.
- Chen, K.S. 1984. The Growth of Large Cooperative and Proprietary Firms In the U.S. Food Sector, unpublished Ph.D. thesis, Purdue University, West Lafayette, IN.
- Cobia, D., J. Royer, R. Wissman, D. Smith, D. Davidson, S. Lurya, J. Mather, and P. Brown. 1982. Equity Redemption: Issues and Alternatives for Farmer Cooperatives, ACS Report No. 23, U.S. Department of Agriculture, Washington, D.C.
- Copeland, T.E. and J.F. Weston. 1983. Financial Theory and Corporate Policy, Addison-Wesley, Reading, MA.
- Cummings, R., D. Brookshire, and W. Schulze. 1986. Valuing Environmental Goods: An Assessment of the Contingent Valuation Method, Towtowa, Rowman and Allanheld.
- Enke, S. 1945. "Consumer Cooperatives and Economic Efficiency." American Economic Review 35, No. 1 (March): 148-55.
- Goodman, A.C. 1989. "Identifying Willingness-to-Pay for Heterogeneous Goods with Factorial Survey Methods." Journal of Environmental Economics and Management 16: 58-79.
- Helmberger, P.G. and S. Hoos. 1962. "Cooperative Enterprise and Organization Theory." Journal of Farm Economics 44 (May):275-90.
- Mitchell, R. and R. Carson. 1989. Using Surveys to Value Public Goods: The Contingent Valuation Method. Johns Hopkins Press, Baltimore, MD.
- Nelson, J. 1979. "Airport Noise, Location Rent, and the Market for Residential Amenities." Journal of Environmental Economics and Management, 6, 320-331.
- Nourse, E.G. 1922. "The Economic Philosophy of Cooperation." American Economic Review 12, No. 4 (December): 577-97.
- Parliament, C. and J. Taitt. 1989. "Financial Performance of Reorganized Agricultural Cooperatives." Staff Paper, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul, MN.
- Ravenscraft, D. and F. M. Scherer. 1987. Mergers, Sell-offs, and Economic Efficiency, Brookings Institution, Washington, D.C.
- Robert Morris Associates. 1971-1988. Annual Statement Studies, Philadelphia, PA.
- Schrader, L.F., E.M. Babb, R.D. Boynton, and M.G. Lang. 1985. "Cooperative and Proprietary Agribusinesses: Comparison of Performance." Purdue Agricultural Experiment Station Research Bulletin 982, Purdue University, West Lafayette, IN.

- Smith, V.K. and W. Desvougues. 1986. Measuring Water Quality Benefits. Kluwer-Nijhoff, Boston, MA.
- Staatz, J.M. 1987. "Farmers' Incentives to Take Collective Action via Cooperatives: A Transaction-Cost Approach." in J.S. Royer, ed., (1987) Cooperative Theory: New Approaches. U.S. Department of Agriculture, Agricultural Cooperative Service, ACS Service Report Number 18, Washington, D.C.
- Zusman, P. 1988. Individual Behavior and Social Choice in a Cooperative Settlement, Magnes Press, Jerusalem, Israel.

APPENDIX

FINANCIAL RATIOS OF DAIRY COOPERATIVES AND INVESTOR OWNED FIRMS

Profit Before Tax to Net Worth

Year	Cooperatives			Investor Owned Firms		
	Lower Quartile	Median	Upper Quartile	Lower Quartile	Median	Upper Quartile
1970	24.2	25.5	34.9	4.6	14.2	26.5
1971	13.8	19.9	26.5	5.1	14.4	27.1
1972	15.2	22.3	24.9	1.6	14.0	21.9
1973	14.7	20.1	24.0	0.8	14.9	21.6
1974	22.9	24.6	43.0	6.2	19.2	28.7
1975	20.3	28.7	37.2	9.9	17.1	29.6
1976	18.8	29.3	35.1	10.1	21.6	38.4
1977	20.7	26.3	31.4	10.3	16.8	30.4
1978	18.5	27.3	30.9	4.6	16.1	35.1
1979	11.9	21.9	28.1	6.2	15.1	31.2
1980	14.7	28.5	36.6	7.5	15.8	29.1
1981	8.2	17.7	25.3	5.7	17.8	32.1
1982	11.5	17.5	26.0	6.8	17.3	31.2
1983	9.7	13.2	16.5	6.1	16.5	31.4
1984	4.8	9.8	16.3	9.0	20.4	31.2
1985	10.5	15.5	26.7	8.6	15.8	29.8
1986	6.5	14.5	26.5	5.2	16.3	30.2
1987	2.2	12.3	18.2	8.1	17.1	31.8

Total Liabilities to Net Worth

	Cooperatives			Investor Owned Firms		
	Lower Quartile	Median	Upper Quartile	Lower Quartile	Median	Upper Quartile
	1.1	2.3	5.1	0.6	1.2	2.6
	1.4	2.2	3.9	0.7	1.1	2.2
	1.2	2.5	3.7	0.7	1.3	2.5
	1.3	2.6	3.6	0.8	1.4	2.1
	1.2	1.9	3.5	0.8	1.5	2.7
	1.1	1.6	3.4	0.8	1.5	2.9
	1.1	1.3	1.8	0.9	1.5	3.4
	1.3	1.6	2.8	0.8	1.6	2.7
	1.3	1.5	3.3	1.0	1.7	3.2
	1.1	1.6	4.1	0.9	1.8	3.0
	1.2	1.6	3.9	1.0	2.0	3.5
	1.1	1.5	3.8	1.0	1.8	4.2
	1.1	1.3	3.6	1.0	1.8	3.7
	1.1	1.3	2.8	0.9	1.8	3.2
	0.9	1.7	2.8	1.2	2.0	4.1
	0.9	1.6	2.5	0.9	1.7	3.2
	1.1	1.6	3.0	0.9	2.0	3.4
	1.1	1.8	3.4	1.1	2.1	3.4

Sales to Total Assets

Year	Cooperatives			Investor Owned Firms		
	Lower Quartile	Median	Upper Quartile	Lower Quartile	Median	Upper Quartile
1976	4.3	5.2	7.1	2.8	3.7	4.5
1977	3.6	4.8	6.2	3.0	3.9	4.9
1978	3.8	4.7	6.3	2.9	4.0	4.9
1979	3.2	5.1	6.7	2.8	3.9	4.8
1980	2.9	4.8	5.9	2.7	3.7	4.8
1981	2.9	4.7	6.5	4.1	4.1	4.9
1982	3.0	4.6	4.9	3.2	4.3	5.4
1983	2.6	4.8	6.2	2.5	4.0	4.8
1984	2.7	5.4	6.3	2.9	4.0	5.0
1985	2.2	5.1	6.4	2.6	3.6	4.8
1986	2.1	3.5	6.3	2.6	3.5	4.6
1987	2.0	4.7	6.4	2.6	3.4	4.7

EBIT to Interest Expense

	Cooperatives			Investor Owned Firms		
	Lower Quartile	Median	Upper Quartile	Lower Quartile	Median	Upper Quartile
	16.0	18.2	41.3	2.3	4.2	13.6
	7.5	16.6	32.6	2.7	4.5	12.8
	6.1	13.0	37.0	1.3	3.2	12.0
	3.1	10.5	24.1	1.6	2.9	5.7
	3.7	20.8	31.4	1.3	2.4	5.1
	4.0	8.9	16.9	1.1	2.2	4.7
	6.3	10.5	14.3	1.6	2.3	5.9
	3.1	6.2	8.3	1.6	2.8	5.7
	1.2	9.3	11.0	1.5	3.2	6.5
	6.5	16.6	85.4	1.5	2.9	5.1
	18.4	25.9	29.9	1.3	3.0	7.3
	1.2	11.3	20.4	1.6	2.8	6.1

Source:

Cooperatives - calculated from the financial statements of 10 large U.S. dairy cooperatives with up to \$100 million in assets. Investor Owned Firms - from Robert Morris Associates, Annual Statement Studies, various years. Efficiency and coverage ratios were not reported by Robert Morris Associates prior to 1976.