Post-Merger Performance of Agricultural Cooperatives

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Abstract

Agricultural cooperatives are participating in mergers, acquisitions, strategic alliances, and joint ventures at a record pace. While post-post merger performance has been examined extensively for investor owned firms, this has not been the case for agricultural cooperatives since these firms do not have an explicit profit motive nor publically traded stock. Results from a three-stage econometric model reveal that a major motivation for cooperatives to engage in these activities is to circumvent unique capital constraints, thus resulting in improved profitability. Furthermore, the decision to merge and financial performance are jointly endogenous, with profitability positively influenced and sales growth negatively influenced by the likelihood of merger.

Key words: acquisitions, capital constraints, cooperatives, financial performance, joint ventures, mergers, probit modeling, strategic alliances

Post Merger Performance of Agricultural Cooperatives

Agricultural cooperatives are combining their businesses through mergers, acquisitions, joint ventures or strategic alliances at a record pace (figure 1). Post-merger performance of publicly-traded firms is relatively easy to measure, given public access to detailed financial statements, the observability of share prices, and standards for pricing corporate assets via the capital asset pricing model (CAPM) or similar pricing models (Jensen and Ruback; Rau and Vermaelen; Franks, Harris, and Titman, and many others). However, cooperatives are not publicly traded, do not have an explicit profit motive, nor are they obligated to share financial information with the general public. Consequently, assessing the post-merger performance of cooperatives is not only empirically, but also conceptually challenging. Perhaps this explains why cooperative mergers have avoided analytic scrutiny until this point.

Although cooperatives are not subject to the same shareholder discipline as publically traded firms, owner-members often depend upon their cooperative to be an efficient extension of their overall operation. Whether their activities take the form of further processing or packaging basic commodities, pooling risks, providing economies of scale, or serving as a countervailing source of market power, for a merger to make economic sense it must improve a cooperative's economic viability. Being able to measure post-merger performance is important not only for the role that cooperatives play in their members' firms, but also due to the value of assets involved. Moreover, because most cooperatives must compete for patronage with investor owned firms (IOFs), their performance both influences and is influenced by for-profit rivals. Despite the fact that cooperatives' objectives differ from IOFs, many of the metrics of managerial performance remain the same. Sales growth, cost per unit of output, and operating profit are all critical measures of performance that are

capitalized directly into the value of a publicly traded firm, or indirectly into the value of private firms that own cooperatives.[1]

The primary objective of this research, therefore, is to determine whether cooperatives that participate in any type of consolidation activity - merger, acquisition, strategic alliance, or joint venture - perform better financially than those that do not. In achieving this objective, however, the research will also provide insights into a number of secondary objectives. Namely, this study will determine whether cooperatives that are able to remove or relax the capital constraint they face through some sort of combination receive the benefits they intended. Second, the results of this study will also assess the relative importance of other financial attributes (liquidity, leverage, efficiency, profitability) in predicting the likelihood of a consolidation. Finally, this research will determine whether benefits, if any, that derive from cooperative M&A activity flow more to the top- or bottom-line of a cooperative's financial statement. With quantitative evidence on each of these questions, cooperative managers and members will be in a better position to assess the likelihood that a particular merger or other form of combination will help to achieve overall firm objectives.

Economic Model of Cooperative Performance

Despite the vast amount of empirical research concerning the returns to shareholders of publically traded firms involved in either a merger or tender offer, there remains considerable debate regarding whether the intermediate-term returns to the acquiring firm's shareholders are indeed negative or positive. While a target firm's shareholders are likely to earn abnormally positive returns, acquiring firm shareholders tend to receive either zero returns or significantly negative returns (Dodd and Ruback; Langetieg; Asquith; Dodd; Bradley, Desai, and Kim, 1983; Jensen and Ruback; Franks, Harris, and Titman; Agrawal, Jaffe and Mandelker; Loughran and Vijh).

In general, however, it is likely that poor returns performance also reflects similarly disappointing financial performance. According to this metric, there is also considerable evidence that mergers or acquisitions fail to generate the benefits expected by shareholders (Ravenscraft and Scherer; Herman and Lowenstein). However, Healy, Palepu, and Ruback find that merged firms experience improved asset productivity and operating cash flows, and moreover, that this improvement is rewarded with super-normal shareholder returns.

In the absence of tradable marketing rights or a market for cooperative equity, there is no way to objectively value a cooperative, so we must necessarily use the more indirect route to determine whether mergers improve or harm performance through the use of financial performance measures. Implicitly, therefore, we assume that improved profitability and sales growth means that owner-patrons regard the cooperative as a more valuable part of their own firm's operations as a result of a merger. Thus, stakeholders in a cooperative must expect some form of economic gain from combining with another in order to give their ascent.

Typically, the justification given for mergers, acquisitions, joint ventures, or strategic alliances among publically traded firms lies in either improved operational efficiencies or through strategic or marketing gains. In their review of the studies completed prior to the early 1980s, Jensen and Ruback find that any positive wealth effects that result from mergers are due to the realization of untapped economies of scale or synergies and not by the creation of market power. Other potential sources of operational gain include efficiencies created through vertical integration, access to key personnel or organizational resources, or through a reduction in agency costs (Klein, Crawford, and Alchian). Furthermore, if a cooperative is able to link to another cooperative or IOF that offers a complementary product line, it will be able to improve both category and geographic market coverage. Such marketing or strategic synergies are often cited as a source of gains from mergers among publically

traded firms (Bradley, Desai, and Kim, 1988; Agrawal, Jaffe, and Mandelker). Acquiring additional production capacity or making better use of existing capacity may indeed be key sources of such scale economies. However, in contrast to evidence cited by Jensen and Ruback, gaining access to a strong brand, removing a rival from the market, or gaining leverage with input suppliers or buyers, increases in market power may be obtained directly by merging with or acquiring another cooperative in the same market. Therefore, potential gains through cooperative mergers suggest that cooperative owners have all the same motivations to merge as those of publically traded firms, plus some that are unique to cooperatives.

In particular, cooperatives are likely to find themselves uniquely capital constrained relative to publically traded firms such that a major impetus to engage in some form of consolidating activity is to relax the capital constraint. Cooperatives are likely to be capital constrained for a number of reasons. First, few issue equity to the public because to do so would be to sacrifice control over the cooperative to outside investors who are not necessarily patrons. Second, although many cooperatives are highly profitable on an operating basis, the cooperative archetype is not-for-profit. Third, any surplus that a cooperative does earn is eventually returned to members through patronage refunds. Thus, if a cooperative is capital constrained, it is not likely to be able to be as profitable as it would otherwise for both operational and marketing reasons.

In summary, a number of hypotheses that can be tested with an appropriate econometric model. First, the likelihood that a cooperative participates in some form of consolidation activity increases in the implicit value of its fixed, and presumably constraining, capital base. Second, if capital is indeed a constraining factor, cooperative profitability is likely to rise as this constraint is relaxed. Third, post-merger cooperative performance is likely to improve as a result of operational efficiencies created through better asset management, economies of scale, utilizing complementary assets, access to

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critical organizational resources or other synergies. Fourth, cooperative owners may also benefit

through strategic or market power effects. Although IOFs derive little value from this source,

cooperatives are often formed for the sole purpose of creating a vehicle for countervailing buyer or

seller market power so are likely to combine for this purpose as well. We test each of these

hypotheses with the econometric model and data described in the next sections.

Econometric Model of Performance Measurement

In order to test the hypotheses that follow from the conceptual model above, we develop a

three-stage econometric model. In the first stage, the shadow value of the capital constraint facing

each cooperative, is estimated using a dual restricted profit function. Of the many candidates for a

suitable functional form, the Generalized Leontief (Diewert) has many desirable attributes and has

also been applied often with acceptable results (see Lopez for an example). Specifically, the GL

offers the benefits of linear homogeneity without normalization, while both symmetry and convexity

can be tested and imposed.[2] Further, it is a flexible functional form, so approximates any arbitrary

alternative. In our case, the profit function for a representative cooperative can be written as

(Morrison):

$$\Pi_c(p \mid K, \Omega) = \sum_{i=1}^{N} \sum_{j=1}^{M} \gamma_{ij}(p_{ic} p_{jc})^{1/2} + \sum_{i=1}^{N} \sum_{l=1}^{L} \eta_{il} p_{ic} K_{lc}^{1/2} + \epsilon_{1c} \tag{1}$$

where p is a vector of netput prices ($p_i < 0$ = input, $p_i > 0$ = output), K is a vector of fixed factors, and

ϵ_{1c} is an iid random variable. This function is estimated over all cooperatives (c) and time periods as

written above. Of the parameters in this system, however, we are primarily interested in the particular

value of η. Taking the derivative of (1) with respect to K provides an expression for the shadow

value of capital for each cooperative:

$$\lambda_c \; ' \; \frac{\text{MB}_c}{\text{M}K_i} \; ' \; (1/2) \sum_{i'1}^{N} \, "_i p_i K_c^{\&1/2},$$

(2)

which is a firm-specific measure of the value of the c cooperative's capital constraint. This estimated

value is then substituted into the second-stage binary choice model of merger-participation.

Specifically, the second-stage binary choice models indicate participation in either a merger,

an acquisition, a strategic alliance, or a joint venture. Although there may be somewhat differing

reasons for participating in each, they share a common promise of allowing each firm to better exploit

shared organizational resources, personnel, technology, markets, and most importantly, capital.

Econometrically, aggregating across these activities also provides for more efficient estimates than

would otherwise be the case, especially given the relatively small data set available to us. In the data

used for this study, some cooperatives were involved in more than one merger or more than one

strategic alliance in any given year. However, there were too few of these multiple-activity

observations to permit efficient estimation of a technically-correct Poisson or other type of count-data

model. All of our results, therefore, should be interpreted as estimates of the recognition of a need to

participate in these activities rather than as measures of the intensity of their actions. Because the

model is within the class of qualitative response models, we estimate the probability that a given

cooperative was involved in a merger, acquisition, joint venture, or strategic alliance within a Probit

framework.[3] Formally, the probability that a cooperative is involved in one of these activities is

written as:

$$P(y_c \; ' \; 1) \; ' \; P(y_c^{\zeta} \; \& \; \text{M}(\zeta x_{ct}) > \epsilon_{ct}),$$

(3)

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where y_c^C is a latent index variable measuring the desire to participate, $\epsilon_{ct} \sim N(0,1)$, and $M(\Theta x_{ct})$ is the normal distribution function defined as:

$$M(\Theta x_{ct}) \prime \int_{\&4}^{\Theta x_{ct}} \left(\frac{1}{\sqrt{2\pi}}\right) \exp(\&z^2/2)\,dz.\tag{4}$$

The parameters of (4) are then found by maximizing the likelihood function:

$$L(\Theta) \prime \sum_{i\prime 1}^{N} [y_{ct}\ln(M(\Theta x_{ct})) \% (1 \& y_{ct})\ln(1 \& M(\Theta x_{ct}))],\tag{5}$$

over N observations in the pooled time-series / cross sectional data set. Extending this model to allow for unobserved heterogeneity across panel members requires redefining the error structure above to consist of a component that varies by observation, and one that varies only by the relevant group, or cooperative in our example:

$$\epsilon_{ct} \prime u_c \% v_{ct}, \quad Var[u_c\%v_{ct}] \prime \sigma_u^2 \% \sigma_v^2, \quad D_{\epsilon_{ct},\epsilon_{dt}} \prime \sigma_u^2/(\sigma_u^2\%\sigma_v^2).\tag{6}$$

In this model, x_{ct} includes proxy variables for each of the economic motivations to combine (Jensen and Ruback), namely to improve liquidity, increase asset-management efficiency, gain market power, respond to mergers of rival firms, or take advantage of rapid economic growth or low interest rates, in addition to the fitted shadow value of capital from the first stage model, ϑ_c. Our objective here, however, is to determine the effect of cooperative consolidation on financial performance.

Consequently, the third-stage consists of a regression model of profitability (return on assets) and sales growth as functions of a cooperative's financial and operating characteristics and a binary

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variable indicating whether or not the cooperative has engaged in some form of combinatorial

activity.[4] Estimating both of these functions in a simple regression framework, however, will result in

biased and inconsistent parameter estimates. There are two reasons for this expectation. First, the

merger binary variable is likely to be endogenous, so the regression residuals are correlated with the

performance dependent variable. Second, sales growth is likely to be an important factor in

determining profitability, and vice versa, so these variables are also likely to be endogenous as well.

Therefore, we address the first source of bias by adopting Heckman's two-stage correction procedure

in which we include the inverse Mills ratio calculated from (5) as a regressor in each third-stage

equation. To account for the joint endogeneity of sales growth and profitability, we estimate both

equations using an instrumental variables estimator. In general notation, the structure of the third-stage

model is written as:

$$
\begin{aligned}
q_1 &= \beta_1' z_1 + \gamma_1 \hat{q}_2 + \delta_1 [N(\theta' x)/M(\theta' x)] \\
q_2 &= \beta_2' z_2 + \gamma_2 \hat{q}_1 + \delta_2 [N(\theta' x)/M(\theta' x)]
\end{aligned}
\tag{7}
$$

where N is the normal density function, z_i are vectors of exogenous financial and operating variables,

and $\hat{q}_i$ is the fitted value of performance measure i. These fitted values are calculated from a first-

stage regression of each metric on a set of instrumental variables, which includes all exogenous and

pre-determined variables in the model. Although this correction provides consistent parameter

estimates, the standard errors are not because each of the fitted performance measures contain a degree

of measurement error. This measurement error arises because each of the $\hat{q}_i$ variables are estimated

and not observed. Consequently, we correct for this inconsistency using the asymptotic covariance

matrix described in Greene (1997). All three stages of this procedure are estimated with the

cooperative financial statement data set described in the following section.

Data and Methods

To explain the financial motivations behind cooperative merger and acquisition activity, this study uses two separate data sets: financial data for all agricultural cooperatives and a qualitative chronicle of their transactions. First, descriptive data on firm identities, and the nature of each transaction was obtained from a variety of data vendors and media sources over the sample period 1980 - 1998. The Food Institute provides profiles of all mergers in the food and beverage industry in their *Mergers and Acquisitions* publication. This information is combined with reports of activity among cooperatives in *Rural Cooperatives*, published by the USDA, and from a wide variety of trade media accessed via the Lexis / Nexis database tool. Once cooperatives involved in these transactions are identified from this database, detailed financial and operating descriptions of the participating firms are obtained from RBS-USDA *Top 100 Cooperatives* database. In order to ensure confidentiality, the identities of the merging cooperatives are removed from this data and the data are provided only in ratio form. The financial data in the *Top 100* database is used both in the structural merger model and in estimating the shadow value of capital.

In the first-stage, estimates of a restricted profit function require both a measure of profitability and data on variable input prices. Although financial statements provide a relatively direct measure of the former (e.g., return on assets), they include only values of various expense categories. Therefore, output prices are obtained on an annual, sectoral basis from the Bureau of Labor Statistics *Producer Price Index* database, while input prices are from the same source, but common across all cooperatives. Real interest rates, a measure of the cost of capital, are obtained from the US Federal Reserve Board. In the profit function model, each cooperative's stock of capital is measured by the ratio of long-term debt to assets for each cooperative.

The second-stage model, uses both firm-specific data from these financial statements and the Federal Reserve's macroeconomic data. Growth in real gross domestic product is calculated from Federal Reserve data, while the value of U.S. agricultural output is from the USDA *Agricultural Statistics* database on a sectoral basis. S&P 500 stock index data are obtained from Commodity Systems Incorporated. The number of mergers, acquisitions, and other transactions among cooperatives and agribusinesses in general are from the transactions database assembled from the Food Institute *Mergers and Acquisitions* data and the other sources described above.

Given that the first stage profit function model is estimated with pooled time-series, cross-sectional data, we test for fixed versus random effects in order to determine the appropriate estimation technique. By substituting the shadow value of capital in each activity-specific discrete choice model, we are then able to determine the factors that cause firms to either merge, acquire, form a strategic alliance, or to participate in a joint venture. In order to obtain consistent parameter estimates in the third-stage model of post-merger cooperative performance, we use Heckman's method of correcting for the presence of "endogenous dummy variables," as explained above. Tests for the appropriateness of this approach consist of simple t-tests on the Mill's ratio in each of the performance equations. Further, these parameters also provide the means by which we test both the statistical and economic significance of consolidation activity on cooperative performance. In the profitability equation, a positive parameter estimate suggests that merging cooperatives perform better than those that do not, while a positive estimate in the sales growth equation indicates that merging firms are likely to grow faster, holding profitability constant. The next section presents and discusses the results of all model selection and hypothesis tests.

Results

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The shadow value of capital, which is estimated from the restricted Generalized Leontief profit function results shown in table 1, has a mean value of -0.074 with a standard deviation of 0.339. The minimum value is -1.819 and the maximum value is 1.657, and similar to the financial performance measures, the shadow value of capital is unique to each firm. Because of the range and diversity of cooperatives in our data set, it is not surprising to see considerable variability in this measure. Although concavity of the profit function in the quasi-fixed input requires positive shadow values for all observations, these violations represent very plausible departures from the profit maximization axioms that underlie duality. Therefore, no attempt was made to constrain these values to be uniformly positive. Further, any constraints placed on this variable would likely introduce bias to the estimated relationships between the shadow value of capital and the probability of observing each of the types of consolidation or restructuring transaction that we consider.

To determine the validity of the first-stage estimates, we also assess the first-stage profit function model in terms of its goodness-of-fit, consistency with the restrictions implied by profit maximization, and the plausibility of the shadow value estimates. Although our data consist of a panel of agricultural cooperatives, the very fact that the *Top 100* frequently merge or acquire other cooperatives means that many members of the data set often disappear or are created anew at some point in the sample period. Therefore, to allow for any idiosyncratic variations in profitability, we hypothesize that a panel-data estimation method will be preferred to a classical regression model with a single, fixed constant. Consequently, we test a maintained fixed-effects model against alternatives of a classical regression model and a random-effects panel model. Because the classical model is nested within the more general fixed-effects specification, we test the null hypothesis of no panel effects using a likelihood ratio test. As shown in table 1, the likelihood ratio chi-square test statistic value is 285.865 with 85 degrees of freedom. Thus, we reject the classical regression specification in favor of

a panel data approach at a 1% level of significance. Next, we compare the fixed-effects model with a maintained random-effects model using a Hausman specification test. With 11 degrees of freedom, the chi-square test statistic value is 141.0, again indicating rejection of the random-effects alternative in favor of the fixed. Therefore, all subsequent regularity tests are based upon a fixed-effects profit function model. As well, tests for heteroskedasticity and autocorrelation fail to reject the null in either case. Because this stage includes an estimated regressor, the estimated standard errors are inconsistent even though the parameter estimates are indeed consistent. Consequently, we adjust our standard-error estimates using White's correction method.

[table 1 in here]

Lopez describes the curvature conditions that must be met by a Generalized Leontief dual profit function. Essentially, convexity in prices requires the Hessian matrix of $B(p \mid K, 2)$ to be positive semi-definite. A sufficient condition for this is that all members of the main diagonal be greater than zero. Further, a restricted profit function must be concave in the quasi-fixed factor, defined here to be the ratio of long-term debt to assets. Concavity in a single quasi-fixed input requires the second derivative of the profit function to be non-positive at all observations. Although our profit function meets neither condition at all observations, all but one element of the main diagonal of the Hessian are positive at the data means. With respect to the capital constraint, negative values, or violations of concavity, are interpreted as cooperatives for which the constraint is non-binding. To preserve the continuous nature of this variable, however, we chose not to restrict negative observations to zero.

An estimate of the shadow value for each cooperative is then substituted into the second-stage Probit model. We also include binary indicators to control for any unobserved heterogeneity between industrial sectors, but reject a random-effects specification across individual cooperatives. All of the estimated results, therefore, are to be interpreted as conditional on the type of cooperative, whether

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dairy, input supply, cotton, grain, diversified, fruit and vegetable, sugar or meat and poultry.[5]

Hypotheses regarding the determinants of any type of consolidation activity (mergers, acquisitions, strategic alliances, and joint ventures) suggest that the probability of a cooperative participating in any given year is a function of its efficiency, profitability, liquidity, growth, and degree of financial leverage as measured by its total asset turnover ratio, return on assets, current ratio, rate of growth of sales and debt-to-assets ratio, respectively. External factors include a measure of aggregate economic activity (rate of GDP growth), the cost of financing an acquisition (interest rate on 30 day T-bills), the rate of market value growth of IOF rivals (rate of appreciation in the S&P 500 index), and an indicator of any likely "merger wave" activity in the agribusiness sector in general as measured by the total number of mergers among all agribusiness firms. Table 2 shows the parameter estimates and the associated marginal effects of each variable.[6]

[table 2 in here]

Comparing the fit of this model to a null-model provides a chi-square test statistic of 103.332, so we easily reject the null hypothesis that the parameters of this model are jointly equal to zero. Among the internal factors, asset management efficiency and growth appear to be the only significant drivers of consolidation activity, although the latter is only statistically significant at a 10% level. A 1% increase in the sales growth rate, however, generates nearly a 10% increase in the probability that the cooperative is involved in some form of transaction, so this effect appears to be economically significant. Stronger still is the impact of external economic factors, particularly the cost of capital and the strength of equity-market prices. As hypothesized, higher interest rates reduce the probability that a cooperative will either merge with or acquire another. Although this result would be expected for IOFs as well, the effect is especially strong for cooperatives because any transaction is likely to be financed with debt. Higher equity prices are also associated with increasing rates of cooperative

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consolidation. Whereas IOFs use inflated equity prices as currency to facilitate mergers, this option is not available to cooperatives, so the effect that is captured here is likely an indirect one. Namely, as IOF rivals use high equity valuations to consolidate at a faster pace, cooperatives are forced to seek some form of partnership or lose competitiveness. This market driven rationale for combining operations is weakly supported by the positive point-estimate of the effect of "total agribusiness mergers." Most importantly, however, our primary hypothesis regarding the effect of capital constraints on the likelihood of consolidation is strongly supported by these results. In fact, the shadow value of capital is the most statistically significant variable driving M&A activity among cooperatives. Given that the value of 8 represents the marginal increase in profitability for a one unit change in a cooperative's long-term debt-to-asset ratio, the estimate in table 1 means that we expect a 6% rise in the probability of some form of transaction for one unit rise in the marginal value of capital. The principal insight of this paper is, however, that consolidation and financial performance are indeed jointly endogenous, as shown in the third-stage of our model.

Particularly for cooperatives, performance cannot be defined in terms of a single metric as sacrifices can be made in one area for improvements in another. For example, restructuring may improve profitability, but often at the cost of slower sales growth, which, of course, may lead to lower profitability in the future. For this reason, we define cooperative performance both in terms of profitability as measured by return on assets and sales growth. Table 3 shows the results of estimating the third-stage profitability model using Heckman's endogenous dummy approach, while table 4 presents the same results for the sales growth model. Consistent with expectations, cooperatives that are more efficient, both in terms of asset turnover and cost-of-goods-sold, and more liquid than others are also more profitable. Because many are active in both input supply and marketing, cooperatives also benefit from sector-wide prosperity, as indicated by the fact that profitability rises in the value of

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agricultural output. Even after controlling for the value of output, however, these results show that there is significant variability in profitability among cooperatives in different sectors. Consistent with our hypothesis that capital constraints provide a key motive for consolidation, firms with lower debt-to-asset ratios tend to be more profitable when we control for the probability that a firm merges in any given period. These results also support the notion that our two performance measures are, to a certain extent, substitutes in that cooperatives with faster sales growth tend to be less profitable.

[table 3 in here]

Most significantly, however, these results also support our central hypothesis that consolidation reduces the extent of any capital constraint, thereby allowing a cooperative to become more profitable. This is important given the weight of the evidence cited above that finds merger activity to be detrimental to financial performance. Clearly if the same negative effects of mergers - overlapping bureaucracies, redundant operations, or product-line cannibalism - exist for cooperatives as for IOFs, the benefits from gaining access to a better capital base dominate. The negative impact of sales growth should be of some concern, however, because this is both one aspect of firm performance and is often cited as a rationale behind cooperative mergers.

As is evident from the results in table 4, few of the financial variables used to explain performance have a significant impact on sales growth. This is perhaps not surprising as top line growth is perhaps the least effected by internal decisions as opposed to conditions in the industry and economy more generally. One decision is, however, critical to sales growth - the decision to combine with other cooperatives or form alliances with either cooperatives or IOFs. The negative impact of consolidation is, upon first consideration, unexpected given the anecdotal evidence from news releases that cite growth as a primary reason for the perceived necessity to get together. There are two potential explanations for this result. First, the regression parameter is interpreted as the partial

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impact of merger activity on sales growth while holding profitability constant. Therefore, it may be the case that among highly profitable cooperatives, those that were forced to merge to achieve this goal were first forced to cut back on advertising, promotion, or other market-penetration strategies. Second, despite the results from IOF studies that show market power to be a minor reason for M&A activity, it may also be the case that cooperatives merge or acquire rivals in order to absorb excess capacity and improve their ability to either control supply or to negotiate with large investor owned clients. One would hope that this is not true, but it is a result that is consistent with our data and results.

[table 4 in here]

From these results, we can draw several important implications for cooperative management and oversight. First, the motives for consolidation among cooperatives include a markedly different set of factors compared to IOFs. While issues of control and managerial largess dominate the discussion for publicly traded firms, cooperatives appear to seek capital adequacy in negotiating merger deals. Second, successful mergers, acquisitions, strategic alliances or joint ventures tend to increase cooperative profitability, but not from the source that is typically expected. Rather, because these transactions are consummated to provide capital to one of the parties, most of the benefits that result come from this source rather than through the more usual synergistic, scale economy, or managerial skill arguments. Third, profitability tends to come at the expense of growth. Whether through retrenchment, or through a desire to enhance market power, more profitable cooperatives combine operations, and then become smaller.

Summary and Conclusions

Agricultural cooperatives are experiencing an increase in the number of mergers, acquisitions,

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and other consolidation and restructuring activities similar to that seen among IOFs. Regardless of the motivation, the final outcome of any of these activities would be regarded *a priori* to provide positive benefits that should eventually be reflected through the value of the companies' stock or through common financial performance measures. While a generally accepted benchmark exists for determining the post-merger performance of IOFs, namely by comparing stock market return to that expected from some asset pricing model, assessing post-merger performance of agricultural cooperatives is not as straightforward. Most agricultural cooperatives do not issue stock to the public and thus are not required to disclose financial statements and other information commonly required of publically held corporations. Despite these complications, given the vital role that agricultural cooperatives play in the U.S. agricultural sector, it is imperative to determine the effects of any consolidation or restructuring activity - in particular their eventual influence on financial performance.

Our findings show the capital constraint faced by a cooperative is the most significant factor motivating cooperatives to partake in mergers, acquisitions, joint ventures, and strategic alliances. Thus, if a cooperative engages in these activities, they are likely to realize greater financial flexibility allowing them to participate in activities that contribute to greater operational efficiency, increased market power, or both. Furthermore, the decision to engage in any of the aforementioned activities is jointly endogenous with financial performance. While efficient and liquid cooperatives are likely to be more profitable, the easing of capital constraints through mergers or alliances with other firms is also found to have a positive effect on profitability. Interestingly, however, the likelihood of these restructuring activities is found to have a negative effect on sales growth. Thus, while certainly not completely mutually exclusive, profitability tends to be sacrificed for sales growth increases and vice-versa. It may very well be the case that this is a temporary phenomenon since advertising, sales, and

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related budgets are likely scaled back to engage in the merger initially thus negatively impacting sales. Furthermore, sales are more directly effected by factors exogenous to firm level decision making (e.g., economic conditions, consumer trends, etc.). Thus, cooperative members, managers, and policy makers need to be cognizant of the potential tradeoffs between profitability and sales growth when considering a merger or similar consolidating arrangement.

As well as providing insight into both the motivations and potential outcomes of cooperative restructuring and strategic consolidation decisions, the implications of this research for cooperative members, managers, and policy makers are many. First, since the decision(s) to merger, acquire, or ally are found to result in increased profitability, these activities should be viewed in a positive light. Any increases in profitability realized by a cooperative should ultimately result in a benefit to the coop's members either through increases in patronage refunds or enhanced cost savings in the case of supply cooperatives. Thus, cooperative members that may be resistant to these activities need to be aware of the potential benefits. Second, cooperative managers as well as policy makers may need to seek new and innovative ways of assisting cooperatives in acquiring external capital to finance both daily operations and positive net present value generating projects without necessarily resorting to consolidation. In other words, consolidation or restructuring activities should not be the primary outlet available to circumvent capital constraints. In the presence of greater opportunities for generating outside capital, in particular equity capital, it may very well be the case that consolidation is not the least cost alternative to easing capital constraints. Thus, regulators and supporting government agencies can help by advancing legislation or structuring regulations that would seek to make equity financing or other types of financing arrangements more attractive. Also, the negative influence of the decision to combine on cooperative sales growth may be construed as evidence that cooperatives seek to absorb excess capacity, control supply, or increase negotiating power - contrary

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to the literature on IOF merger and acquisition activity that suggests market power plays a minor role in these decisions.

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Figure 1. Cooperative Mergers, Acquisitions, Joint Ventures, and Strategic Alliances : 1980-1998
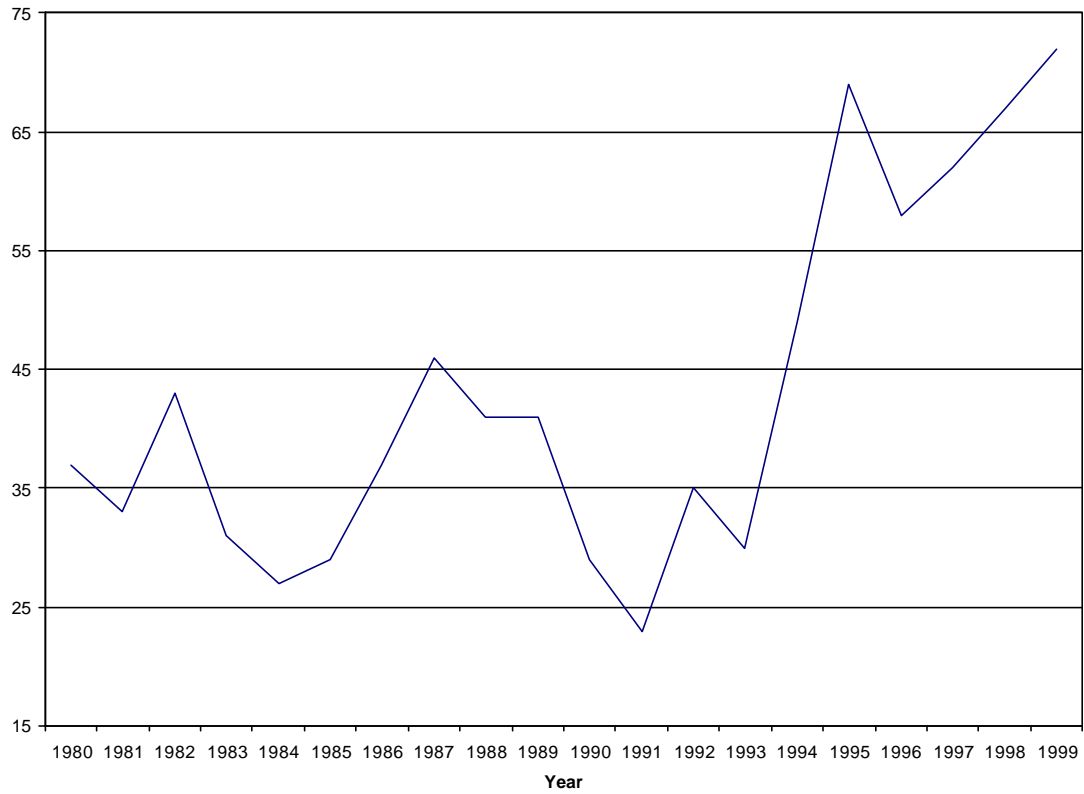
Table 1. Generalized Leontief Profit Function Estimates

Variable[1]	Sample Constant		Fixed Effects		Random Effects	
	Estimate	t-ratio	**Estimate**	t-ratio	**Estimate**	t-ratio
B_{t-1}	0.6134*	25.8200	0.3053*	10.4390	0.4684*	18.2630
$(pw_1)^{1/2}$	0.0023	1.0570	0.0038	1.7290	0.0029	1.3530
$(pw_2)^{1/2}$	-0.0056	-1.1110	-0.0024	-0.5040	-0.0042	-0.8910
$(pw_3)^{1/2}$	0.0031	1.1790	0.0003	0.1380	0.0020	0.8020
$(w_1 w_2)^{1/2}$	0.0028	0.5100	-0.0033	-0.6320	0.0004	0.0740
$(w_1 w_3)^{1/2}$	-0.0026	-0.8410	-0.0001	-0.0500	-0.0016	-0.5680
$(w_2 w_3)^{1/2}$	-0.0002	-0.1740	0.0008	0.7900	0.0002	0.1780
$pK^{1/2}$	-0.0313*	-3.6850	-0.0260*	-2.9990	-0.0297*	-3.6070
$w_1 K^{1/2}$	-0.0074	-1.4540	-0.0056	-1.1050	-0.0060	-1.2450
$w_2 K^{1/2}$	0.0480*	2.2270	0.0441*	2.1320	0.0431*	2.1230
$w_3 K^{1/2}$	-0.0073	-0.6960	-0.0091	-0.8870	-0.0063	-0.6350
μ_0	0.0447*	2.1440	N.A.	N.A.	0.0593*	3.0380
R^2	0.4627		0.5728		0.4448	
χ^2			285.865		141.000	
$\bar{\delta}$					-0.074	

[1] In this table, the variables are as follows: B = return on assets ratio, p = sectoral-specific output price, w_1 = fuel price index, w_2 = energy price index, w_3 = food and kindred products production labor cost index, K = firm-level long-term debt-to-assets ratio, and δ is the shadow value of capital, evaluated at the sample mean of the preferred model. The chi-square test statistic value compares panel data model to classical regression model, and fixed-effects to random-effects model within the chosen panel data framework. In all tables, a single asterisk indicates significance at a 5% level in a two-tailed test.

Table 2. Probit Model of Combination Activity

	Estimate	t-ratio	Marginal
Constant	-0.8740	-1.6620	-0.2398
Asset Turnover Ratio	0.0941*	2.8970	0.0258
Return on Assets (%)	-0.9466	-0.9370	-0.2597
Current Ratio	0.0002	0.0010	0.0001
Sales Growth Rate (%)	0.3483	1.8200	0.0955
Debt to Assets	-0.2402	-0.4450	-0.0659
GDP Growth Rate (%)	3.0225	0.9430	0.8291
S&P 500 Growth Rate (%)	0.8362*	2.2160	0.2294
T-Bill Yield (%)	-5.5443*	-2.0910	-1.5209
Total Agribusiness M&A Activity	0.0179	1.5110	0.0049
Shadow Value of Capital Constraint	0.2349*	3.2590	0.0644
Lagged Shadow Value	-0.0003	-0.9490	-0.0001
Sector 1[1]	-0.0980	-0.6330	-0.0269
Sector 2	-0.0269	-0.1960	-0.0074
Sector 3	1.0175*	6.4060	0.2791
Sector 5	-0.2244	-1.6600	-0.0616
P²	103.3323		

[1] The sector descriptions are suppressed to preserve the anonymity of cooperatives within each.

Table 3. 2SLS Model of Cooperative Post-Merger Performance: ROA

	Estimate	t-ratio	Elasticity
Constant	0.0501	1.2130	
Asset Turnover Ratio	0.0194*	1.9850	0.2158
Current Ratio	0.0211*	2.1530	0.0948
Debt to Assets	-0.1749*	-5.8310	-0.3630
GDP Growth Rate (%)	-0.2167	-1.4110	-0.0460
Value of Agricultural Output	0.0778*	2.6680	0.0025
Sector 1[1]	0.0248*	2.6460	0.0099
Sector 2	0.0194*	2.4000	0.0190
Sector 3	0.0491*	3.5220	0.0342
Sector 5	0.0020	0.1940	0.0009
Cost of Goods Sold to Assets	-0.0164	-1.6790	-0.1645
Sales Growth (%)	0.0000*	-2.9660	0.0074
(N / M)	0.0311	1.8360	0.1267
R²	0.3669		

[1] The sector descriptions are suppressed to preserve the anonymity of cooperatives within each.

Table 4. Stage 2: 2SLS Model of Cooperative Post-Merger Performance: Sales Growth

	Estimate	t-ratio	Elasticity
Constant	0.6345	1.0950	
Asset Turnover Ratio	-0.0076	-0.3130	-0.0365
Current Ratio	0.0096	0.0860	0.0185
Debt to Assets	-0.2522	-0.7030	-0.2259
GDP Growth Rate (%)	0.7779	0.4120	0.0712
Value of Agricultural Output	0.4892	1.6060	0.0068
Sector 1[1]	0.0757	0.6670	0.0130
Sector 2	0.0530	0.5460	0.0225
Sector 3	-0.4360*	-2.5190	-0.1309
Sector 5	0.2159	1.9550	0.0417
Output Price Index	0.0040	1.8470	0.6280
Return on Assets (%)	-0.0003	-1.5250	0.0193
(N / M)	-0.6906*	-3.3920	-1.2158
R²	0.2558		

[1] The sector descriptions are suppressed to preserve the anonymity of cooperatives within each.

Footnotes

1. Operating profit prior to the disbursement of surplus, or "patronage refunds" to members.

2. Convexity in prices requires the Hessian to be positive semi-definite, while concavity in a single quasi-fixed input requires the second derivative to be non-positive (Lopez).

3. As is well understood, OLS estimation with a binary dependent variable produces biased and inconsistent parameter estimates.

4. Healy et al. use a measure of cash flow (EBITDA) rather than profitability because this value is not influenced by the method used to finance the merger or acquisition. However, the data necessary to construct this variable were not made available to this study. The bias created by doing so is likely to be small, however, because cooperatives have fewer alternatives available for financing acquisitions or mergers.

5. We will not disclose the precise association of each variable with the particular sector in order to protect the identities of the cooperatives in each.

6. The marginal effects are defined as the change in the expected probability of observing y = 1 for a unit change in each regressor: $\bigtriangleup_x E[y|x] \; ' \; N(\mathcal{O}x) \, \mathcal{C}$.