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Zvi Lerman

Claudia Parliament

Department of Agricultural and Applied Economics

University of Minnesota
Institute of Agriculture, Forestry and Home Economics
St. Paul, Minnesota 55108

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The authors are, respectively, Lecturer, Department of Agricultural Economics and Management, Hebrew University, Rehovot, Israel, and Assistant Professor, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul, MN. This paper was written when Zvi Lerman was on sabbatical leave at the University of Minnesota. The research was supported by BARD – U.S.–Israel Binational Agricultural Research and Development Foundation.

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COMPARATIVE PERFORMANCE OF FOOD-PROCESSING COOPERATIVES AND INVESTOR-OWNED FIRMS

1. Introduction

Cooperatives and investor-owned firms (IOFs) are alternative forms of business organization that operate in the same economic system and perform similar functions. Cooperatives, like IOFs, buy, sell and produce goods and services, but cooperatives, unlike IOFs, aim to provide a service to their member patrons rather than earn a return on an investment. The difference in objectives may be attributable to the origin of cooperatives. In market economies, groups of producers or consumers have formed cooperatives when they became dissatisfied with the conduct of investor-owned firms. Cooperatives have thus been viewed as a tool for correcting market failures[1], such as those found in the agricultural sector with its thin and spatially distributed markets. Indeed, Nourse, in his concept of cooperatives as a competitive yardstick, felt cooperatives should exist in order to eliminate monopolistic excesses of profit-oriented firms[2].

The issue addressed in this research is whether the difference in objectives between cooperatives and investor-owned firms outweighs the effect of the similarities in business functions. This question is examined through comparative analysis of financial performance of cooperatives and investor-owned firms in two food industries in the US agribusiness sector – fruit and vegetable processors and dairy product manufacturers. Agribusinesses are chosen as the research base because

of the prominence of cooperatives in agriculture. In the last decades, nearly 30% of all farm products and 20% of all farm inputs in the US were handled by cooperatives, and in some states the cooperative share is as high as 50%.[3]

Comparative performance evaluation of cooperative and investor-owned agribusinesses has been the subject of several recent US studies. A series of surveys conducted at Purdue University examined the performance through an analysis of financial statement data and opinion surveys of members[4]. The survey results indicated that some cooperatives paid slightly higher prices to producers than IOFs, farmers ranked the level and quality of services provided by their cooperatives higher than the similar services provided by IOFs, and small cooperatives compared favorably to IOFs with respect to profitability. Overall, however, there were few significant differences in financial performance for the two firm types.

In another study, Chen, Babb, and Schrader[5] examined the growth of agricultural cooperatives and IOFs in the US food sector. They found that cooperatives had lower profitability, higher leverage, and higher growth rates than comparable IOFs. These results were obtained, however, without separating the US food sector into its component industry groups and without controlling for firm size.

More recently, Parliament, Lerman, and Fulton[6] compared the performance of cooperatives and IOFs within one specific industry group in the US food sector – the dairy industry – and found, in contrast, that cooperatives had higher profitability and lower leverage than

comparable IOFs. Lerman and Parliament[7] subsequently studied the performance of large and small agricultural cooperatives in four distinct industry groups. They found, without comparison to IOFs, that financial performance of cooperatives differed significantly across size and industry categories. Specifically, the dairy cooperatives and the fruit and vegetable processing cooperatives were found to occupy the two extremes of the cooperative performance scale, with dairies performing significantly better and fruit and vegetable processors significantly worse than farm supply and grain cooperatives.

The apparent differences in the performance of cooperatives across industries may be the result of industry-related effects. For instance, the relatively poor performance of fruit and vegetable cooperatives might be in line with the performance of IOFs in the same industry. This study analyzes the comparative performance of cooperatives and IOFs in the fruit and vegetable processing industry and in the dairy industry. To control for the previously observed size effect[7], the present study focuses only on "small" firms with average asset size not exceeding $100 million for both the cooperatives and the IOFs.

The paper is organized as follows. Sec. 2 outlines the initial hypotheses regarding the performance of cooperatives relative to IOFs, followed by the description of the data and the methodology in Sec. 3. The empirical results are presented in two sections: Sec. 4 discusses the findings of financial ratio analysis, and Sec. 5 examines the growth of cooperatives and IOFs in the two industries. Concluding remarks are presented in the last section.

2. Implications of the Theory of Cooperative Behavior for Comparative Performance of Cooperatives and IOFs

The theory of cooperative behavior suggests fundamental differences in objectives and business strategy between cooperatives and IOFs.[8-10] Differences in objectives and strategy should lead to observable differences in profitability, capital structure, and operating efficiency of cooperatives and IOFs.

With respect to profitability, cooperatives, in contrast to IOFs, are seldom regarded as rate-of-return maximizers: cooperative members expect to receive benefits through services provided by the cooperative, such as lower input prices or better marketing channels, and not through return on investment[9]. Cooperatives thus can be expected to have lower profitability than IOFs.

With respect to capital structure, at least two factors suggest that cooperatives can be expected to have a higher proportion of debt than comparable IOFs. First, cooperatives are frequently viewed as "equity bound": they cannot issue common stock to raise equity from nonmembers and the direct infusion of equity by members is usually very small[11]. Cooperatives therefore may need to rely more heavily on debt financing than IOFs in order to sustain comparable growth rates. Second, cooperatives and IOFs may differ in their attitudes toward risk. The cooperative principle of risk sharing and mutual responsibility may be interpreted by cooperatives as providing an "insurance policy" in case of adverse business outcomes[10]. Recent findings indeed suggest that a financially strong cooperative may be encouraged to merge with a weaker cooperative to prevent the latter's bankruptcy[12]. Cooperative decision

makers thus may be susceptible to moral hazard behavior and willing to assume higher levels of risk than the managers of "uninsured" investor-owned firms. Since it is the risk of bankruptcy and default that prevents IOFs from assuming excessive debt levels[13], cooperatives can be expected to borrow more heavily than IOFs and have lower safety margins against the risk of defaulting on debt service and current liabilities.

With respect to operating efficiency, as measured by the utilization of assets to generate sales, moral hazard considerations also suggest that cooperatives may be less discriminating in undertaking investments than IOFs. Thus, cooperatives may have a tendency to "overinvest," forming an asset base greater than the asset base of IOFs for the same level of sales. "Overinvestment" on the part of cooperatives may also arise from differences in the evaluation of the opportunity cost of equity funds. Since members usually do not expect a direct return on their investment in the cooperative, cooperatives may treat members' equity as costless funds, without acknowledging their opportunity cost. Undervaluing the cost of equity may encourage excessive investments, leading to lower efficiency of asset utilization and higher asset growth rates for cooperatives than for IOFs. Overinvestment need not be restricted to fixed assets: it can also affect current assets, resulting in higher levels of inventory for a given level of sales.

The various hypotheses suggested by the theory of cooperative behavior can be tested by analyzing standard financial ratios for cooperatives and IOFs. The attitude of cooperatives toward return on members' investment can be deduced by comparative examination of the

rate of return to equity. The argument that cooperatives are likely to carry higher debt levels than IOFs because they are "equity bound" and susceptible to moral hazard behavior can be tested by a comparative examination of the debt to equity ratio. The implications of moral hazard behavior can also be tested by comparing the solvency and liquidity of cooperatives and IOFs, as measured respectively by the ratio of earnings to interest payments and by the ratio of current assets to current liabilities. The claim that cooperatives tend to "overinvest" can be tested by comparing the ratio of sales to fixed assets and the asset growth rates in cooperatives and IOFs. Comparison of inventory turnover ratios provides a test of overinvestment in current assets.

The profitability, capital structure, and operating efficiency ratios used in this study are defined in Table 1. The table also indicates the expected relationships of these ratios for cooperatives and IOFs.

3. Data and Methodology

The data for this research included a sample of 18 cooperatives: 9 cooperatives specializing in canned and frozen fruits, vegetables, and juices and 9 dairy cooperatives processing fluid milk and manufacturing value-added dairy products, such as butter, cheese, ice cream, and yogurt. Fruit and vegetable cooperatives that are mainly wholesalers of fresh produce and dairies that mainly sell fluid milk were excluded from the sample. The financial ratios of the cooperatives were calculated from their audited annual reports for the period 1976-1987. For each

observation year, the median of each of the six financial ratios was calculated for each of the two cooperative industries. Two time series of 12 median observations were thus obtained for each ratio – one for the fruit and vegetable cooperatives and the other for the dairy cooperatives.

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	Profit before tax* / Net worth**	Coop < IOF
Leverage	Debt to equity	Total liabilities / Net worth**	Coop > IOF
Solvency	Coverage ratio	Operating Earnings*** / Interest	Coop < IOF
Liquidity	Quick ratio	Cash + Receivables / Current liabilities	Coop < IOF
Efficiency	Fixed asset turnover	Sales / Fixed assets	Coop < IOF
Efficiency	Inventory turnover	Cost of Goods Sold* / Inventory	Coop < IOF

* Some of the fruit and vegetable processing cooperatives that operate on a pooling basis do not report cost of goods sold, and their "bottom line" on the income statement is therefore not comparable to profit before tax for other cooperatives and IOFs. In these instances, cost of goods sold was estimated from the reported cash payments to members during the year. These are mostly payments for produce delivered to the cooperative and are thus conceptually identical to cost of goods sold in conventional accounting. Given the estimate for cost of goods sold, profit before tax was calculated in a standard way to provide a figure comparable to that for other firms.

The rate of return to equity is defined in terms of profit before tax in order to ensure consistency with the available data base for IOFs. 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 cooperatives is the total equity as reported in their financial statements.

*** Earnings before interest and tax (EBIT).

The financial data for IOFs were obtained from Robert Morris Associates Annual Statements Studies (RMA)[14], which report a selection of median financial ratios for a wide range of industries. IOFs with operations comparable to the dairy cooperatives were represented by the Dairy Product Manufacturers category (SIC nos. 2021-24, 2026), which does not include firms primarily engaged in sales of bulk milk. No single IOF category matched exactly the operations of the fruit and vegetable processing cooperatives, and therefore two industrial classifications were used: Manufacturers of Canned and Dried Fruits and Vegetables (SIC nos. 2033-34) and Manufacturers of Frozen Fruits, Fruit Juices, and Vegetables (SIC no. 2037). In addition to being comparable with respect to the scope of operations, all the firms were of comparable size – less than $100 million in average total assets.

To detect significant differences between cooperatives and IOFs, the 1976-1987 time series of the median financial ratios in each industry were analyzed using the nonparametric Kruskal-Wallis test[15] ("one-way analysis of variance by ranks"). The test ranks the pooled median financial ratios in the different firm categories in each industry and forms the sums of the ranks for the pooled sample. If the rank sums, or the average scores, are sufficiently different between the IOF and cooperative categories, the test rejects the null hypothesis that the median financial ratios are the same for the two types of firms and establishes that, with a certain probability, the cooperatives and IOFs in a particular industry have different median financial ratios. Moreover, the average rank scores in each category can be used to

determine if the performance measures of cooperatives are greater or less than those of IOFs.

4. Results of Financial Ratio Analysis

The 1976-1987 time series of the six median ratios for cooperatives and IOFs in the two industries are presented in Figure 1. The thick solid lines plot the cooperative ratios and the broken lines plot the IOF ratios. Separate time series are shown for the two IOF industrial classifications to which the fruit and vegetable cooperatives are compared.

Panels a-c in Figure 1 present the three ratios related to profitability and capital structure – the rate of return to equity, the debt to equity ratio, and the ratio of operating earnings to interest. In the fruit and vegetable processing industry, the three ratios for the IOFs overlap the corresponding ratios for the comparable cooperatives. The Kruskal-Wallis test indicates that these three median ratios are not significantly different for the cooperatives and IOFs in the fruit and vegetable industry. In the dairy industry, the rate of return to equity (panel a) is also not significantly different between IOFs and cooperatives, but both the debt to equity ratio (panel b) and the earnings to interest ratio (panel c) are significantly different. By both ratios, the dairy cooperatives outperform the dairy IOFs – the debt to equity ratio is lower and the earnings to interest ratio is higher.

The three median ratios related to current operations (panels d-f in Figure 1) reveal significant differences in cooperative and IOF performance in both industries. The differences, however, are in

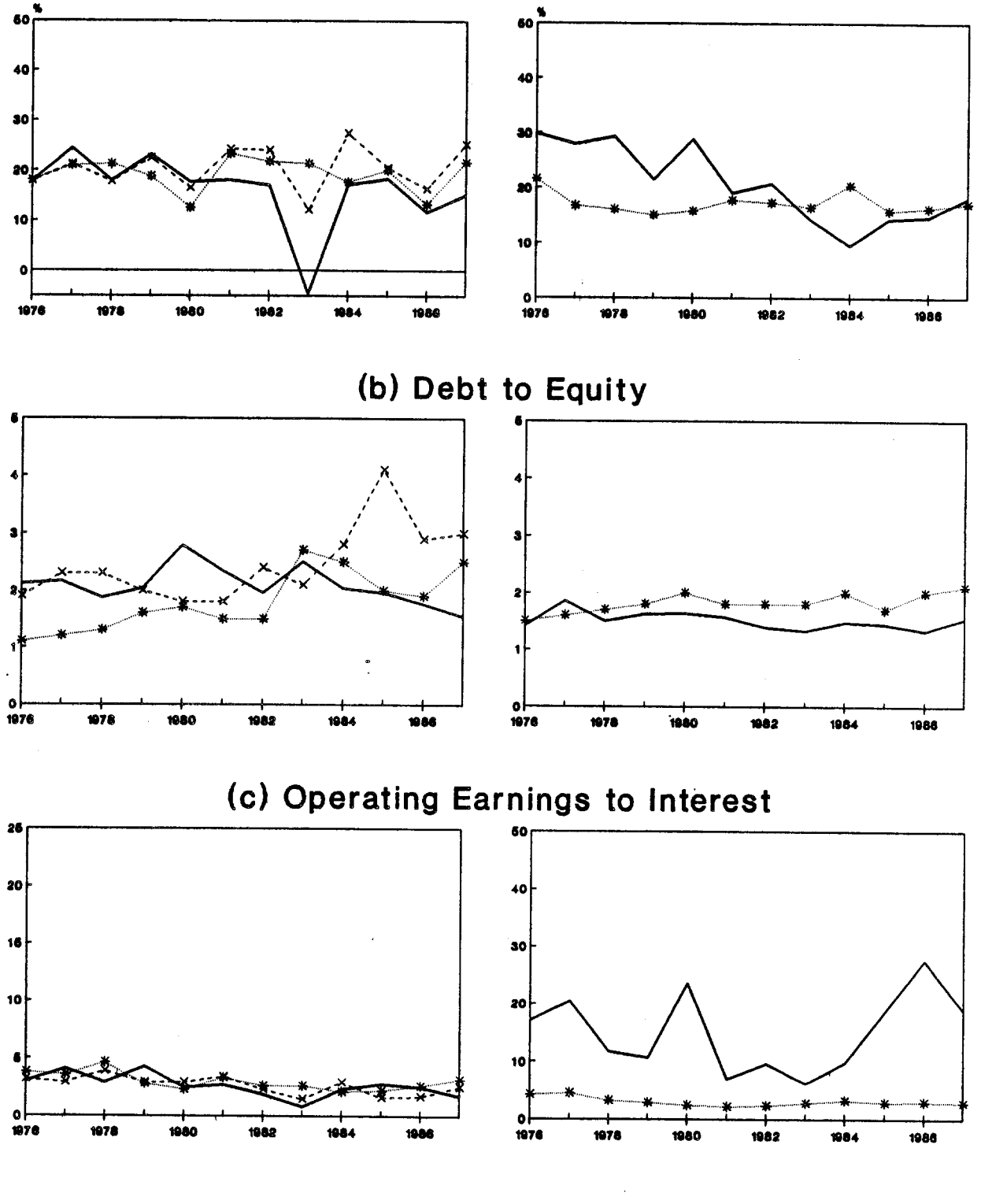
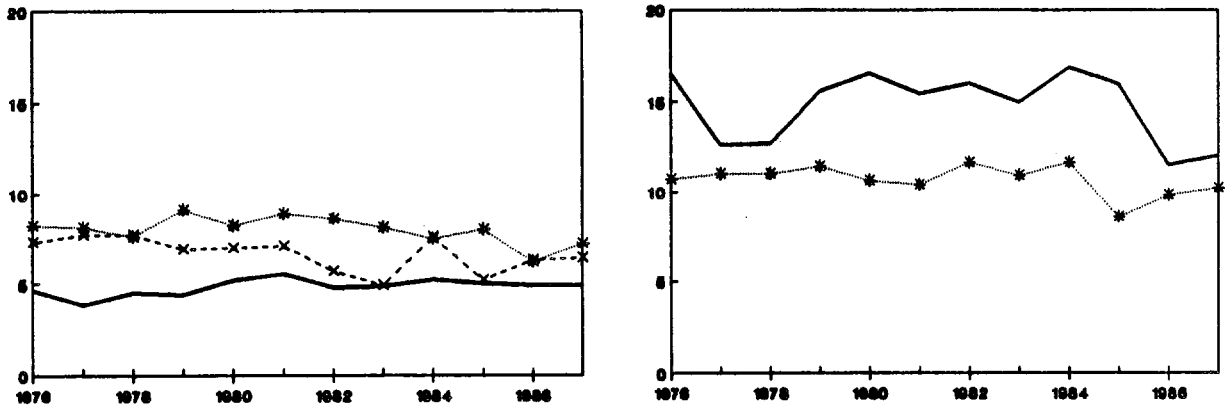
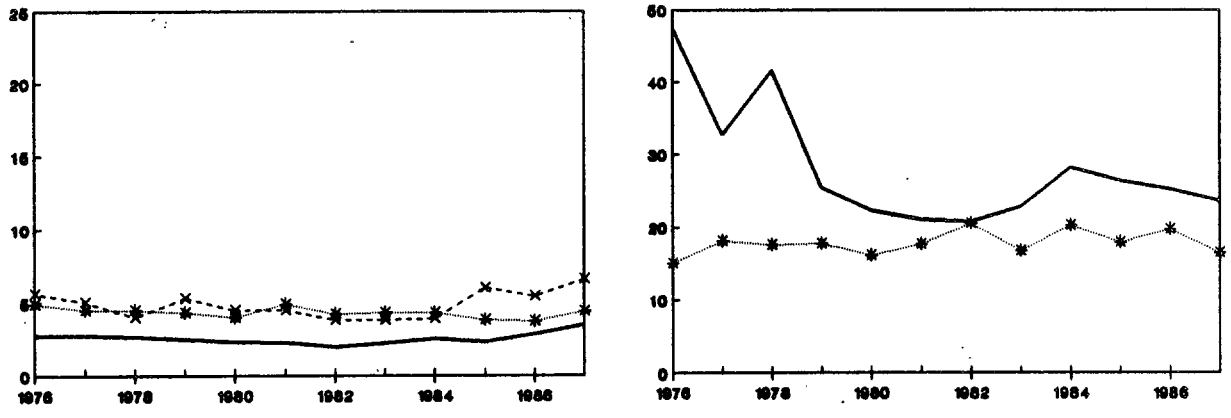


Fig. 1: Median financial ratios for cooperatives and IOFs in the fruit and vegetable and the dairy industries.

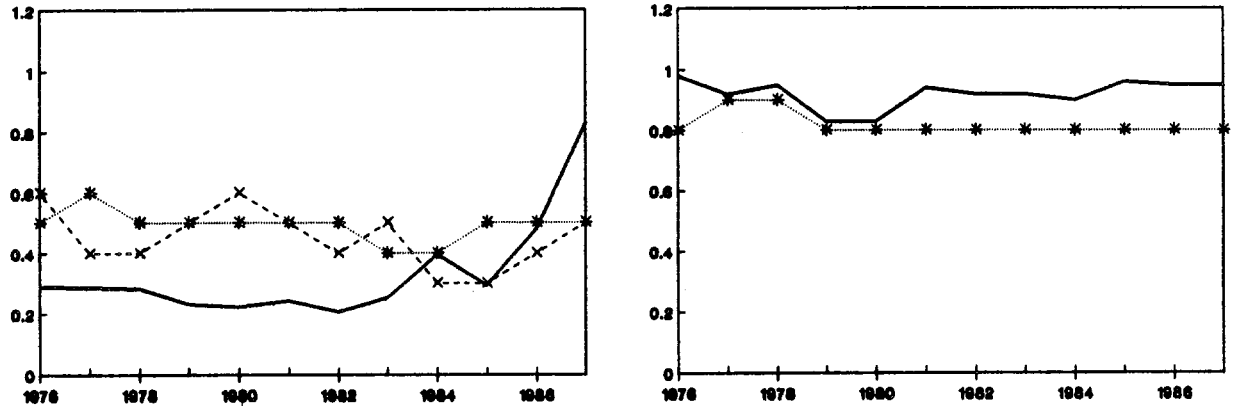
(d) Sales to Fixed Assets



(e) Inventory Turnover



(f) Liquid Current Assets to Current Liabilities



IOFS: FROZEN IOFS: CANNED & DAIRY COOPS

Fig. 1: Median financial ratios for cooperatives and IOFs in the fruit and vegetable and the dairy industries (continued).

opposite directions. The ratio of sales to fixed assets (panel d) indicates that fruit and vegetable cooperatives were consistently less efficient in utilizing their fixed assets to generate sales than IOFs, whereas the dairy cooperatives were more efficient than the comparable IOFs. The inventory turnover (panel e) indicates that fruit and vegetable cooperatives were carrying higher levels of inventories relative to sales than the comparable IOFs, whereas the dairy cooperatives were carrying lower inventory levels relative to sales than the dairy IOFs. The quick ratio, defined as the ratio of liquid current assets to current liabilities (panel f), was consistently higher for dairy cooperatives than for comparable IOFs, whereas for fruit and vegetable cooperatives it was lower than for IOFs over most of the years. These quick ratio comparisons indicate that dairy cooperatives maintained a higher liquidity level, while the fruit and vegetable cooperatives maintained a lower liquidity level compared to IOFs in their industry.

Table 2 summarizes the comparative performance findings. Contrary to the relationships suggested by the initial hypotheses (Table 1), cooperatives in both industries were not found to be inferior to comparable IOFs by the rate of return on equity, the debt to equity ratio, and the ratio of earnings to interest. In contrast, the three current operations measures observed for the fruit and vegetable cooperatives were consistent with the hypotheses that suggest lower performance for cooperatives than for comparable IOFs. The dairy cooperatives, on the other hand, performed significantly better than the dairy IOFs by the three current operations measures.

TABLE 2: **Comparison of cooperatives and IOFs in the fruit and vegetable and the dairy industries**

Ratio	Fruit & Vegetables	Dairy
Profitability and Capital Structure		
Rate of Return to Equity	Coops ≈ IOFs	Coops ≈ IOFs
Debt to Equity	Coops ≈ IOFs	Coops ≈ IOFs
Operating Earnings to Interest	Coops ≈ IOFs	Coops > IOFs*
Current Operations		
Sales to Fixed Assets	Coops < IOFs*	Coops > IOFs*
Inventory Turnover	Coops < IOFs*	Coops > IOFs*
Liquid Current Assets to Current Liabilities	Coops < IOFs*	Coops > IOFs*

* The corresponding ratios are significantly different between cooperatives and IOFs at 0.05 significance level by the Kruskal-Wallis test.

The results indicate that the previously observed poorer performance of the fruit and vegetable cooperatives compared to cooperatives in other industries[7] cannot be attributed solely to industry-specific factors. An examination of the distinctive features of cooperatives and IOFs in each industry is required in order to account for these differences.

It could be argued that the higher sales to fixed assets ratio and inventory turnover for the dairy cooperatives is caused by a higher proportion of fluid milk sales for cooperatives than IOFs. Fluid milk sales do not require as high a level of fixed assets as value added processing and, being perishable, generate a higher turnover rate than processed products. Indeed, as the dairy cooperatives shifted into more

value-added processing during the 1970s, the proportion of fluid milk sales declined and the inventory turnover decreased markedly (panel e). This trend, however, did not result in a corresponding decrease of the sales to fixed assets ratio (panel d). The advantage that dairy cooperatives exhibit relative to IOFs in generating sales from their fixed assets thus cannot be entirely attributed to fluid milk sales, and may be an indication of higher operating efficiency.

Fruit and vegetable processors, unlike dairies, deal with a variety of nonhomogeneous raw products. In this industry, cooperatives may be at a disadvantage because they have difficulties controlling the mix of the members' products, and inadequate product mix may cause the cooperatives to miss market opportunities. Cooperatives may also suffer from adverse selection of members, and the resulting effect on quality may prevent them from getting top prices for their products. In either case, the fruit and vegetable cooperatives are unable to maximize sales for a given asset base, which is reflected in lower sales to fixed assets ratios and lower inventory turnovers compared to IOFs.

Differences in the quick ratio between cooperatives and IOFs were analyzed by examining the balance sheet composition. Cooperatives in both industries were found to carry a higher proportion of current liabilities than the comparable IOFs. For cooperatives, these current liabilities were primarily funds owed for members' products. Fruit and vegetable cooperatives, however, were observed to have a substantially lower proportion of accounts receivable than the comparable IOFs, which accounts for their lower quick ratio. The dairy cooperatives, in addition to the higher proportion of current liabilities, also carried a

higher proportion of accounts receivable than the comparable IOFs. The relative increase in accounts receivable, however, was greater than the relative increase in current liabilities, which accounts for the higher quick ratio of the dairy cooperatives compared to IOFs.

The higher proportion of accounts receivable for the dairy cooperatives could result from relatively liberal credit terms to customers. The cooperatives apparently support this policy by delaying the payments to their members, as evidenced by their higher proportion of current liabilities. This credit policy would enhance their sales, which is consistent with the higher sales to fixed assets ratio observed for the dairy cooperatives. For the fruit and vegetable cooperatives, on the other hand, the lower proportion of accounts receivable compared to the IOFs may reflect more stringent credit terms than those adopted by the rest of the industry. More restrictive credit terms may result in lower sales and thus account in part for the lower sales to fixed assets ratio of these cooperatives.

5. Fixed Asset Growth

The lower sales to fixed assets ratio of the fruit and vegetable cooperatives relative to the comparable IOFs may be interpreted as a symptom of "overinvestment". An alternative way to assess overinvestment tendencies is by examining growth, as firms investing in excess capacity are likely to have relatively high fixed asset growth rates.

Mean annual growth rates of fixed assets were estimated separately for cooperatives and IOFs in the two industries (Table 3). Because of the limitations imposed by the available fixed-asset data for IOFs, the growth rates were estimated for the "average" firm in each category: the "average" firm fixed assets were determined by dividing the sum of fixed assets of the sample firms by the number of firms. The estimation was carried out by A semilogarithmic regression was ued to estimate the growth rates, assuming the standard compound growth model

$$FA_t = FA_0(1 + g)^t$$

where FA_t stands for fixed assets in year t and g is the mean annual growth rate. The explanatory variables in the regression included dummies for organizational structure (cooperatives or IOFs) and industry effects (fruit and vegetable processors or dairies).

The test for homogeneity of slopes indicated that there were no significant differences between the fixed asset growth rates of cooperatives and IOFs in each industry. Within organizational categories, the dairy cooperatives had a significantly higher mean growth rate than the fruit and vegetable cooperatives, but there were no significant differences in the growth rate between IOFs in the two industries.

Figure 2 plots the growth of average fixed assets over time for the dairy and the fruit and vegetable industries. The graphs visually confirm the estimated growth rates reported in Table 3: the growth rates are not dramatically different between cooperatives and IOFs in each industry. Therefore, the lower fixed asset utilization of the fruit and vegetable cooperatives is currently the only evidence of overinvestment by food-processing cooperatives.

TABLE 3: **Mean Annual Growth Rates of Fixed Assets for Cooperatives and IOFs in the Fruit and Vegetable and the Dairy Industries estimated from regression (1)**

	Cooperatives	IOFs
Fruit and Vegetable*	7.5%	9.6%
Dairy	11.1%**	9.6%

* The two IOF industry classifications representing canned and dried fruits and vegetables and frozen fruits, vegetables, and juices were both included in the regression, as a preliminary analysis showed that their asset growth rates were not significantly different.

** Significantly different at 0.05 level from the estimated growth rate for the fruit and vegetable cooperatives by the test for homogeneity of slopes in dummy variable regression. All other growth rates are not significantly different from one another at 0.05 level.

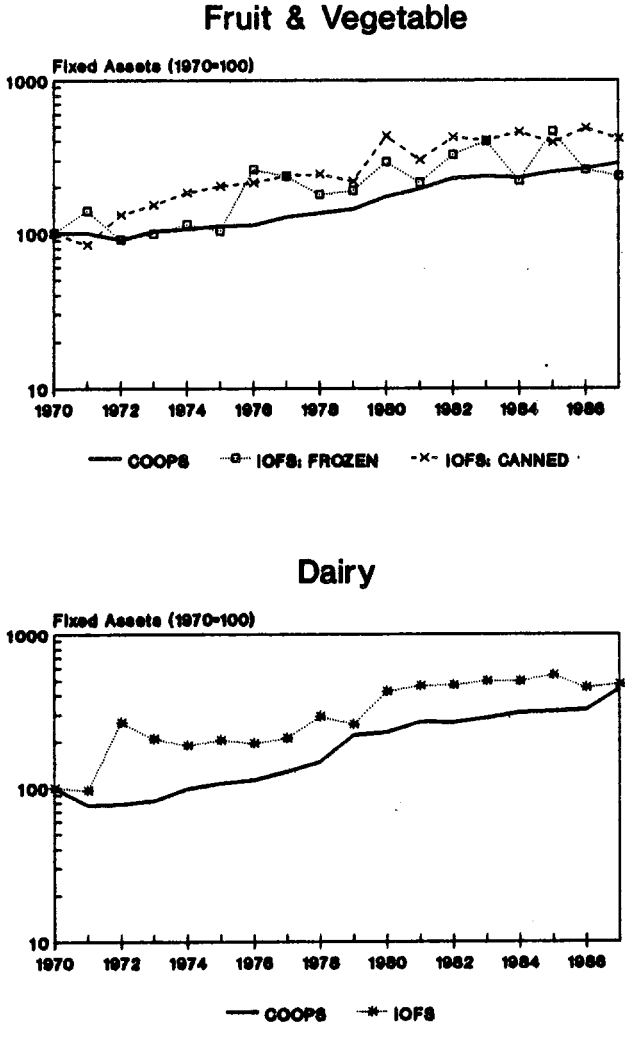


Fig. 2: Growth of fixed assets of cooperatives and IOFs in the fruit and vegetable and the dairy industries (1970 = 100).

The similarity of asset growth rates between cooperatives and IOFs is also relevant for the interpretation of the debt to equity findings (see Sec. 4 and Fig. 1, panel b). Although cooperative borrowing levels are lower than initially hypothesized, cooperatives achieved the same growth rates as the comparable IOFs, without visible signs of capital starvation. Thus, lack of investment opportunities or externally imposed restrictions on borrowing cannot by cited to explain why the cooperative debt was found to be lower than expected.

6. Conclusions

The performance comparisons between US cooperatives and IOFs in two food industries do not provide strong evidence in support of the initial hypotheses which suggested that cooperatives could be expected to exhibit low profitability, moral hazard behavior, and overinvestment in fixed assets and inventories. The rate of return to equity in cooperatives was not found to be significantly different from that of IOFs in the comparable industries; the debt to equity and the earnings to interest ratios for cooperatives were not found to be higher than for the comparable IOFs; and no compelling evidence for overinvestment was found for cooperatives in either industry.

The observation that the profitability of cooperatives was better than expected and comparable to that of IOFs cannot be attributed to a low equity base in cooperatives. The proportion of equity of the cooperatives was not found to be lower than that of the comparable IOFs. In fact, the dairy cooperatives were observed to have a significantly lower debt to equity ratio than the dairy IOFs, which indicates a

relatively large equity base. These results counter the view that cooperatives are "equity bound."

The finding that cooperatives, while maintaining the same growth rates as IOFs, do not rely more heavily on debt financing and do not maintain lower safety margins against default is similarly inconsistent with the hypothesis of moral hazard behavior in cooperatives.

On the overinvestment issue, the findings conclusively indicate that the dairy cooperatives are not overinvested: they utilize their fixed assets more efficiently in generating sales than the comparable IOFs, while maintaining comparable long-term growth rates. The conclusions are not as clear with regard to the fruit and vegetable cooperatives. Their relatively low sales to fixed assets ratio is a symptom of overinvestment. However, there has been a significant improvement in this ratio over time relative to the rest of the industry (see Figure 1, panel d). The findings suggest that the extent of overinvestment, although initially present, has diminished over time as cooperatives increased the utilization of their asset base to generate sales. The initial overinvestment may be a reflection of the indivisibility of new investments in fixed assets made in the early 1970s as the fruit and vegetable cooperatives moved into more value-added processing. The entry into new product lines may have involved unavoidable excess capacity, or "overinvestment," but the utilization of capacity improved as sales increased over time. The lack of clear evidence of overinvestment in the fruit and vegetable and the dairy cooperatives conflicts with the findings of Sexton[8], who observed overinvestment for cotton ginning cooperatives. This may be another

reflection of industry effects that have been previously observed to produce differences in various performance measures among cooperatives.

The relatively conservative capital structure and lack of overinvestment on the part of cooperatives do not support out the hypothesis of cooperative susceptibility to moral hazard behavior. The immobility of cooperative equity and the members' largely undiversified investment in the agricultural sector may cause cooperative members to be more risk averse than IOF shareholders with their more liquid, diversified portfolios. As a result, pressure exerted by members may counteract in part the hypothesized tendency of cooperatives to accept higher risks.

Lang, Babb, Boynton, and Schrader[16] report in their survey that policy makers and university economists felt that there were significant differences in goals between cooperatives and IOFs. On the other hand, managers of cooperatives and IOFs ranked their goals essentially the same. The findings of this paper suggests that the standards of financial analysis in the business community may have "forced" cooperatives to adopt virtually the same goals as investor-owned firms, in line with the views expressed by the surveyed practitioners.

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