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Managerial Incentives, Moral Hazard, and Structural Change in Agricultural Cooperatives

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"Over the past twenty years the theory of the firm, and of organization more generally, has grown into a substantial field of economic research. Yet, peculiarly little attention has been spent on understand the role of cooperatives…" (Holmstrom, p. 404).

1. Introduction

The federated business structure, a regional or national network of autonomous, local businesses or affiliates that share a brand or business function, exists in many sectors of the economy, especially in non-profit, purchasing, and agricultural sectors. Yet, we know little about this unique form of business and thus, can say little about why it continues to exist as an alternative to more mainstream corporate structures. The federated structure seems to exist as a substitute for internal growth or consolidation. Firms can achieve similar economies of scale, gain market share, and eliminate duplication of efforts through a jointly owned company while still retaining the advantages of independent identity and local connections (Carman; Knapp, 1973; O'Flanagan and Taliento; Vilstrup, Cobia, and Cropp, 1989). However, recent summaries of the federated structure in non-profit and agricultural sectors suggest that the federated structure is struggling, that it no longer has a comparative advantage over other forms of organization in today's business environment (O'Flanagan and Taliento; Dempsey et al., 2002; Dunn et al., 2002; Torgerson, Eversull, and Cummins, 2000).[1]

A federated system operates most efficiently when a single regional serves a captive set of local cooperatives (Figure 1). Since the local cooperatives own the regional and therefore serve as the residual claimants of the regional's profits, they clearly have an incentive to patronize a single regional. In practice, however, "federations don't always work as they should" (O'Flanagan and Taliento, p. 113). Regionals may compete with each other as well as with their non-federated competition for local business.[2] When local businesses fail to commit to a single regional, or choose to do business outside of the system, the entire structure weakens, even to the

point of collapse (Dahl; Ginder; Torgerson 1985).[3] Since no comprehensive data set for federated systems exist, the current behavior of the locals, their loyalty to the system, has not been analyzed empirically. Findings from qualitative and firm-specific studies support the premise that federated structures are not operating efficiently, that local businesses are not loyal to a single regional (Dahl; Hogeland; O'Flanagan and Taliento).

One plausible neoclassical explanation for this seemingly irrational disloyalty is that growth and consolidation among locals has made the federated structure redundant. For example, 16 of the 20 largest nonprofit organizations in the US operate within a federated structure (O'Flanagan and Taliento). Consolidation in agriculture over the past two decades has resulted in the unprecedented growth of local and regional cooperatives. Many local co-ops are now large enough to do business directly with wholesale and retailers, bypassing the regionals altogether (Frederick et al., 2002; Wadsworth 1999; Fulton and King, 1993). Do larger local businesses still need a second-tier regional structure or are they able to capture the same benefits with a different structure (e.g., partnerships or operating independently)?

The theory of the firm, as propounded by Hansmann, Williamson, and others, offers an alternative explanation for disloyalty in the federated system. The relevant "agents" or decision-makers in the system are the local owners (or the local board members who represent the owners) and the local mangers. In many firms, including cooperatives, the managers are effectively in control since they make the day-to-day business decisions (Hart and Moore, 1998). Holmstrom and Milgrom (1994) have shown theoretically that alternative employee incentive systems create different optimal organizational structures. If locals are failing to commit to a single regional it may be connected to the actions (and incentives) of their managers. Assuming no agency problem, the managers may be directed or induced to produce outcomes that are not

compatible with system fealty (e.g., finding the lowest prices). Agency problems may arise, however, from the manager's non-excludable, private incentives (Holmstrom and Milgrom). These incentives could foster either more or less loyalty to a single regional, depending on the characteristics of the manager (e.g., interest in career opportunities). As Fulton (2001) shows, leadership in participatory organizations may rationally pursue strategies that lead to what he calls "organizational failure," the failure to perform efficiently.

The purpose of this paper is to explore (theoretically and empirically) the current dynamics of the federated system. We do so in context of the US farm supply and grain marketing sectors. Federated cooperatives have a long history of strategic importance in these sectors and many of the regional are major corporations.[4] Today, cooperatives handle approximately 38 percent of all grain/oilseed marketing and supply 26 percent of all farm production inputs in the US and the majority of these cooperatives are part of a federated system (Kraenzle and Eversull, 2003; Kraenzle et al., 2002). During the last decade (1990-2000), the number of local grain marketing co-ops decreased from 1,402 to 797, while the number of regionals fell from 5 to 2 (USDA RBCS). Within the farm supply sector, over the same period, the number of locals declined from 1,655 to 1,233 and the regionals, 18 to 13 (USDA RBCS). Consolidation of regionals and locals explain most of this trend (Wadsworth 1999), although some locals and regionals have also either opted out of the federated system completely or have adopted hybrid structures with federated and centralized characteristics.[5] This suggests that at least some cooperatives have found the federated system sub-optimal.

A comprehensive survey was sent to over 600 local, federated grain marketing and farm supply cooperatives in the Upper Midwest in 2003. The focus on the Midwest is justified for two reasons: it is home to the largest farm supply and grain marketing regional cooperatives (and by

extension, the most extensive federated systems) and the majority of the structural change within the federated system has also taken place in this region. The survey results provide interesting statistics regarding the loyalty between local and regional farm supply and grain marketing cooperatives in seven different federated systems.

A theoretical model that extends the work of Holmstrom and Milgrom (1994) shows the impacts associated with alternative management incentive systems on federated structure loyalty. The results are tested empirically using two different sets of regressions and a panel data set that captures local co-op purchasing and grain marketing patterns for seven different regionals. The panel data approach lets us compare commitment levels across regionals, an important consideration given the diversity of regional cooperatives captured in our data.

By focusing on a unique, but important form of ownership, our inquiry contributes to the theory of the firm literature in the tradition of Hansmann's seminal work. Is the federated system functioning as it should, or are local firms disloyal? In either case, what explains the behavior of the locals, or in a more general sense what economic factors explain the federated structure? Our analysis also provides some insight into the long-term viability of the structure and, therefore, should be of interest to a wide group of policymakers. Those interested in the welfare of farmers and the efficiency of the agricultural sector as well as those interested in promoting alternatives to the conventional corporation model. If the federated structure no longer serves the needs of its locals (due to growth or external competition), we can expect that local businesses will find alternative forms of organization. If, however, it is related to management incentives, the federated structure may evolve to better meet the requirements of the locals or management contracts may have to change to solve agency problems.

The paper proceeds as follows. Additional background on the federated cooperative structure and the relevant theory that underscores the testable hypotheses and our econometric models are provided in the subsequent section. The econometric models used to analyze local co-op patronage of regional co-ops are presented in section three, followed by a more detailed description of the survey methodology and panel data set, including some descriptive statistics that inform the econometric model specification in section four. The econometric results are reviewed in section five accompanied by a discussion of the implications for the future of the federated structure. The final section summarizes the article's main findings.

2. An Incentive-based Model for Federated Cooperatives

There are no significant entry or exit barriers to regional cooperatives. Local co-ops are under no contract to do business with any regional of which they are a member and further, membership typically only requires patronage (and meeting the cooperative eligibility requirement). When local co-ops do patronize a regional, they build up allocated equity in the regional cooperative. The regional redeems a portion of the patronage refunds (the annual profits created by member business) as cash each year to the locals. The remainder is added to the local co-op's allocated equity and will be redeemed to them at some point in the future.[6] The percentage of patronage refunds returned as cash and equity redemption practices vary across cooperatives.

Given this free market environment, we can define three possible federated system scenarios: (1) the local co-op is completely loyal to a single regional cooperative, purchasing all possible goods and services from that regional (they cannot obviously buy what the regional doesn't sell); (2) the local co-op is not loyal and either (a) encourages regionals to compete with each other for its business or (b) encourages regionals to compete with non-cooperatives for its

business; and (3) the local co-op is antagonistic to the system, choosing to purchase everything from a non-cooperative despite having equity built up in regionals. Whether or not the local cooperative fits any of the scenarios is largely at the discretion of the local co-op's CEO or general manager. The local co-op manager acts as an agent for the local co-op's board (the principals). The board can direct the behavior of the manager in two ways: (1) direct orders or (2) compensation incentives—bonuses or commissions (they cannot purchase any membership/ownership stock in cooperatives). Managers, however, also have their own personal incentives, such as their ability to find future employment (their marketability). Strategic and organization theory tells us that managerial commitment to any system is largely a function of their satisfaction. Thus, agency problems may arise.[7]

The orientation of the local co-op's directives (i.e., the level of regional loyalty they try to achieve) and the factors that drive their orientation have not yet been established in the cooperative literature. For such an important institution, especially in agriculture, the federated structure has received remarkably little scholarly attention.[8] Dahl (1991) synthesized case studies of federated grain marketing cooperatives to assess reasons behind (or just descriptive?) their structural change. Hogeland (2001) interviewed thirty local co-op managers to form some general conclusions about the changing relationship between local and regional cooperatives. Her findings suggest loyalty to a regional depends is largely a function of price and the local's cooperative culture. For example, she states that some local cooperatives encourage regional competition in order to receive the best price: "For locals…all that matters is that the regional be the lowest bid today" (p. 8). Hogeland also argues that attitudes towards cooperatives and business norms (the "co-op culture") dictate the standards locals use to evaluate regionals. Homogeneity (or congruence) of culture and values between a local and regional would imply

greater trust and in turn, greater loyalty (Carman). Trust is the "ideological glue" that is essential for cooperative success: "Without trust, cooperative alliances may be little more than reactions to threatening market conditions" (Carman, p. 15). This suggests that regional loyalty may not be a function of a particular federated system but rather idiosyncratic to the local cooperatives.

The question of what factors influence individual producer or consumer *member commitment* to cooperatives has received fairly substantial treatment in the literature (e.g., Cotterill, 1987; Sexton 1986 and 1990; Karantininis and Zago, 2001; Fulton, 1999; Fulton and Giannakas, 2001; Zeuli and King). Since this is analogous to a local co-op's commitment to a regional (minus the influence of the manager), some findings from this body of literature are relevant. Member satisfaction, defined as the degree to which they believe the co-op is serving their interests, is a key variable in determining member commitment or loyalty (Fulton and Giannakas). Member satisfaction (and commitment) is positively influenced by the specialization of the cooperative, member homogeneity, and dependency (Fulton and Giannakas; Izraeli, Pizam, and Neumann).[9] The more the member's success depends upon the success of the cooperative, the greater the degree of their commitment (Fulton and Giannakas).

Translating these findings to the federated system context, if the local co-op's board (representing its members) feels the regional is not serving their needs, we would expect them to advance disloyal directives to management. The directives (and satisfaction) should be regional specific. For example, some regionals have already changed their orientation in response to lack of member loyalty, concentrating on becoming higher valued "food companies" rather than commodity-based agencies (Dahl, 1991; Hogeland). Therefore, some locals feel their regionals are no longer focused on serving their needs, but rather on growing their food business

(Hogeland; Torgerson, Eversull, and Cummins). We would expect locals that use specialized regionals (e.g., in grain marketing) to have more positive perceptions (satisfaction).

We also expect local co-op characteristics to influence their satisfaction and commitment. The underlying assumption of the federated structure is that local co-ops will base their patronage decision primarily on economy of scale factors. Since smaller locals are less likely to procure the same favorable terms of trade as the regional (or a larger local) (i.e., they are more dependent on the regional), we would expect them to direct management to purchase only from a single regional. Dependency also may be linked the amount of equity the local cooperative has invested in the regional. If the regional cooperative fails, the local will lose their investment. However, there is a timing issue here. If the local already believes the regional is failing, they will do business elsewhere to avoid increasing their equity (and potential loss). Thus, the importance of the regional equity to the local becomes a significant variable. For some locals, the regional is essentially keeping them solvent (Dempsey; Torgerson et al).

Equity redemption, the period of time the local has to wait to receive the equity it has built up in a regional, is equally important. Locals will feel more comfortable investing in the regional (through continued patronage) if they are more certain it will be returned; certainty increases as the timing of the future event decreases. Following the same logic, the percentage of patronage refunds returned annually as cash (versus accruing as equity) would also clearly increase a local's willingness to patronize a regional. In sum, we would expect locals that feel their regional equity is very important to their future viability to issue regional loyalty directives. However, in regionals with long (or unknown) equity redemption periods and low annual cash patronage payouts, we would expect locals to be less loyal.

Economies of scope may also enter the loyalty equation. A growing percentage of consumer members, especially in farm supply cooperatives, is a national trend that reflects an increase in the number of non-farm families moving to rural areas (Merlo, 2003). The more diverse the cooperative (the more products and services it provides to its members), the higher the probability they will find better prices for at least some of their products outside a single regional. Thus, we would expect very diverse cooperatives to direct management to find the best price rather than stay loyal to a single regional.

Building on Holmstrom and Milgrom's model, the manager can choose to patronize regionals $j = 1, \ldots, J$ and IOFs $f = 1, \ldots, F$, where the total purchased from each is represented by $T_{jf.}$ with the full vector of patronage levels denoted by $\mathbf{P} = (P_1, \ldots, P_{J+F})$. Let $P_{j,f} = T_{j,f} / \sum_{j,f} T_{j,f}$, where $0 \le P_{j,f} \le 1$ and $\sum_{j,f} P_{j,f} = 1$. The manager's choice of $\mathbf{P}$ can be directly observed by the board of directors and can either be directly or indirectly controlled by the board. If the board chooses to control the manager's choice indirectly, it will offer commission based on a collection of verifiable measures $X = (X_1, \ldots, X_K)$, which can be thought of as the price of inputs the manager buys or the price of grain that is marketed. To be more general, it could represent the local co-op's net revenues. X is a function of regional and non-regional patronage:

$$(1)\quad X_i = F_i(P) + \varepsilon_i \qquad i = 1,\ldots, K.$$

We further assume that X is an increasing (monotonic) function of P; as the set within P--the number of nonzero $P_{j,l}$'s increases, so does X. This assumption is supported by the idea that competition will lead to lower prices. The incentive scheme for each manager *m* can be modeled as follows:

$$(2)\quad s(X, P) = \sum_i \alpha_i X_i + \beta$$

where the coefficients $\alpha = (\alpha_1, \ldots, \alpha_K)$ are the commission rates and β is salary. Both are restricted to nonnegative numbers to avoid creating disincentives (e.g., hiding behavior and not working). If the board decides to control the manager's patronage choices directly, $\alpha = 0$ (this follows from the fact that X is a function of P). Alternatively, the co-op could tie the commissions to the manager's use of one or more firms. For example, it could offer a commission = $\lambda P_{j=1}$. However, for this to work, $\lambda \geq \alpha$ and the manager would simply maximize the patronage of the chosen firm(s), creating the same effect as a higher base salary with the restriction.

Managers also have non-excludable private returns associated with patronizing each regional, $M(P_j)$, and IOFs, $M(P_f)$. The term non-excludable means that the manager's returns cannot be excluded by any contract. We assume the return from patronizing the regional is feeling positive about their contribution to the cooperative system out of loyalty to the cooperative movement. In contrast, the return from patronizing an IOF is improving their job marketability. The two private returns are mutually exclusive. The manager chooses P to maximize the following payoffs from the organizational design:

(3) $Y = \sum_i \alpha_i X_i + \beta + M(P_j) + M(P_l)$.

Assuming (without a loss of generality) that Xi is simply net revenue (X), and given the assumptions above, we achieve the following result,

(4) $Y' = \alpha(P_{J+L}) + M'(P_j)/P_j + M'(P_l)/P_l$.

3. Survey Methodology and Descriptive Statistics

Managers from 113 local farm supply and grain marketing cooperatives across the Midwest, representing at least ten different federated cooperative systems, returned an extensive

mail survey in 2002-2003.[10] The responses were distributed relatively evenly among the four states (Table 1) and represent reasonable samples of the existing farm supply and grain marketing co-ops.[11] The majority of the respondents provided information on more than one regional, resulting in 349 total data points for regional information. On average, each local in the sample is a member of 2.5 regional cooperatives; the majority of the locals were members of the largest regionals—Farmland, Growmark, CHS, and Land O'Lakes, Agri, and AGP.

The sample appears to adequately represent the nation in terms of local membership numbers, membership composition, and sales. On average, the local cooperatives comprise 924 producer members and 1,675 consumer members and reported $16.8 million in gross sales in 2001 (Table 1). The range of responses across the sample in all three categories is remarkable and indicates a diversity of local cooperatives in the Midwest. The cooperatives themselves are also diverse, selling an average of twelve different products and services. A small portion of the sample was specialized: eight sold only petroleum and consumer goods to their members and another eight only provided grain marketing. These cooperatives were excluded from the regression analysis.

As expected, all of the locals have experienced some measure of growth during 1990-2001. Thirty-four percent of the locals reported an increase in producer members and 41 percent an increase in consumer members. On average, producer membership numbers increased by 11 percent while consumer membership numbers increased more dramatically by 66 percent.[12] The majority of locals in the sample (55 percent) reported an increase in gross sales; on average, gross sales grew by 58 percent. Perhaps not surprisingly, 45 percent of the locals in the sample reported an increase in the number of products and services they sell (although on average the number only grew from 10 to 12). Growth at the local level may be partially attributed to

mergers; 66 percent of the locals engaged in merger activities during 1990-2001. Interestingly, 74 percent believe that additional merger activities are necessary for future viability.

Management at the local cooperatives has remained fairly stable. On average, the managers have worked in their current position for over eleven years, although the sample was varied (0.25-30 years). Many of the managers had been previously employed at the cooperative. Total years of employment at the same cooperative averaged just over 16 years, with the maximum of 38 years.

The local managers were also asked to report equity information, satisfaction, and purchasing patterns for each regional they patronized (table 2). Local investment in regionals varied. On average, the regionals returned the locals equity on a fourteen year cycle. The locals were asked to rank their satisfaction with the regionals in terms of prices, products, and services.

4. Econometric Model Specification

To test the theoretical results, we estimate two sets of regressions that measure using different metrics the extent of a local's loyalty to the federated system. The first uses standard Tobit regression techniques to analyze local *i*'s patronage of regional j. Here the proportion of business conducted with each regional is the dependent variable allowing us to investigate the determinants of doing more business with an individual regional. The second regression estimates the determinants of loyalty to the regional system using a loyalty index variable. In this case loyalty is defined as a binary state where a loyal local purchases more than 75% of their goods from the federated system. That equation is estimated as a probit model.

For the tobit regression on business decisions, let the dependent variable (pct_all_ati) be defined as follows: Y_{ij} = proportion of total 2001 sales spent by the local *i* co-op on products at regional *j*. The dependent variable will be censored at zero and at one (100% purchased at a

single regional). Thus, a double-censored Tobit model (Maddala), which takes this censoring into account, is appropriate. For an individual data point with a vector of independent variables x_i, and a vector of parameters to be estimated β, a double-censored Tobit is estimated as follows:

$$
\begin{array}{ll}
Y_i^* = \beta' x_i + \varepsilon_i & \textit{where} \\
Y_i = 1 & \textit{if } Y_i^* \geq 1 \\
Y_i = Y_i^* & \textit{if } 0 < Y_i^* < 1 \\
Y_i = 0 & \textit{if } Y_i^* < 0.
\end{array}
$$

The estimation procedure for this model maximizes a standard Tobit likelihood function with the changes for upper censoring rather than the more common lower censoring at zero. With 100 percent as Y^u, the upper bound of our estimation, and Y^o denoting the lower bound, 0 percent, the likelihood function is as follows:

$$
\ln L = \sum_{Y_i = Y^o} \ln\left[\Phi\left(\frac{(Y^o - \beta' x_i)}{\sigma}\right)\right] - \tfrac{1}{2}\sum_{Y_i \leq Y^u}\left(\ln(2\pi\sigma^2) + \frac{(Y_i - \beta' x_i)^2}{\sigma^2}\right) + \sum_{Y_i = Y^u} \ln\left[1 - \Phi\left(\frac{(Y^u - \beta' x_i)}{\sigma}\right)\right],
$$

where Φ is the normal cumulative distribution function and Y_i is the purchase share.

The dependent and exogenous variables assumed to impact the functioning of the federated system are reported in Table 3. We estimate the tobit model using each regional and local combination. It describes the proportion of business given to a single regional as a function of variables describing i) the manager, ii) the local, and iii) the regional. Among manager variables we hypothesize that managers will be more likely to patronize a regional the longer they have been in their position (Yrs_pos), if they have prior co-op experience (prior_coop), and if they have more total years in cooperatives (Total_yrs). In terms of characteristics of the local, we include variables describing the scale and scope of the business as well as their recent and future plans of merger activity. Locals who have higher sales (Sales), have recently merged (Merged), plan to merge in the future (Future_M), and have experienced recent growth in the

number of products (P_Growth) we expect to have lower levels of patronage of a single regional. In addition we include the number of years that the regional revolves its equity as a variable to describe the expected returns on equity in a regional. We hypothesize that locals will be more likely to patronize regionals that revolve their equity more often. We also include dummy variables for each of the regionals to control for regional specific effects.

The probit model uses data from each local and describes the loyalty of the local as a function of characteristics of its manager and its own business. Due to the small number of data points and multicollinearity problems we use a reduced set of variables in the loyalty probit. We use total sales as a measure of the scale of the local, hypothesizing that larger locals will be less loyal. The manager's own loyalty to the cooperative system is measured with prior experience in cooperatives, which is hypothesized to be positive. In addition we include a measure of the importance the manager attaches to patronage refunds as a method of measuring the influence of patronage refunds on a local's loyalty. We hypothesize that the more important the patronage refunds are to the local, the higher the probability of them being loyal.

5. Results

The results from the Tobit estimation in table 4 show relatively few significant variables. Nonetheless they do demonstrate the hypothesized effect of the character of regionals on business patterns. In particular, locals do more business with regionals that revolve their equity more often. In addition a number of the regional specific dummy variables are significant show that the intercept term for those particular regionals are significantly different from the intercept for the baseline regional CHS. There is a relatively higher proportion of business done at Farmland and AGP than CHS and a lower proportion at Growmark and Agriliance. Given the

insignificance of the other variables in our equation, we cannot accept any of the other hypotheses proffered.

Table 5 shows the results from the probit model on loyalty. It shows that local managers who consider patronage refunds important have a higher probability of being loyal to the federated system. We do not find any significant effect of either the manager's prior tenure in the cooperative system or the size of the local, although both of these variables are positive. Overall the probit model confirms the importance of the patronage refunds to loyalty that were suggested by the importance of equity in the tobit model.

6. Conclusion

Our study of the federated business structure in the context of farm supply and grain marketing cooperatives suggests a complex relationship between independent local firms and their regionals. Data from 113 local cooperatives support the premise that few locals patronize a single regional, creating inefficiency within the federated structure system. On average, the locals hold membership in three regionals. The local co-ops are making a trade-off between their own individual co-op's short term gain and the long-term viability of the system.

One plausible explanation for this disloyalty is that growth and consolidation among locals has made the federated structure redundant. Our data clearly shows that local cooperatives have grown over the past decade, increasing in sales, the number of products and services they offer, and membership numbers. Some of this growth was due to mergers; the majority of the sample had merged since 1990. The size of the local co-op, as measured by gross annual sales, was included in both regressions, but was not significant. Management behavior may offer an alternative explanation. Years in their current position and prior years at the cooperative are used

as proxies for loyalty to the cooperative system. Loyalty to the system, we hypothesize, reduces disloyalty incentives. None of these variables were significant in the regressions.

If the local co-op's board (representing its members) feels the regional is not serving their needs, we would expect them to advance disloyal directives to management. A number of the regional specific dummy variables in our regression were significant. Controlling for other factors, there was a relatively higher proportion of business completed at a single regional in Farmland and AGP than CHS and a lower proportion at Growmark and Agriliance. Loyalty to a regional would, we expect, also depend on equity. In particular, locals do more business with regionals that revolve their equity more often and have more loyalty to a single regional when their regional's patronage is very important to their viability.

By focusing on a unique, but important form of ownership, our inquiry contributes to the theory of the firm literature in the tradition of Hansmann's seminal work. Our analysis also provides some insight into the long-term viability of the structure and, therefore, should be of interest to a wide group of policymakers. Those interested in the welfare of farmers and the efficiency of the agricultural sector should take note... If the federated structure no longer serves the needs of its locals (due to growth or external competition), we can expect that local businesses will find alternative forms of organization. An alternative strategy (to demise) would be to increase the size and scope of regional cooperatives. In fact, some regionals have merged and/or entered into joint ventures, and others have organized inter-regionals (e.g., CF Industries).

If, however, it is related to management incentives, the federated structure may evolve to better meet the requirements of the locals or management contracts may have to change to solve agency problems. To change management behavior, they would have to change incentive system.

Endnotes

[1] The recent bankruptcy of Farmland, a federated structure that grew into one of the largest farm supply cooperatives in the US, supports the argument that the federated structure is in trouble.

[2] Regional co-op territories, which once were fairly geographically distinct—especially in agriculture, now tend to overlap. This allows for greater competition.

[3] Dahl and Ginder point to the lack of local commitment to the regional as a primary reason for the collapse of Farmers Export Company in 1985, a federated regional grain marketing cooperative. Theoretically, one of the factors that influence the stability of such a structure (i.e., a non-cooperative game) is the long-term commitment of both sets of cooperatives to the system (Fulton, Popp, and Gray, 1996).

[4] CHS and Land O'Lakes, for example.

[5] Local and regional cooperatives with no affiliation to regionals are categorized as centralized cooperatives. The number of centralized regional co-ops in both sectors increased during that period (from 2 to 26 in grain and 15 to 24 in farm supply). Hybrid cooperatives (those combining federated and centralized structures) are categorized by the USDA as "mixed."

[6] It appears on the local co-op's balance sheet as investments in other co-ops.

[7] Managers may ignore the directives of the co-op board, their own incentives may outweigh the co-op's, or they may manipulate the board into choosing a directive that is inefficient—that serves his or her own interests and not the members (Fulton 2001).

[8] A significant body of literature on the more general concept of vertical financial ownership (hierarchy) exists (e.g., Mahoney, 1992), but the focus is on explaining contracting versus ownership strategies. Some explain motives for vertical integration (see Mahoney p. 560; 568).

[9] Member homogeneity implies similarity in culture and values, which in turn would be expected to foster more mutual trust.

[10] An extensive survey was mailed out to all existing local grain and farm supply cooperatives (608) in Illinois (176), Iowa (104), Minnesota (233), and Wisconsin (95). A total of 113 useable surveys were ultimately received, achieving a final response rate of 19%. This rather low response rate seems to have been caused by the comprehensive nature of the survey (13 pages) since a standard Dillman approach was used and the surveys were sent at what is a typically low-peak business time (Pennings, Irwin, and Good, 2002). The response rate is typical for agricultural mail surveys (e.g., Hudson and Herndon; Pennings, Irwin, and Good, 2002).

[11] Response rates for each state are as follows: Illinois 13%, Iowa 23%, Minnesota 19%, and Wisconsin 24%.

[12] The majority of the cooperatives in the sample (62%) retain a producer orientation, meaning the ratio of consumer members to producer members is less than one.

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Figure 1. The Federated Structure

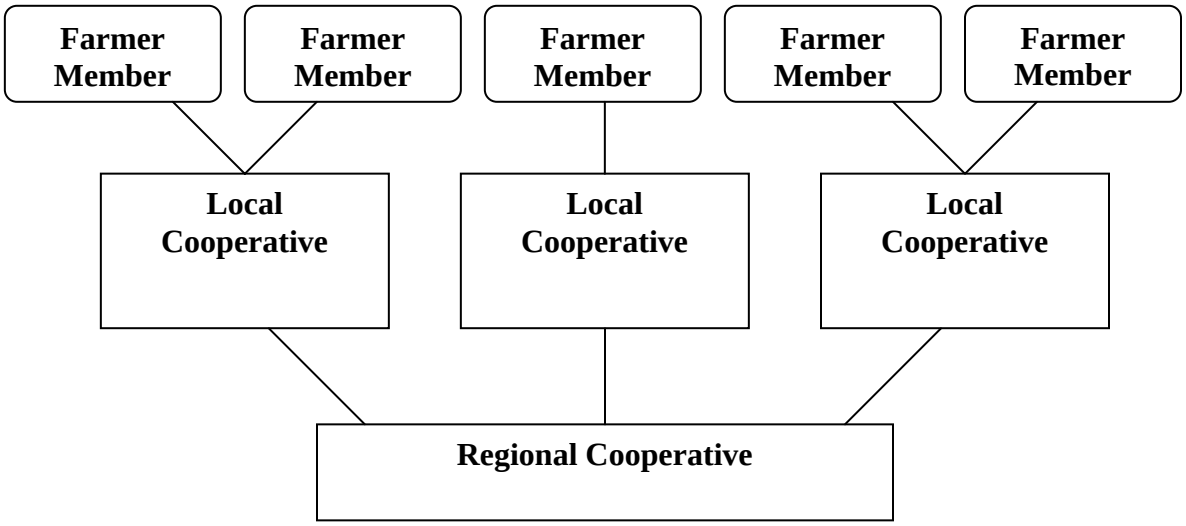

Table 1. Local Cooperative Descriptive Statistics		
Region	**Mean (N responses)**	**Minimum/ Maximum**
Illinois	(23)	----
Iowa	(24)	----
Minnesota	(43)	----
Wisconsin	(23)	----
Total	(113)	----
Regional memberships		
AGP	(18)	----
AGRI	(12)	----
Agriliance	(11)	----
CHS	(88)	----
Co-Bank	(24)	----
Farmland	(65)	----
FC Stone	(10)	----
Growmark	(22)	----
Land O'Lakes	(74)	----
Others[1]	(25)	----
Regional membership/local	2.5	0/10
Size & Diversity		
Producer members	924	1/20,755
Consumer members	1,675	30/11,500
Gross sales ($ million)	16.8	0.1/161.9
# of products and services sold	12	1/21
Growth (1990-2001)	**Percentage of responses (Percentage change)**	
Locals with producer member growth	34%	----
Locals with consumer member growth	41%	----
Average % increase in producer members	(11%)	----
Average % increase in consumer members	(66%)	----
Locals with increase in gross sales	55%	----
Average % increase in gross sales	(58%)	----
Locals with increase in # of products and services sold	45%	----
Engaged in mergers	66%	----
Manager Characteristics	**Mean**	**Minimum/ Maximum**
Years in current position	11.4	0.25/30
Total years at the cooperative	16.1	1/38
1. Smaller regionals with fewer than 2 total responses were grouped in this category.		

Table 2. Investment and Satisfaction Variables by Regional (mean, min/max)							
Investment[1]	**AGP**	**AGRI**	**Agriliance**	**CHS**	**Farmland**	**Growmark**	**Land O'Lakes**
Annual patronage refunds							
% in cash							
Length of equity revolvement							
Importance of patronage refunds (for all)[2]							
Satisfaction							
w/ prices							
w/ products							
w/ services							

1. Annual patronage refunds and % in cash were reported as averages over past five years.
2. 0 = not at all; 1 = somewhat; 2 = very

Table 3. Independent and Dependent Variables				
Variable	**Mean**	**Std. Dev.**	**Min**	**Max**
Pct_Bus: Portion of business at regional *j*	0.329424	0.359943	0	1
Revolve: Number of years equity revolves at regional *j*	14.36981	3.999886	11	20
Yrs_pos: Number of years local manager has held his/her position	10.70802	7.82184	0.25	30
Prior_coop: If local manager has prior coop experience	0.473684	0.500248	0	1
Total_yrs: Local manager's total coop experience	15.36641	9.432829	1	38
Sales: Total local sales in $millions	29.11276	36.42959	0.888241	230.2551
Merged: =1 if local merged in last the last decade	0.77551	0.4181	0	1
Future_M: =1 if local believes future mergers are necessary	0.852459	0.355373	0	1
P_Growth: =1 if the local grew its products in last decade	0.596	0.491682	0	1
reg1: Farmland	0.209559	0.407744	0	1
reg2: Growmark	0.058824	0.235728	0	1
reg3: CHS (default value for regressions)	0.290441	0.45803	0	1
reg4: Land o' Lakes	0.268382	0.443935	0	1
reg6: Agriliance	0.040441	0.197355	0	1
reg8: AGP	0.0625	0.242508	0	1
loyalty_12: =1 if 75% of business with regionals	0.434783	0.498445	0	1
Patron_imp: Importance of patronage refund, =0 if none, =1 somewhat important, =2 very important	1.530864	0.614134	0	2

Table 4. Tobit Regression Results Dep = pct_bus			
Variable	**Coefficient**	**Std. Err.**	**t**
Revolve	-0.0618	0.023	-2.67
yrs_pos	-0.002	0.008	-0.26
prior_coop	-0.115	0.112	-1.02
total_years	0.003	0.008	0.37
sales	-0.001	0.001	-0.74
Merged	-0.094	0.105	-0.9
Future	-0.154	0.119	-1.29
P_Growth	-0.143	0.214	-0.67
reg1	0.734	0.250	2.93
reg2	-0.356	0.094	-3.77
reg4	-0.132	0.218	-0.6
reg6	-0.304	0.165	-1.84
reg8	1.586	0.321	4.94
_cons	-0.0618	0.023	-2.67
_se	0.488	0.036304	
N=198			
Log Likelihood	-151.47		
Pseudo R2	0.1632		

Table 5. Probit regressions results Dep = loyalty_12			
Variables	**Coefficient**	**Std. Err.**	**z**
prior_coop	0.4096214	0.30689	1.33
sales	6.90E-03	0.005449	1.27
Patron_imp	0.7013162	0.283325	2.48
_cons	-1.606431	0.530392	-3.03
N=75 Log Likelihood = -46.45 Pseudo R2 = 0.0971			