Capital, Ownership, and Governance:

Analyzing the Structure of U.S. Farmer Cooperatives

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Abstract: The interrelationship of capital, ownership, and governance in U.S. farmer cooperatives is not well-understood. In order to better conceptualize the overall structure of farmer cooperatives, a new framework is constructed with member ownership diversity, member control delegation, and financial flexibility as its three dimensions. Primary survey data on 371 U.S. farmer cooperatives is collected and analyzed to discover moderate to strong correlation coefficients for ownership and governance (0.27), ownership and capital (0.33), and governance and capital (0.51). An ordered probit model is specified and estimated for each structure. The empirical relationship of member ownership diversity and member control delegation is characterized by bi-directionality, which implies endogeneity must be addressed in future research. On the whole, the ownership structure and the capital structure are independent, although the probability of financial flexibility is increased by outside investment in subsidiary organizations. In terms of governance, delegation of real control from board directors to senior managers has a positive impact on the capital structure. Most hypotheses, as informed by agency, finance, and cooperative theory, are accepted, suggesting the three-dimensional framework has merit.

Keywords: capital structure, agricultural cooperative, survey data, ordered probit.

JEL Codes: Q13, Q14, Q15.

I. Introduction

The ownership structure and the governance structure, which comprise the rights to claim profits and the rights to control resources, respectively, are often discussed in relation to the boundaries of the firm (Demsetz, 1983; Hart and Moore, 1990).[1] For the investor-owned firm (IOF), its residual claimants are its lenders of capital, who also possess the rights to formal control as designated on the basis of one share, one vote.[2] However, effective control, which concerns the authority to make final decisions on assets and resources, is delegated to managers and directors who are contracted to maximize the return on investment of shareholders. Both characteristics, the dispersion of claim rights to investors and the delegation of control rights to decision specialists, facilitate a relatively high financial flexibility as debt or equity acquisition is possible on both private and public markets (Fama and Jensen, 1983).

However, the public corporation is merely one mode of organization. Following Williamson (1991), Menard (2004) used the term hybrid to describe the modes of organization in the space between the market and the hierarchy, envisioning a combination of market-like hierarchies and hierarchy-like markets. Makadok and Coff (2009) rejected the hybrid as a two-dimensional construct. Instead, such non-market and non-hierarchy arrangements are intermediate modes of organization with mixed arrangements of rights, assets, and profits. Of course, one example of a hybrid or intermediate mode of

[1] In this paper, ownership structure is the assignment of claim rights in the spirit of Demsetz (1983), and governance structure is the assignment of control rights in the spirit of Williamson (2002). Both structures emphasize the input-output coordination but often disregard the interrelationship with the capital structure.

[2] The one share, one vote system implies proportionality of control and ownership.

organization is the cooperative.[3] In fact, the versatility in ownership structures is good reason to regard the cooperative as the true hybrid of all organizations (Chaddad, 2012).[4]

Unlike the IOF, the connection between the ownership structure, the governance structure, and the capital structure is not always explicit for the cooperative, in part because the ownership structure of the cooperative is so diverse and versatile.[5] Traditionally, control and ownership of the cooperative is restricted to individuals who act as its suppliers or customers. Such configuration of the ownership structure and the governance structure has consequences for the capital structure. Access to the private debt market is limited as the roles of risk bearing and decision management are performed by the same individuals, access to the private equity market is constrained by the personal wealth of member patrons, and access to the public equity market is nonexistent as ownership or membership of the cooperative is impossible for outside investors.[6] Consequently, financial flexibility is considered to be problematic (Cook, 1995).

Organizational design adaptation, which implies the sacrifice of member control or member ownership, has improved the financial flexibility of various cooperative modes of organization (Chaddad and Cook, 2004; Chaddad et al., 2005; Bijman et al., 2013; Kalogeras et al., 2013). However, academic research on the relationship between the ownership structure, the governance structure, and the capital structure is

[3] As explained in Parmigiani and Rivera-Santos (2011), other examples of intermediate modes of organization are contracts, franchises, joint ventures, networks, partnerships, and others.

[4] Emphasis in this paper is placed on the farmer cooperative. Cooperatives are also common in the housing sector, the credit sector, the energy sector, the insurance sector, and the retail sector. While similar in ownership structure, such cooperatives are not producer-owned but rather employee-owned (Hyvee) or customer-owned (Puget Consumers Cooperative).

[5] While explicit, the connection between the ownership structure and the capital structure of the IOF is anything but unambiguous, as evidenced by the famous Modigliani-Miller theorem and the plethora of research to test and especially disprove the theorem. See Graham and Leary (2011) for a recent review of the relevant literature.

[6] Access to the private debt market is limited as financial institutions, which supply bonds and loans as debt instruments, are uncomfortable with the unconventional ownership structure of cooperatives (Lerman and Parliament, 1993).

scarce. There is no empirical or descriptive study of the explicit impact of sacrifice of member control or member ownership on the capital structure of the cooperative. The purpose of this paper is therefore to (i) connect the various configurations of claim and control rights, as presented in Chaddad and Cook (2004) and Chaddad and Iliopoulos (2013), respectively, to the various configurations of the capital structure in a conceptual framework, (ii) test hypotheses on the interrelationship of capital, ownership, and governance with primary and secondary data, (iii) measure the diffusion of ownership structures and governance structures, and (iv) empirically estimate the causal impact of ownership and governance on the financial flexibility of U.S. farmer cooperatives. Thus, new research is presented in order to further the collective understanding of the cooperative mode of organization in agriculture.

Five original contributions to the literature are made. First, capital, ownership, and governance are combined in an analytical framework to help analyze the overall structure of U.S. farmer cooperatives. Using survey responses from 371 U.S. farmer cooperatives, mild evidence is found in support of a positive relationship between member ownership diversity, member control delegation, and financial flexibility. Specifically, member ownership diversity and member control delegation are believed to be necessary but not sufficient conditions in order to improve financial flexibility. Second, the ownership structure typology in Cook and Chaddad (2004) and the governance structure in Chaddad and Iliopoulos (2013) both lack sophistication. The former represents only half of the sampled cooperative, while the latter disregards the diverse conceptualization of cooperative governance. Updated typologies in relation to the ownership and governance of U.S. farmer cooperatives are thus warranted. Third, following the specification and estimation of an ordinal regression model for each structure, the empirical relationship of ownership and governance is determined to be bi-directional, which implies endogeneity must be addressed in future research on the overall structure of U.S. farmer cooperatives. Fourth, counter to agency, finance, and cooperative theory, the ownership structure is seemingly

independent to the capital structure. The overall indicator for the ownership structure has no significant impact on the probability of financial flexibility, while the relationship of outside investment inside and outside the cooperative is negative and positive, respectively, in relation to the capital structure. Fifth, member control delegation is proven to have a significant positive impact on the probability of financial flexibility. Specifically, the probability of financial flexibility is impacted positively by the presence of non-member senior managers, which informs the discussion of member control constraining access to debt and equity markets.

The paper proceeds as follows. Section II provides a brief overview of the relevant literature on the capital, governance, and ownership of farmer cooperatives. The conceptual framework is advanced and discussed in section III, including the hypotheses as based on agency, finance, and cooperative theory. Primary and secondary data on the sample of 371 fisher, farmer, and rancher cooperatives is presented in section IV. Section V presents the descriptive analysis in relation to the framework. Section VI contains the empirical analysis, and Section VII the summary and the conclusion.

II. Literature Review

A. Ownership Structure

Modes of organization can be distinguished by virtue of ownership rights assignments (Hansmann, 1996).[7] For farmer cooperatives, Chaddad and Cook (2004) presented a taxonomy on the basis of residual claim rights, illustrating how adjustments to claim rights characteristics can shape different cooperative modes of organization which remain user-owned, user-controlled, and user-benefited to a great extent.

[7] Claim rights and control rights are combined in Hansmann's (1996) definition of ownership rights.

The defining characteristic of the classical cooperative is the full restriction of ownership to member patrons (Van Bekkum and Bijman, 2006). The organization is both fully owned and fully controlled by its patrons. In addition, shares are non-tradable, non-appreciable, and redeemable. The nature of the ownership structure lies at the foundation of the equity constraint (Cook, 1995; Hart and Moore, 1998). As access to private and public debt sources is limited or nonexistent, capital acquisition is primarily in the form of member equity, which is complicated by the free rider problem, the horizon problem, and the portfolio problem (Cook and Iliopoulos, 2000; Borgen, 2004, Bogetoft and Olesen, 2007). As such, the classical cooperative is constrained in its ability to acquire risk capital by its own ownership structure, which Richards and Manfredo (2003) identified as the primary explanation for mergers and acquisitions of farmer cooperatives.

Over time, many cooperatives have made adjustments to the classical ownership structure in efforts to loosen the equity constraint (see Figure 1). One example is the proportional investment cooperative, for which equity is use-proportional to limit the over- or underinvestment of members (Chaddad and Cook, 2004). The transferability of ownership shares improves the financial flexibility, but only marginally as ownership is still restricted to member patrons. Another configuration of the ownership structure is the member-investor cooperative, which distributes net earnings on the basis of shares, not patronage. The appreciability of shares, including bonus shares and participation unit shares, serves as motivation to retain equity for future growth opportunities. Even greater financial flexibility is achieved in the new generation cooperative (NGC), which features both transferable and appreciable shares (Cook and

Iliopoulos, 1999; Nilsson, 1999). Member-investors are enabled to align risk portfolios to risk preferences, but the capital structure is constrained by the closed membership.[8]

Financial flexibility is further improved in cooperative modes of organization for which ownership is not restricted to member patrons. The participation shares cooperative is one example, featuring a combination of members who receive net earnings on the basis of usage and investors who receive net earnings on the basis of shares (Nilsson, 1999). Residual claim rights are accessible to members, other cooperatives, or outsiders, but full formal control of assets and resources is retained. The addition of subsidiary joint-stock companies is common to co-maker cooperatives (Nilsson, 2001). The subsidiary, whose ownership is a mixture of members and investors, is primarily used for value-added business. The hybrid listed cooperative is similar in structure, but ownership of the subsidiary is in the hands of investors only, implying the ownership shares are traded on the stock exchange (Van Bekkum and Bijman, 2006).

A different legal form is established by the limited liability cooperative, a mode of organization in which all members are investors (Nilsson, 1999). Claim and control rights are proportional to investment, not patronage. The organization is only considered a cooperative if the member patrons form a majority. The most radical adjustment to the ownership structure of the classical cooperative is the converted listed cooperative, whose ownership shares are traded on the stock exchange (Van Bekkum and Bijman, 2006). Individual farm producers are now just suppliers or customers of the organization, which is no longer member-used, member-controlled, or member-benefited.

B. Governance Structure

[8] See Harris et al. (1996) and Chaddad (2012) for a detailed discussion of the ownership structure and the governance structure of the NGC.

In addition to different configurations of claim rights, cooperative modes of organization also differ in terms of control rights. However, the number of ways to separate control and ownership is limited. Many cooperatives use the same governance structure, which implies the variety in ownership structures is not equaled by the variety in governance structures.

While acknowledging the many cross-country differences, Chaddad and Iliopoulos (2013) and Bijman et al. (2013) identified four types of governance structures (see Figure 2). In the traditional model, the board of directors has both formal and effective authority to make final decisions on collectively owned assets and resources.[9] The primary function of the board of directors is to translate member interests at the farm level into strategic decisions at the cooperative level. Much like the assignment of claim rights, over time cooperatives have adjusted the assignment of control rights in response to changes in the competitive environment (Chaddad and Iliopoulos, 2013). In particular, the role of the board of directors and its relationship to management has been altered, as evidenced by the extended traditional model, the managerial model, and the corporate model (Bijman et al., 2013). Each model is characterized by greater separation of risk bearing and decision management as effective control is delegated to decision specialists who are not residual claimants. In North America, the most common governance structure of farmer cooperatives is the extended traditional model, for which management is responsible for the day-to-day running of the business but the board of directors still has final control of all decisions (Chaddad and Iliopoulos, 2013).[10]

[9] Each cooperative is by law mandated to have a board of directors, which is to be comprised of member patrons. The directors are elected or appointed by fellow member patrons.

[10] As conceived, the managerial model and the corporate model have limited applicability to U.S. farmer cooperatives as no supervisory committees or boards of commissioners exist. Refinement or adjustment of the typology is needed to better portray the degrees of control and ownership separation for U.S. farmer cooperatives.

Over time, the separation of control and ownership is in part motivated by the rising cost of collective decision making (Hansmann, 1996). As the cooperative grows in members and activities, the increased number of opinions on how to distribute the costs and benefits will lengthen and complicate the democratic process, in particular if member participation is high (Hendrikse and Veerman, 2001; Pozzobon and Zylbersztajn, 2013). Democratic cost is reduced by implementing the extended traditional model, the managerial model, or the corporate model, in which effective control is delegated to managers and directors. However, the tradeoff of lower democratic cost is higher agency cost.[11] As explained by Jensen and Meckling (1976), any separation of control and ownership causes the formation of a principal-agent relationship, which is complicated by bounded rationality, contractual incompleteness, interest misalignment, and imperfect information.[12] Subsequently, the principal must incur several expenses to pursue the business objective.[13]

The primary mechanism of any governance structure is the board of directors, which is generally perceived as the intermediary in the principal-agent relationship (Van den Berghe and Levrau, 2004). According to research by Burress et al. (2011; 2012), who surveyed the 1,000 largest U.S. fisher, farmer, and rancher cooperatives by revenue in 2009, the mean cooperative board of directors has

[11] Both democratic cost and agency cost are ownership costs (Hansmann, 1996), which are not to be confused with transaction costs (Williamson, 1979; 1981). According to ownership cost theory, the observed separation of control and ownership causes a decrease in democratic cost and a smaller increase in agency cost (Chaddad and Iliopoulos, 2013). By comparison, transaction cost theory cannot explain the ex post decision to change internal governance as autocratic or democratic control is not well-integrated. Hence, in order to explain the dynamics of governance structures, ownership cost theory appears to be more suitable.

[12] The principal-agent relationship is most often analyzed in the context of the shareholders (principal) and the managers (agent) of the firm (Fama and Jensen, 1983). The stylized objective of the shareholder is profit maximization, whereas the objective of the manager as an employee is to maximize welfare or utility. The principal-agent problem is characterized by hidden information (ex ante) and hidden action (ex post), which concern the ability and willingness, respectively, of the agent to pursue profit maximization for the principal.

[13] Ex ante, the principal can screen to limit information asymmetry, or incentivize to limit interest misalignment. Ex post, the principal can monitor to limit opportunism.

approximately nine directors, who are predominantly male and not independent.[14] Moreover, the mean board director is almost 52 years old, has served almost ten years on the board, and has 0.10% equity in the organization. Except for size, each board characteristic of the mean cooperative is different as compared to the mean firm in the agri-food industry. Differences in the characteristics of corporate and cooperative boards of directors are not surprising. Because of the ownership structure, control is much more important to the members of the cooperative as compared to the shareholders of the IOF (Hansmann, 1999). Also, cooperative governance is in general perceived to be more complex than corporate governance (Spear, 2004; Cornforth, 2004).[15]

C. Capital Structure

"In comparison with corporate capital structure, the literature on agricultural cooperative capital structure is relatively underdeveloped, and yet no less controversial" (Pederson, 1998). Not only is the literature controversial, it is also dated, scattered, and generally not applied or empirical.[16]

The first part of the literature on cooperative capital structure is advisory or explanatory, often analyzing the balance sheet of the cooperative in comparison to the firm. Although the cooperative also lists assets on the left side and debt and equity on the right side, the exact composition of the individual items is not as straightforward as for the firm. One obvious difference is the nature of accounts

[14] To be exact, of all cooperative board directors in the sample, only 0.53% are independent and 1.36% are female. The comparable percentages are 64% and 12%, respectively, for corporate board directors in the agri-food industry (Grashuis and Cook, forthcoming).

[15] The duality of purpose refers to the dual relationship of the member to the cooperative as both a supplier and a transactor (Feng and Hendrikse, 2012). Consequently, the cooperative balances input cost minimization and output return maximization, which are mutually exclusive.

[16] In the interest of space and relevancy, the scarce literature on the cooperative capital structure from before 1990 is not discussed.

receivable, which is composed of credit to be received from customers who are primarily the owners, as well as accounts payable, which is composed of debt to be paid to suppliers who are primarily the owners (Binion, 1998).[17]

As for equity, each cooperative has four types of equity acquisition (Peterson and Cobia, 2000). The first type is direct investment by means of member purchases of common or preferred stock. Such equity is always allocated, which implies the equity will have to be returned to the member, but typically at the discretion of the board of directors. Direct investment may or may not be proportional to patronage, which depends on the ownership structure. The second type is retained patronage, which is applicable when a certain percentage of net income is withheld for future reinvestment in the cooperative. Similar to retained patronage, the third type is per-unit capital retains, which is deducted from revenue, not net income. Just like direct equity investment, retained equity is also allocated. The fourth type is unallocated equity, which is accumulated from net income to serve as a permanent buffer for future losses or source for future financing of assets and resources. Unallocated equity is only redeemed upon dissolution of the cooperative.

The second part of the literature on cooperative capital structure is descriptive, examining the debt and equity sources and proportions for the farmer cooperative. For example, Lerman and Parliament (1993) studied 60 U.S. regional farmer cooperatives for the 1970-1987 period, concluding the capital structure of the mean cooperative evolved over time. On average, the use of equity increased, decreased, and then increased again, while the use of current liabilities rose throughout. Rathbone and Wissman (2000) reported USDA survey data on the capital structure of farmer cooperatives for four decades. The use of

[17] The importance of each account is dependent on the type of cooperative. All else equal, accounts receivable is more applicable to a supply cooperative than a marketing cooperative, and vice versa for accounts payable. For a cooperative with mixed operations, such as a grain marketing cooperative which supplies petroleum, both accounts are applicable.

equity decreased from almost 60% in 1954 to approximately 40% in 1997, the same percentage as current liabilities. The trend of rising leverage continued in 2008 as the mean equity percentage of 1,164 sampled cooperatives dropped to 32% (Eversull, 2011).

Much research illustrates the impact of size on cooperative capital structure. Lerman and Parliament (1991) concluded the leverage of the mean small and large cooperative decreased and increased, respectively, from 1970-1987, while a Kruskal-Wallis rank test determined no significant difference in the median debt-to-equity ratios for the small and large cooperative. However, Lerman and Parliament (1991) found the difference in the asset turnover ratio, the quick ratio, and return on equity to be significant. Pederson (1998) conducted a similar comparison for a sample of 424 Midwest cooperatives. When sorting by size, the mean cooperatives in the first quartile and the fourth quartile had a debt proportion of 31% and 69%, respectively. However, between 1984 and 1995, the 100 largest cooperatives increased the use of equity from 33.8% to 37.3%, while also increasing the use of current liabilities. Eversull (2011) presented the most recent data, illustrating the positive relationship of size, as measured by total assets, and leverage (see Table 1).

Descriptive data is also often presented by cooperative type or by commodity type. For the 1970-1987 time period, Lerman and Parliament (1991) reported the median financial ratios for cooperatives in the dairy, food manufacturing, grain, and supply cooperatives. Supply and food marketing cooperatives had the lowest and the highest debt-to-equity ratio, respectively, while dairy cooperatives had the best efficiency and the best liquidity, as evidenced by the asset turnover ratio and the quick ratio. However, return on equity proclaimed grain cooperatives as the most profitable. Pederson (1998) examined two cross-sectional data sets for 1989 and 1994, observing a general increase in total assets for grain marketing cooperatives, other marketing cooperatives, petroleum supply cooperatives, and other

supply cooperatives for the five-year period. Except for other marketing cooperatives, all types decreased the use of equity and increased the use of current liabilities, which on average accounted for approximately 40% of all financing. Once again, Eversull (2011) provided a comprehensive overview of balance sheet proportions for eight types of cooperatives (see Table 2). Relatively, service cooperatives have little debt and much allocated equity, dairy cooperatives have the least permanent equity, and farm supply cooperatives make the most investments.

Finally, it is also common to conduct a comparative study of corporate and cooperative capital structures. For example, Royer (1991) compared the financial ratios of 13 types of cooperatives to firms in the same agri-food sectors. Ten of the 13 types of cooperatives had a lower median current ratio, which indicated a lesser ability to cover current liabilities. Comparison of the debt-to-equity ratio proved to be less conclusive as seven (six) of the cooperatives had lower (higher) debt-to-equity ratios than the corresponding firms in the same sector. Lerman and Parliament (1993) reached a similar conclusion when comparing the growth percentages of long- and short-term debt and equity use by cooperatives and nonfinancial corporations.

D. Financial Flexibility

Researchers have observed and discussed the equity constraint of farmer cooperatives for a long time (Helmberger, 1966; Vitaliano, 1983; Staatz, 1987; 1989). More recently, Richards and Manfredo (2003) accused the equity constraint of being the primary cause of mergers and acquisitions of farmer cooperatives, and Van der Krogt et al. (2007) also concluded the preference for mergers, partnerships, and joint ventures by farmer cooperatives is motivated by the limited access to equity. Chaddad et al.

(2005) empirically tested the financial constraint hypothesis, concluding investment by farmer cooperatives is very dependent on the availability of internal equity.

The equity constraint, and therefore the nature of the capital structure, is attributable to the ownership structure and the governance structure in three manners. First, access to the private debt market is limited as decision control is assumed by the residual claimants, which makes financial institutions weary (Vitaliano, 1983; Lerman and Parliament, 1993). Second, access to the public equity market is limited or nonexistent as the traditional cooperative has no stock market presence. Third, access to the private equity market is limited by the personal wealth and risk attitudes of the member patrons as ownership is not available to outside investors. A clear connection between the capital structure, the governance structure, and the ownership structure is welded by the concept of property rights problems (Cook, 1995). Specifically, the free rider problem, the horizon problem, and the portfolio problem all relate to the equity constraint.[18]

The free rider problem, which arises in any group action setting, applies to farmer cooperatives both internally and externally (Royer, 1999). External free riding applies when non-members pay or receive the same price as members.[19] Internal free riding can occur in at least three ways. First, when relatively new members pay or receive the same price as relatively old members. Second, when relatively small members pay or receive the same price as relatively large members. Third, when members using one aspect of a mixed or multi-purpose cooperative pay or receive the same price as members using another

[18] Two other property rights problems are the control problem (Jensen and Meckling, 1979), which concerns the agency relationship of members-members and members-managers, and the influence problem (Bogetoft and Olesen, 2007), which concerns the uneven distribution of costs and benefits. Both types of problems have limited correlation to the capital structure, which is why further discussion is deemed unnecessary.

[19] For example, a group of walnut growers form a marketing cooperative, thus increasing the collective bargaining power vis-a-vis retailers and processors. However, buyers may pay non-members the same price as the market structure has been changed.

aspect.[20] In each situation, members face disincentive to invest because returns are diluted by the noninvestment or relative underinvestment of free riders (Cook and Iliopoulos, 2000; Sykuta and Cook, 2001).

Farmer cooperatives have a residual horizon problem if a residual claim on the income stream of an asset is shorter than the lifespan of the income stream (Porter and Scully, 1987). Investment in a long-term asset which generates an income stream beyond the claim right is irrational. The horizon problem breeds a preference for "current cash flow at the expense of future earnings" (Staatz, 1987). Member patrons with retirement on the horizon will be relatively uninterested in investing in long-term growth opportunities, in particular such activities as research and development (Cook, 1995). In efforts to extract member equity, exiting member patrons may pursue equity redemption or even full dissolvement of the cooperative. In addition to high average age, the horizon problem is exacerbated by five conditions: "1) the per-member capital invested in the cooperative is large, 2) the cooperative has a closed membership, 3) few of the member firms are legally incorporated, 4) the intergenerational transfer of membership within families is prohibited, and 5) the cooperative has a large, diverse membership" (Staatz, 1987).

The portfolio problem concerns risk attitudes at the farm level and the cooperative level (Jensen and Meckling, 1979; Vitaliano, 1983; Porter and Scully, 1987).[21] Facilitated by the inability to sell or trade ownership, misalignment of risk attitudes applies if the optimal risk portfolio at the farm level is more or

[20] For example, if a multi-purpose cooperative in the business of marketing grain and processing milk uses a pooled capital system, grain producers and milk producers will receive the same benefit even if the proceeds from marketing grain or processing milk are uneven nominally or relatively.

[21] According to Plunkett (2005), the portfolio problem is existent in two forms: (i) the lateral portfolio problem, and (ii) the vertical portfolio problem. The former is applicable when, for example, a hog producer cooperative makes a long-term investment in corn marketing. An example of the latter is when a grain marketing cooperative builds an ethanol plant.

less risk averse as compared to the observed risk portfolio at the cooperative level. Consequently, member patrons may be under- or overinvested. If underinvested, a member patron likely has a preference for risky activities for which the return and the variance is relatively high, and if overinvested, a member patron likely has a preference for safe activities for which the return and the variance is relatively low. Also, if overinvested, the cost of risk-bearing is relatively high to member patrons, which may imply the cooperative is not the optimal mode of organization (Hansmann, 1996).

III. Framework: Capital, Governance, and Ownership

At this point, the theory as reviewed in the previous section is applied and extended to develop the framework. The primary objective is to connect the structures of capital, ownership, and governance in the context of U.S. farmer cooperatives. In doing so, testable hypotheses are formed. The framework is developed step by step by combining two structures at a time. The initial emphasis is on the interrelationship of the two structures, not on the individual determinants. Later all three structures will be combined.

The first combination is the ownership structure and the governance structure (see Figure 3). As explained in the introduction, the ownership structure and the governance structure specify the assignment of claim rights and control rights, respectively. For the classical cooperative, which employs the traditional one-member, one-vote system, there is minimal control and ownership separation. As effective control is assumed by the board of directors, member patrons of the classical cooperative have full control and full ownership. This combination is represented by the square at the top.

What is the impact of change in one structure on the other structure? As member ownership is diluted or dispersed, is retaining full member control feasible?[22] The answer is likely to be no. Increases in the number of member patrons imply increases in the number of opinions and interests. Then, as the board of directors is challenged to represent the various opinions and interests, there is added pressure to further separate "the management (initiation and implementation) and control (ratification and monitoring) of decisions" (Fama and Jensen, 1983). Indeed, as democratic cost rises (Pozzobon and Zylbersztajn, 2013), "the main function of the board will shift from directing to supervising" (Bijman et al., 2013).

Hypothesis 1: Diversity and dispersion of member ownership forces the adoption of a non-traditional governance structure (in order to minimize democratic cost)

The same logic applies to the sacrifice of member ownership, which implies outside investment in the cooperative by means of common stock shares, preferred stock shares, participation shares, or other equity instruments.[23] Such investment is unlikely to be made if no complementary control is granted, or if full member control is maintained. According to property rights theory, optimal ex ante investment is secured by means of optimal ex post protection of the income stream, which implies control must in part be assumed by the investors (Hart and Moore, 1990). Delegation of control management is in particular necessary to secure outside investment in the downstream part of the supply chain (Hendrikse and Bijman, 2002).

[22] Diversity is perceived as the decrease in the relative ownership share of the median member patron. On the same note, dispersion is perceived as the geographical expansion of membership. Both phenomena make active member control complicated.

[23] Considering the first claim on net income, debt holders are often considered to be owners, but its impact is not pursued in this paper.

Hypothesis 2: Sacrifice of member control facilitates the adoption of an ownership structure with less member ownership

Hypothesis 3: Member control delegation is driven by outside investment in common or preferred stock inside or outside the cooperative or in other equity instruments (in order to secure specific knowledge)

The second combination is the ownership structure and the capital structure (see Figure 4). The top square once again represents the classical cooperative, for which the core ownership characteristics are non-transferability, non-appreciability, and redeemability (Chaddad and Cook, 2004). Nominally, each characteristic is likely to have a negative impact on member equity as risk attitude at the farm level is not adjustable to the risk portfolio at the farm level (Porter and Scully, 1987), and relatively, each characteristic is likely to have a negative impact on debt access as the ability of debt repayment is not obvious to credit providers. Altogether, financial flexibility for the classical cooperative is likely to be relatively low.

Hypothesis 4: As compared to the classical cooperative, financial flexibility is higher in cooperative modes of organization in which ownership is transferable and appreciable

Of course, the defining characteristic of the classical cooperative is its ownership restriction. Traditionally, claim rights are only assigned to its suppliers and customers. The sacrifice of member ownership is accomplished with outside investment in participation units, preferred stock, or even common stock in the cooperative or its subsidiaries, as applicable to the co-maker cooperative or the hybrid listed cooperative (Van Bekkum and Bijman, 2006). Relaxing the ownership restriction thus

improves access to the private equity market, which implies both individuals and organizations have opportunity to invest equity in the cooperative. Furthermore, access to the public equity market is granted if cooperative stock or subsidiary stock is listed on the stock exchange. By extension, improved access to the private equity market and possibly the public equity market is likely to foster improved access to the private debt market as cooperative equity is more dispersed or less concentrated. On the same note, improved access to the private equity market also strengthens the ability to repay debt and withstand adversity, which implies greater creditworthiness (Chesnik, 2000).[24]

Hypothesis 5: As compared to the classical cooperative, cooperative modes of organization with mixed member and investor ownership have greater financial flexibility

Finally, the third combination is the governance structure and the capital structure (see Figure 5). Here, the top square represents the combination of full member control and relatively low financial flexibility, which is again likely applicable to the classical cooperative. For the classical cooperative, decision management is assumed by the board of directors, while formal control is retained by the member patrons, which corresponds to the traditional model (Chaddad and Iliopoulos, 2013). Consequently, separation of control and ownership is at the legal minimum for the classical cooperative.

What is the impact of further separation of control and ownership on the capital structure? With the adoption of the extended traditional model, the management model, or the corporate model, what happens to the financial flexibility of the cooperative? The first impact relates to the debt market. Traditionally, access to the debt market is limited as control is held by the residual claimants, which as compared to the IOF is unconventional (Lerman and Parliament, 1993). Consequently, the delegation of

[24] Cooperative equity is not permanent or temporary but dynamic because a large percentage is allocated. Only unallocated equity is considered to be a permanent source to cover debt and losses. Consequently, improved access to the private equity market is likely to facilitate the growth of both allocated and unallocated equity as future income increases.

effective control to management, which in general is composed of non-residual claimants, reinforces the notion of the cooperative being operated on for-profit objectives.[25]

The second impact relates to the equity market. For the classical cooperative, the cost of equity is relatively high as no effective control is granted to outside investors (Hendrikse and Veerman, 2001). Consequently, as full member control is retained, the cooperative is still characterized by its duality of purpose (Feng and Hendrikse, 2012). While the mean member patron is interested in both input cost minimization and output return maximization, the mean outside investor is only interested in profit maximization. Hence, in order to secure outside investment, effective control cannot be held by the residual claimants.

Hypothesis 6: Financial flexibility is greater for cooperative modes of organization in which decision management is not assumed by the board of directors

So far, this paper advanced the framework by analyzing two structures at a time. However, a major point of emphasis in this paper is the interrelationship of capital, governance, and ownership. None of the structures exist in a vacuum. As hypothesized, a change in one structure likely causes a change in both other structures. Hence, instead of three two-dimensional grids, the interrelationship of capital, governance, and ownership is now portrayed by one three-dimensional cube (see Figure 6). Each axis represents a structure, where ownership is proxied by the degree of member ownership diversity, governance by the degree of member control delegation, and capital structure by the degree of financial flexibility at the cooperative level. To be clear, the classical cooperative is hypothesized to be in the

[25] Theoretically, managers can be residual claimants as outside investors in the cooperative or its subsidiaries. However, the impact of ownership by management, which is much discussed in the context of the IOF (Coles et al., 2012), is not well- documented for the cooperative mode of organization. Managerial ownership in the cooperative is thus often assumed to be zero or negligent.

upper right corner with a combination of low member ownership diversity, low member control delegation, and low financial flexibility, and the IOF is hypothesized to be in the bottom left corner with a combination of high member ownership diversity, high member control delegation, and high financial flexibility. The implied tradeoff is one between member ownership and financial flexibility, as well as member control and financial flexibility, which allows the formulation of two more hypotheses.

Hypothesis 7: No organizational modes exist with a combination of low member ownership diversity, low member control delegation, and high financial flexibility

Hypothesis 8: No organizational modes exist with a combination of high member ownership diversity, high member control delegation, and low financial flexibility

IV. Data

Data used for this paper is both primary and secondary in nature. Secondary financial data is provided by USDA for all U.S. farmer cooperatives for the year 2014. The database contains the major balance sheet, income statement, and cash flow statement items. Additional primary data is collected for the same population via the online survey method. The survey is directed at the CEOs or board chairmen of the cooperatives, persons with intimate knowledge of the ownership and governance of the organization. Online contact information for CEOs or board chairmen proved to be available for 1,164 of the 2,001 cooperatives on file, which implies a sampling frame of 1,164. Each contact received a survey invitation in early December 2015. Non-respondents received a series of reminders in December 2015 and January 2016. By February 2016, the final sample comprised 371 observations for a response rate of 32.73%. After deleting observations with missing data, the effective response rate came to 31.87%.

The survey comprised six sections: (i) respondent information, (ii) cooperative characteristics, (iii) common and preferred stock, (iv) entry and exit, (v) subsidiary organization and public market presence, and (vi) governance (see Appendix A). The questions were formulated so as to inform the ownership model typology of Chaddad and Cook (2004) and the governance model typology of Chaddad and Iliopoulos (2013). The survey resembled one conducted by Benos et al. (2015), who studied ownership and governance in relation to strategy and performance.

Table 3 presents the basic respondent characteristics. Almost 74% of the sampled cooperatives are active on the local level, which likely implies the state level. 14 of the 371 cooperatives are active nationally, and another 13 are active internationally. Most of the cooperatives are supply or marketing cooperatives, while vertical integration is exhibited by the 210 cooperatives which combined two or more core activities. The commonness of supply and marketing cooperatives in the sample is reinforced by the commodity sector classifications. Overall, 61% of the respondents are marketing cooperatives, while 28% are supply cooperatives. The percentages for the sample are not much different from the percentages for the population. While grain marketing cooperatives and supply cooperatives are somewhat over- and underrepresented, respectively, the sample overall is quite representative of the full population of U.S. farmer cooperatives.

V. Descriptive Analysis

A. Ownership Structure

Ownership structure is given by twelve dimensions. The dimensions are ownership of common stock, proportionality of equity and patronage, share transferability among members, share transferability

among members and non-members, share appreciability, equity redeemability, preferred stock availability, ownership of preferred stock, subsidiary organization(s), outside ownership in subsidiary organization(s), membership openness, and upfront capital contribution (see Table 4). As each dimension is binary in nature, there are 2^{12} = 4,096 possible structures.

For the purpose of testing the ownership structure typologies in Chaddad and Cook (2004) and Cook and Chaddad (2004), it is necessary to first only consider eight of the twelve dimensions: ownership of common stock, proportionality of equity and patronage, share transferability among members, share transferability among members and non-members, share appreciability, equity redeemability, subsidiary organization(s), and outside ownership in subsidiary organization(s). As illustrated in Table 5, approximately half of the observations fit one of the seven common ownership structures.[26] Interestingly, many of the cooperatives conform to the mold of the classical structure (20%). Few cooperatives fit the rigid description of the new generation cooperative (1%), while a fair percentage is observed to have adopted an ownership structure with outside capital in the cooperative or in its subsidiary(ies) as the main characteristic (16%). However, ownership structures of 183 sampled cooperatives are not captured, which suggests the ownership structure typologies in Chaddad and Cook (2004) and Cook and Chaddad (2004) need refinement in order to better represent the full population of U.S. farmer cooperatives. Overall, the data reveal 132 different ownership structures. By far the most common ownership structure, which is adopted by 17 of the 371 cooperatives, has the following characteristics: ownership is restricted, equity is non-transferable, non-appreciable, and non-redeemable, membership is closed and requires an upfront capital contribution, there is no preferred stock, and there is no subsidiary organization. The ownership structure with the next highest adoption

[26] Of course, the investor-oriented firm is not observed in the sample. Instead, the hybrid-listed cooperative (Van Bekkum and Bijman, 2006) is included to accommodate the single observation which is listed on the public market.

rate has identical characteristics, except membership is open, no upfront capital contribution is required, and equity and patronage are proportional.

B. Governance Structure

Governance structure is informed by nine dimensions, which are proportionality of voting and patronage, board size, board independence, membership of the CEO, directorship of the CEO, chairmanship of the CEO, senior management team size, manager independence, and board committees (see Table 6). Unlike for the ownership structure, not each dimension for the governance structure is binary. Board size and senior management team size are categorical in nature. When assuming the natural form for all dimensions, the number of possible structures is 1,536.

Two dimensions, the presence of board directors and the presence of senior managers, are considered in order to test the governance structure typologies in Chaddad and Iliopoulos (2013) and Bijman et al. (2013). Table 7 illustrates the great popularity of the traditional model and the extended traditional model. The complete irrelevance of the two polar models is by default as each U.S. cooperative is by law mandated to have a board of directors, and the Supervisory Committee and the Member Council are two governance mechanisms only found in Europe. While the two typologies are applicable to the full sample at this level of abstraction, the data suggest governance is not quite as one- or two-dimensional as is portrayed in the literature. Among the sampled cooperatives, there are as many as 85 different governance structures when considering all nine dimensions in natural form. The most common governance structure, which is adopted by 25 of 371 cooperatives (6.74%), is characterized by a medium board size (6-10 directors), a small and independent management team (1-2 senior managers with no

membership or directorship), and one or more committees. The next most common governance structure (4.58%) has the same characteristics, only without committees.

C. Capital Structure

Unlike the ownership structure and the governance structure, there is no existing typology in the literature to serve as guideline. Traditionally, capital structure is envisioned or interpreted in terms of debt or leverage, which gives the proportion of total assets financed by total liabilities. Figure 7 presents the combined debt ratio distributions for the sample and the population of U.S. farmer cooperatives. The frequencies are percentages so as to facilitate comparison of the data distributions. As illustrated, neither distribution is characterized by normality, but the majority of the observations are concentrated around the median of 0.46 and 0.47 for the sample and the population, respectively. As compared to the population, the data distribution of the sample is skewed to the left, which implies a disproportionate number of survey respondents have a low debt ratio. Ideally, debt is not considered as a uniform construct (Rauh and Sufi, 2010), but the available data disallow a more refined conceptualization of debt.

In order to provide a fuller and better conceptualization of the capital and financial structure of the sampled cooperatives, a few other ratios and statistics are considered (see Table 8). For the solvency and liquidity ratios, the table presents the unweighted mean as well as the weighted mean in order to limit the disproportionate impact of observations with low equity and few assets.[27] However, as the weighted mean represents the disproportionate impact of observations with many assets, the median is likely the better statistic to discuss. The current ratio for the median cooperative lies under the guideline

[27] The mean is weighted by gross business volume, which is the combination of total sales, total service receipts, total dividends, and total non-operating expenses.

prescribed by CoBank (1994), which implies a subpar ability to cover short-term obligations. By contrast, the median interest coverage ratio is well above the guideline. Both ratios have very large standard deviations, which is indicative of wide distributions. In terms of solvency, the debt to equity and ownership ratios correspond to the discussion of the debt ratio above: for the median cooperative, total equity is greater as compared to total liabilities. In each case the observed median is superior to the guideline, probably because the median cooperative is relatively small.

D. Rating System

A benchmark system is used in order to fill the framework as presented in section III. Each cooperative is rated on each structure: capital, governance, and ownership. For each structure, the cooperatives with the lowest and the highest ratings are benchmarks for the two ends. All ratings are thus standardized, where the lowest cooperative is zero (or 0%) and the highest cooperative is one (or 100%).

The ownership rating is based on nine dimensions: outside ownership of common stock, share transferability among members, share transferability among members and non-members, share appreciability, preferred stock availability, outside ownership of preferred stock, subsidiary(ies), outside ownership in subsidiary(ies), and stock market listing.[28] Each binary dimension is worth one point, except outside ownership of common stock and outside ownership in subsidiary(ies) are weighted by the percentage of stock owned by outsiders. The ownership rating is an indicator for the degree of

[28] Openness of membership and type of upfront contribution are not included in the ownership rating because of the ambiguous relationship to outside investment.

member ownership diversity, where zero is indicative of tight and exclusive ownership by member-patrons and one is indicative of open and strong ownership access for outside investors.

Similarly, the governance rating is based on seven dimensions: proportionality of voting and patronage, board independence, CEO independence (CEO is not a member, director, or chairman of the cooperative), senior management team size, manager independence (managers are not member-patrons), and board committees. Analogous to the ownership rating, the governance rating is an indicator for the degree of member control delegation. Hence, the lower (higher) the rating, the smaller (greater) the separation of control and ownership.

Finally, the capital rating is an indicator for the degree of financial flexibility, which to many Chief Financial Officers is the most important determinant of capital structure (Graham and Harvey, 2001). "Financial flexibility represents the ability of a firm to access and restructure its financing at a low cost" (Gamba and Triantis, 2008). Similarly, "financial flexibility refers to the ability of a firm to respond in a timely and value-maximizing manner" to uncertainty in cash flow or investment capacities (Denis, 2011). In contrast to the Modigliani-Miller world of costless financing, financial flexibility is only of importance in case of frictions which cause individuals and organizations to be constrained in terms of investing (Denis, 2011).[29] However, the degree of financial flexibility is for the most part unobserved (Gamba and Triantis, 2008; Marchica and Mura, 2010). In addition, the financial data provided by USDA is not extensive in terms of cash and debt components, which disallows proper conceptualization of financial flexibility. Consequently, financial flexibility is best indicated by the natural logarithm of long-term liabilities plus total equity, which is identical to total assets minus current liabilities. Current liabilities are not included as such finances are often earmarked and thus unavailable for long-term growth

[29] As established in the introduction and the literature review, cooperatives face constraints on both debt and equity markets.

opportunities. Generally, a low rating is associated with poor financial flexibility, and a high rating with strong financial flexibility.

Before advancing to the framework, Table 9 presents the summary for the three ratings. Because each rating is ordinal and the distance between the categories is not necessarily equal, the only proper summary method is to show frequencies by range or category. Member ownership diversity is relatively low for the majority of the sample. As approximately 80% of the sample has a governance rating of five or lower, the same observation is true for the degree of member control delegation. While not reported, measures of skewness and kurtosis indicate both distributions are non-normal. By comparison, the distribution of the capital rating is characterized by normality or near-normality.

E. Framework

A graphical presentation of the three-dimensional cube is not easily interpreted. Instead, the interrelationship of capital, ownership, and governance is better portrayed by a two-dimensional grid for each combination.

Because there exist many duplicate observations for the combination of ownership and governance, Figure 8 presents a bubble chart so frequency is also incorporated. The higher the frequency, the larger the bubble. While the two variables are characterized by moderate positive correlation (0.27), the degrees of member ownership diversity and member control delegation are not quite proportional. Combinations of tight member ownership and medium-to-strong control delegation are most frequent, while combinations of loose member ownership and weak control delegation are nonexistent. Thus, it is obvious ownership diversity is not a necessary condition for control delegation.

The scatter plot for the combination of ownership and capital is presented in Figure 9. The correlation coefficient for ownership diversity and financial flexibility is 0.33. Interestingly, there exist combinations of low member ownership diversity, or even full member ownership concentration, and relatively high financial flexibility. The largest standardized degree of financial flexibility for low ownership diversity is 0.76. Once member ownership is diluted, relatively low financial flexibility is no longer observed, or at least to much smaller degrees. Also, relatively high financial flexibility is only exhibited by observations with relatively high member ownership diversity.

The final scatter plot, presented in Figure 10, relates to the combination of governance and capital. As compared to the two other combinations, member control delegation and financial flexibility are characterized by relatively strong positive correlation (0.51). For the most part, relatively high financial flexibility is combined with relatively high member control delegation. Vice versa, there are several observations of relatively high member control delegation and relatively low financial flexibility. However, extreme combinations of low (high) member control delegation and high (low) financial flexibility are not observed. Altogether, the scatter plot indicates control delegation is necessary but not sufficient to obtain financial flexibility.

VI. Empirical Analysis

A. Model Specification

Similar to the descriptive analysis, the purpose of the empirical analysis is to study the interrelationship of the three structures, but the implementation is also mathematical instead of just statistical. Moreover, the intention is to study causation and not just correlation.

An ordinal regression model is chosen for two reasons: (i) each rating is ordinal with a non-continuous range, and (ii) the distances between the categories are unknown (Long and Freese, 2006).[30] Preference is given to ordered probit as the distribution of each rating is characterized by relatively thick tails. First, for the equation with ownership structure as the outcome variable, the underlying relationship is defined as

$$y^* = \psi_i v_i + \pi_i w_i + \beta_i z_i + \varepsilon_i \quad (1)$$

where y is the degree of member ownership diversity for cooperative i, v is the vector of governance characteristics, w is the vector of capital characteristics, z is the vector of control variables, ψ, π, and β are the parameters to be estimated, and ε is the stochastic term with a normalized mean of zero and a normalized variance of one. While y* is unobserved, observed variation in member ownership diversity is related to the latent variable in the following manner:

$$\begin{aligned} y &= 0 \quad \text{if } y^* \le 0, \\ y &= 1 \quad \text{if } 0 < y^* \le \mu_1 \\ y &= 2 \quad \text{if } \mu_1 < y^* \le \mu_2 \\ &\dots \\ y &= j \quad \text{if } \mu_{J-1} \le y^* \end{aligned} \quad (2)$$

where each μ is an unknown threshold parameter to be estimated with ψ, π, and β via maximum likelihood (Greene, 2012). Correspondingly, the probabilities are

[30] While based on numeric formulas, the foundation of the rating is rather subjective. For example, the ownership rating is in part based on the transferability and appreciability of member equity. Although each dimension is observed in binary form, its exact impact on the degree of member ownership diversity is unknown, and therefore the distance between 1and 2 is not necessarily equal to the distance between 6 and 7.

$$
\begin{aligned}
&\Pr(y = 0 \mid v, w, z) = \phi(-v'\psi, w'\pi, z'\beta) \\
&\Pr(y = 1 \mid v, w, z) = \phi(\mu_1 - v'\psi, w'\pi, z'\beta) - \phi(-v'\psi, w'\pi, z'\beta) \\
&\Pr(y = 2 \mid v, w, z) = \phi(\mu_2 - v'\psi, w'\pi, z'\beta) - \phi(\mu_1 - v'\psi, w'\pi, z'\beta) \\
&\ldots \\
&\Pr(y = j \mid v, w, z) = 1 - \phi(\mu_{j-1} - v'\psi, w'\pi, z'\beta)
\end{aligned} \tag{3}
$$

where ϕ gives the density of the distribution function. The whole setup is analogous for the equation with governance structure as the outcome variable, which is given as

$$y^* = \tau_i x_i + \pi_i w_i + \beta_i z_i + \varepsilon_i \tag{4}$$

where each symbol is as before, x is the vector of ownership structure characteristics, and τ is the new parameter to be estimated via maximum likelihood.

Because of the high number of possible ratings for the capital structure, the 0-100% range is first collapsed into twenty categories of 5% increments: 0-5%, 6-10%, 11-15%, 16-20%, et cetera. Each successive category is characterized by increased financial flexibility. Doing so simplifies interpretation of the results. Now, again analogous to the ownership structure and the governance structure, the underlying relationship for the equation with capital structure as the outcome variable is defined as

$$y^* = \tau_i x_i + \psi_i v_i + \beta_i z_i + \varepsilon_i \tag{5}$$

where each symbol is as before. As the criteria are also predictors, there is obvious potential for endogeneity, which may warrant a multivariate probit model. However, determining if such estimation is at all warranted is not the primary purpose of the current exercise.

B. Results

Before advancing to the discussion, it should be noted interpretation of probit coefficients is not at all unambiguous (Greene, 2012). In general, each coefficient gives the shift in the probit index, otherwise called the z-score, which may or may not change y*. The impact or magnitude of each coefficient is assumed to be equal across the categories. Ideally, marginal effect is discussed to approximate OLS interpretation, but considering the total number of categories and the total number of predictors, presentation of the marginal effects is not practical. Therefore, the main discussion is centered on the sign and not the magnitude of the probit coefficients.

Results of equation (1) are presented in Table 10. The left column presents the model including the governance rating and the capital rating as predictors, and the right column the model including the full vector of governance characteristics. On the whole, control variables do not significantly predict the probability in the ownership rating. The type and scope of operations are not strong predictors of the degree of member ownership diversity. There are two exceptions: processors and exporters both have an increased probability of high member ownership diversity. In contrast to the capital rating, the governance rating is characterized by strong statistical significance. Considering its mean of 0.41 and its median of 0.38, the governance rating causes a substantial shift in the z-score of the ownership rating. Model II illustrates which governance characteristics are most responsible for the significance. Interestingly, increases in board directors and senior managers have a significant negative impact on the

probability of high member ownership diversity, which is counter to intuition. The only other governance characteristic of significance is committee formation, which has a positive relationship to the probability of high member ownership diversity.

Because there is no single goodness-of-fit measure for the ordinal regression model which is analogous to R^2 for the linear regression model, several different indicators are presented at the bottom of the table so as to avoid reliance on one single measure. Each model is superior to the empty model, while model II is considered to be relatively better. Between the McFadden pseudo R^2 and the McKelvey-Zimmermann pseudo R^2, the former (latter) appears to be the lower (upper) bound estimate of the percentage of variation in the criterion explained by the model.

Table 11 contains the results for equation (4). Similar to the ownership rating, the left column presents the truncated model, and the right column the full model. The probability of member control delegation is significantly lower for federated as compared to non-federated cooperatives, which is perhaps attributable to the additional governance by the parent or central organization. Cooperative size, as proxied by the total number of employees, has a significant positive impact on the probability of member control delegation, which is also estimated to be lower for supply cooperatives and higher for marketing cooperatives. Otherwise, control variables do not significantly predict the probability in the governance rating, suggesting member control delegation is more or less independent across production types and scopes. Financial flexibility is estimated to have no significant impact on the probability of member control delegation in either model. By contrast, the positive impact of member ownership diversity on member control delegation is characterized by statistical significance. Considering the magnitude of the coefficient and the distance between the intercepts, increases in the ownership rating may cause increases in the governance rating. When expanding the ownership structure in model IV,

statistical significance is observed for outside ownership of common stock (+), equity and patronage proportionality (-), transferability among members and non-members (+), outside ownership of preferred stock (+), and open membership (-). Thus, it is obvious the probability of member control delegation is increased by the financial involvement of non-members.

Finally, results for equation (5) are presented in Table 12.[31] Once again, the truncated model is in the left column and the full model in the right column. The probability of financial flexibility is increased by cooperative size and exporter status. As compared to bean marketing and processing cooperatives, the probability of financial flexibility is significantly lower for cooperatives in the poultry sector and the artificial insemination sector, as well as for cooperatives active at the processing stage in general. Member control delegation is estimated to have a significant positive impact on the probability of financial flexibility, while the relationship of ownership to capital appears to be characterized by independence. In addition to the control variables, model VI contains the parameter estimates for the ownership and governance characteristics. For the former, the probability of financial flexibility is decreased, surprisingly, by outside ownership of preferred stock, and increased by subsidiary(ies) and outside ownership of subsidiary(ies). For the latter, a significant positive impact on the probability of financial flexibility is observed for voting and patronage proportionality and large management team size.

VII. Summary and Conclusion

[31] Because the underlying structure of the financial flexibility rating is continuous, equation (5) is also estimated by means of OLS. The OLS estimates are not much different as compared to the ordered probit estimates. In the interest of efficiency and consistency, only ordered probit estimates are reported.

The interrelationship of ownership, governance, and capital for U.S. farmer cooperatives is examined both descriptively and empirically. First, a three-dimensional framework is developed with member ownership diversity as the proxy for ownership, member control delegation as the proxy for governance, and financial flexibility as the proxy for capital structure. A spectrum with low (high) member ownership diversity, low (high) member control delegation, and low (high) financial flexibility at the two extremes is hypothesized to exist.

For the ownership structure, the typology by Cook and Chaddad (2004) is determined to be an imperfect representation of the current population of U.S. farmer cooperatives. Evidently, cooperatives have engaged in much ownership structure adaptation in the past decade, suggesting an updated typology is needed to incorporate novel hybrid structures. The same conclusion is applicable to the governance structure as the typology by Chaddad and Iliopoulos (2013) is found to be too simplistic to accurately depict the diversity in the governance characteristics of the sampled cooperatives. Using CoBank guidelines, the capital structure of the median cooperative is characterized by strong solvency and liquidity.

A rating system is used to represent each proxy. Each cooperative is rated on a 0-100 scale for the ownership structure, the governance structure, and the capital structure. Each combination is plotted to illustrate the correlation within the overall structure. The correlation between ownership and governance is 0.27. There is much evidence of member ownership concentration and member control delegation, suggesting the former is not necessary for the latter. The correlation coefficient for the ownership structure and the capital structure is 0.33, but there exist a surprising number of combinations with low member ownership diversity and high financial flexibility. Positive correlation is the strongest for the governance structure and the capital structure, where relatively high financial

flexibility is only observed in conjunction with relatively high member control delegation. When examining all three structures, there exist no combinations of high (low) member ownership diversity, high (low) member control delegation, and low (high) financial flexibility, which is evidence in favor of hypotheses 7 and 8 (see Table 13).[32]

Empirical evidence is produced by specifying and estimating an ordinal regression model for each structure. Ordered probit is selected as each rating is ordinal and the category-to-category distances are unknown. Furthermore, the distribution of each rating is characterized by relatively thick tails. The impact of member ownership diversity on the probability of member control delegation is positive and significant. The reverse is true as well, suggesting the causal relationship of ownership and governance is bidirectional, which relates to hypotheses 1 and 2. Hence, future research on the overall structure of farmer cooperatives must address the endogeneity of ownership and governance. Specifically, the probability of member control delegation is significantly predicted by any form of outside investment in or outside the cooperative, which allows hypothesis 3 to be accepted. On the whole, the relationship between capital and ownership is characterized by independence, which motivates rejection of hypotheses 4 and 5. Furthermore, the exact impact of outside investment on the probability of financial flexibility is ambiguous. Finally, the causal relationship for governance and capital is determined to be from the former to the latter. Specifically, the probability of financial flexibility is impacted positively and significantly by voting and patronage proportionality as well as management team size, which is in favor of hypothesis 6.

[32] The subjective low/high thresholds for each structure are 1/3 and 2/3, respectively. As such, there exist no observations with an ownership rating below 1/3, a governance rating below 1/3, and a capital rating above 2/3. And conversely, there exist no observations with an ownership rating above 2/3, a governance rating above 2/3, and a capital rating below 1/3.

Future research is possible in at least three directions. First, the applicability of the three-dimensional framework is testable outside the United States. It would be interesting to know if the corridor of low-to-high member ownership diversity, member control delegation, and financial flexibility also exists in Europe, where farmer cooperatives have a long and rich history. Second, the interrelationship of ownership, governance, and capital is extendable to performance. For example, Kalogeras et al. (2013) studied performance in relation to ownership, yet did not consider governance. In doing so, a system of equations is probably needed in order to address endogeneity. Third, considering the imperfection of current typologies, there is an opportunity to discover and identify novel hybrid ownership and governance structures. In addition, it is important to learn if there exist significant differences in terms of geographic scope, value chain orientation, or performance among the various ownership and governance structures. Research in any such direction will further our collective understanding of the structure and performance of farmer cooperatives.

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Figure 1 Taxonomy of Ownership Structures for Cooperative Modes of Organization

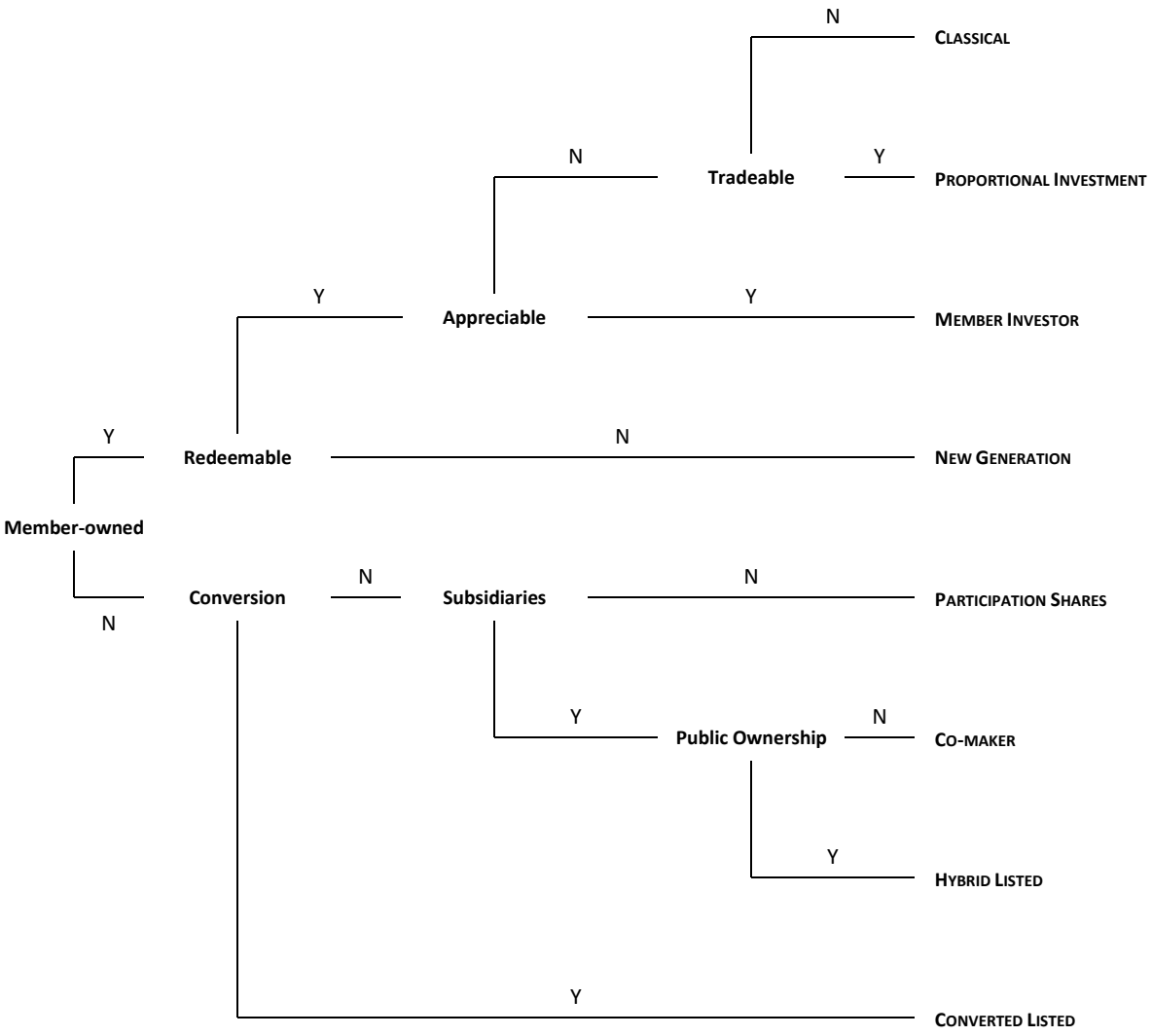

Figure 2 Taxonomy of Governance Structures for Cooperative Modes of Organization

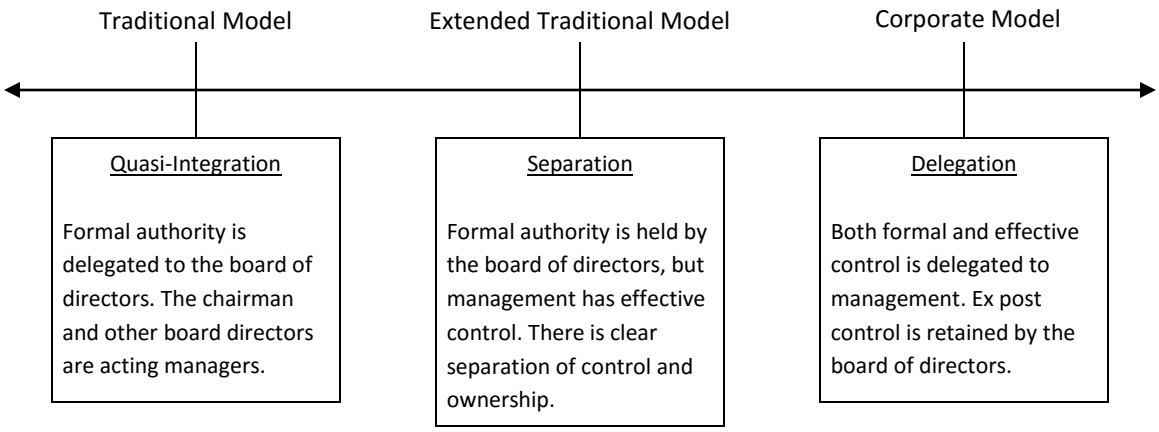

Table 1 Common Size Balance Sheet by Cooperative Size in 2008

	Asset Size ($ millions)				
	<1	1-4.99	5-19.99	20 – 50	All
Current Assets	63.86	58.92	65.38	66.40	66.17
Other Assets	4.53	2.29	2.70	10.33	8.68
PP&E	19.45	23.18	20.24	19.02	19.40
Investments	12.15	15.60	11.67	4.24	5.75
Total Assets	100.00	100.00	100.00	100.00	100.00
Current Liabilities	29.57	36.05	54.40	53.38	52.97
Long-term Liabilities	4.28	8.01	5.11	17.65	15.48
Total Liabilities	33.85	44.07	59.52	71.03	68.45
Allocated Equity	46.41	37.55	24.88	20.52	21.41
Retained Equity	18.74	18.38	15.60	8.45	10.14
Total Equity	66.15	55.93	40.48	28.97	31.55
Total Debt and Equity	100.00	100.00	100.00	100.00	100.00

Table 2 Common Size Balance Sheet by Cooperative Type in 2008

	Cooperative Type								
	Cotton and Cotton Gin	Dairy	Fruit, Vegetable, and Nut	Livestock, Wool, and Poultry	Other Marketing	Service	Grain and Oilseed	Farm Supply	All
Current Assets	78.61	59.46	60.21	75.51	53.81	51.64	75.04	66.51	66.17
Other Assets	2.27	20.49	8.07	0.98	9.30	9.58	3.33	6.42	8.68
PP&E	16.10	18.69	29.31	21.06	34.65	35.81	15.15	15.79	19.40
Investments	3.02	1.35	2.40	2.46	2.24	2.97	6.48	11.28	5.75
Total Assets	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Current Liabilities	49.60	50.38	42.25	58.10	38.24	28.75	65.61	50.85	52.97
Long-term Liabilities	20.72	23.98	23.92	12.25	20.63	12.00	9.68	10.49	15.48
Total Liabilities	70.31	74.36	66.17	70.34	58.86	40.75	75.29	61.35	68.45
Allocated Equity	22.44	25.40	21.16	20.81	30.59	42.86	13.85	22.04	21.41
Retained Equity	7.25	0.24	12.65	8.84	10.55	16.39	10.87	16.62	10.14
Total Equity	29.69	25.64	33.83	29.66	41.14	59.25	24.71	38.65	31.55
Total Debt and Equity	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Figure 3 Two-Dimensional Interrelationship of Ownership and Governance

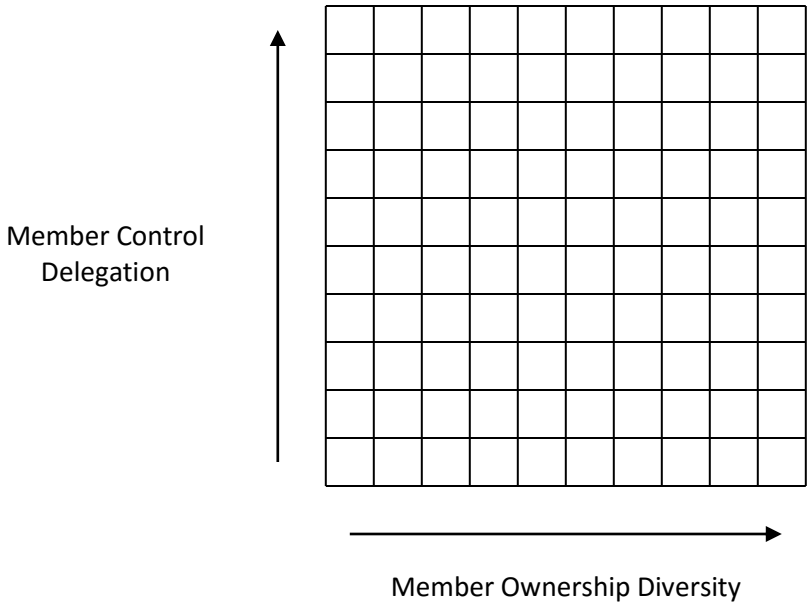

Figure 4 Two-Dimensional Interrelationship of Ownership and Capital

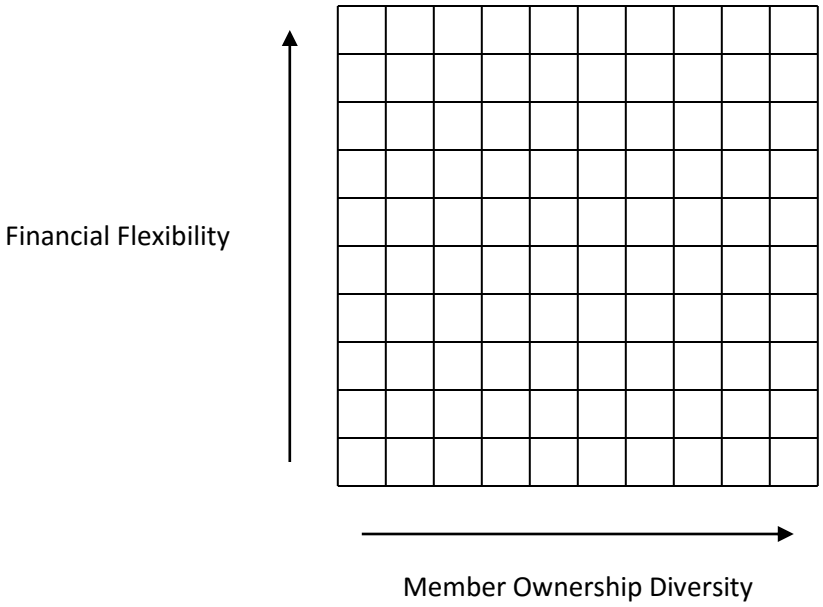

Figure 5 Two-Dimensional Interrelationship of Governance and Capital

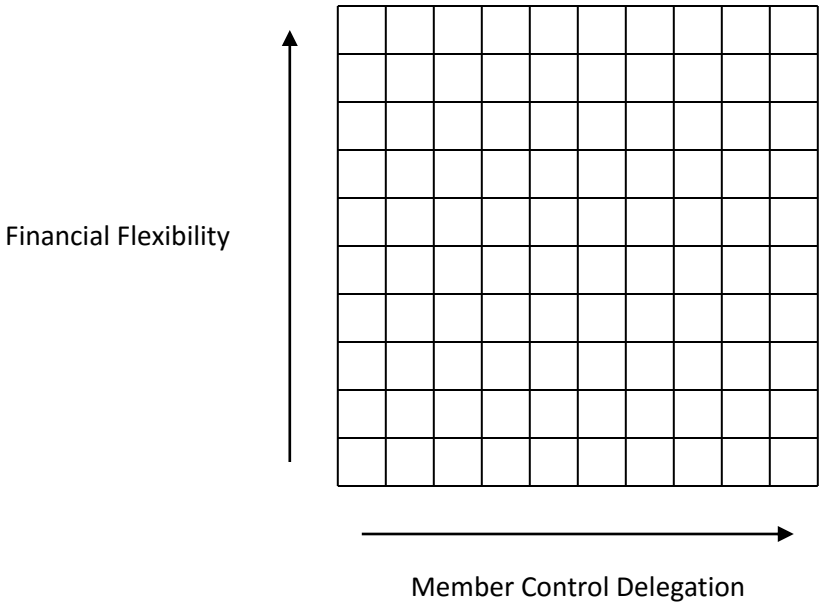

Figure 6 The Three-Dimensional Framework

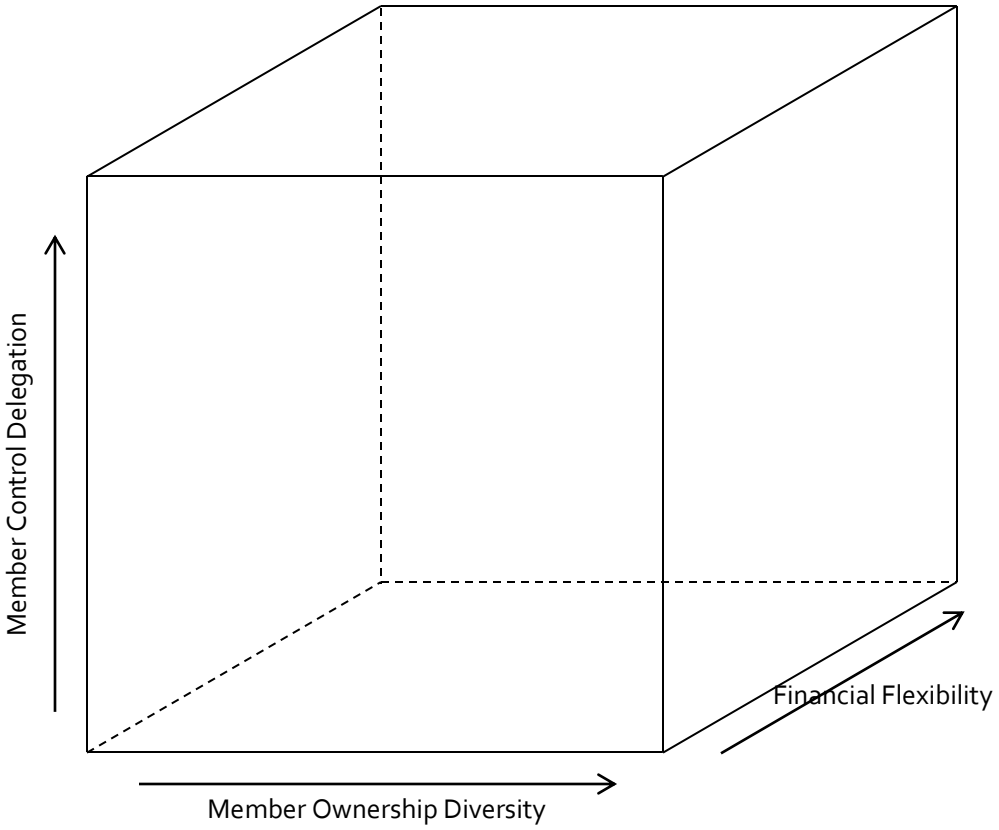

Table 3 Categorical Characteristics of Survey Respondents

	% of Sample	% of Population
Level of Operation		
Local	73.85%	—
Regional	18.87%	—
National	3.77%	—
International	3.50%	—
Supply Chain Segment		
Supply	81.67%	—
Marketing	64.42%	—
Processing	27.76%	—
Multi-Purpose	56.60%	—
Commodity Sector		
Bean and Pea	0.54%	0.23%
Cotton	5.39%	7.32%
Dairy	5.66%	5.81%
Fish	0.54%	1.78%
Fruit and Vegetable	4.85%	6.63%
Grain and Oilseed	35.04%	22.42%
Livestock	6.47%	4.16%
Nut	0.81%	0.82%
Poultry	0.27%	0.55%
Rice	0.81%	0.55%
Sugar	1.62%	1.24%
Other Marketing	1.89%	1.05%
Artifical Insemination	0.54%	0.55%
Other Supply	26.15%	39.30%
Other Service	1.35%	4.48%
Other	8.09%	1.00%

Table 4 Ownership Structure Dimensions

Variable	Definition	Variable Mean
Common Stock Ownership	1 if ownership of common stock is open to outside investors; 0 if other	0.04
Equity-Patronage Proportionality	1 if member capital investment is proportional to patronage; 0 if other	0.47
Member-Member Share Transferability	1 if it is common for member-patrons to transfer ownership to other member-patrons; 0 if other	0.09
Member-Investor Share Transferability	1 if it is possible for member-patrons to transfer ownership to outside investors; 0 if other	0.02
Equity Appreciability	1 if the value of member equity can increase or decrease over time; 0 if other	0.09
Equity Redeemability	1 if it is possible for member-patrons to redeem member equity; 0 if other	0.46
Preferred Stock Availability	1 if preferred stock is available in the cooperative; 0 if other	0.35
Preferred Stock Ownership	1 if ownership of preferred stock is open to outside investors; 0 if other	0.08
Membership Openness	1 if membership is open; 0 if other	0.64
Upfront Capital Contribution	1 if an upfront capital contribution is required for membership; 0 if other	0.56
Subsidiary	1 if the cooperative has one or more subsidiaries; 0 if other	0.25
Subsidiary Ownership	1 if ownership of common stock in the subsidiary(ies) is open to outside investors; 0 if other	0.04

Table 5 Diffusion of Ownership Structures

Name	Classical	Propor-tional Investment	Member-Investor	New Generation	Investor-Share	Co-Maker	Hybrid-Listed
Total	67	55	2	4	45	14	1
%	18%	15%	1%	1%	12%	4%	0%

Table 6 Governance Structure Dimensions

Variable	Definition	Variable Mean
Voting-Patronage Proportionality	1 if voting is proportional to patronage; 0 if other	0.09
Board Size	1 if the number of board directors is between six and ten; 2 if the number of board directors is eleven or more; 0 if other	0.97
Board Independence	1 if at least one board director is an outsider; 0 if other	0.07
CEO Membership	1 if the CEO is not a member-patron; 0 if other	0.67
CEO Directorship	1 if the CEO is not a board director; 0 if other	0.92
CEO Chairmanship	1 if the CEO is not the board chairman; 0 if other	0.99
Senior Management Team Size	1 if there are one or two senior managers; 2 if there are three or four senior managers; 3 if there are five or more senior managers; 0 if other	1.58
Manager Independence	1 if none of the seniors managers are member-patrons; 0 if other	0.64
Board Committees	1 if there is at least one board committee; 0 if other	0.54

Table 7 Diffusion of Common Governance Structures

Characteristic	Governance Structure			
	Full Control	Traditional	Extended Traditional	Managerial and Corporate
Formal Authority: Board of Directors	no	yes	yes	no
Formal Authority: Senior Management	no	no	no	yes
Real Authority: Board of Directors	no	no	no	no
Real Authority: Senior Management	no	no	yes	yes
Percentage of Population	0%	15%	85%	0%

Figure 7 Comparison of Debt Ratio Distributions

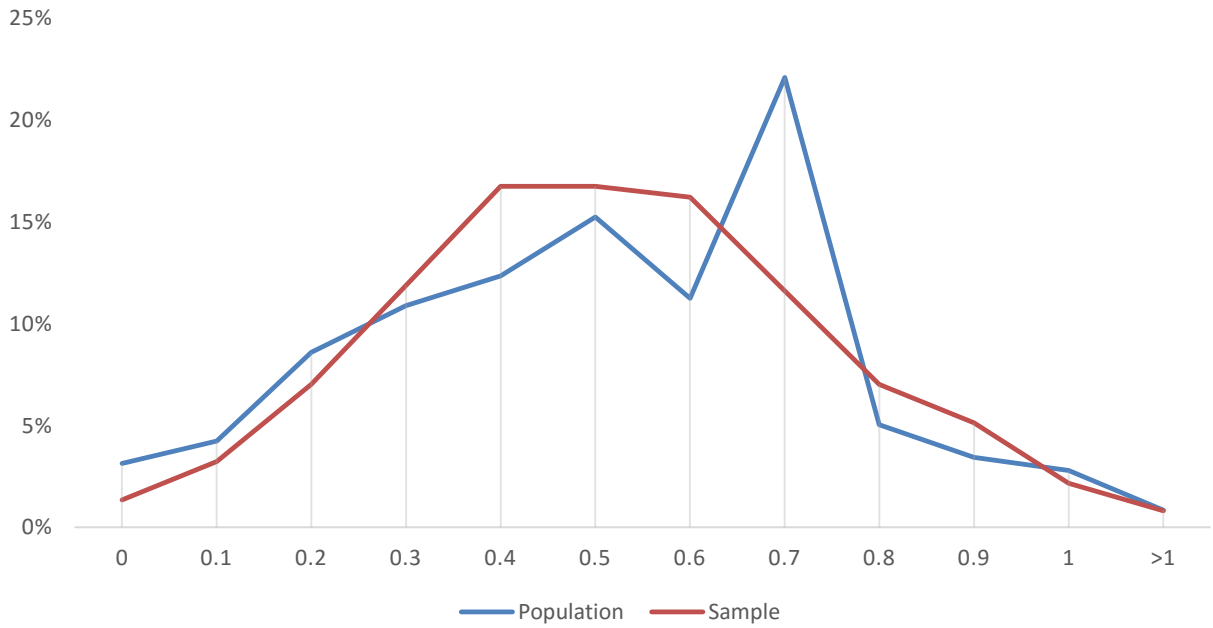

Table 8 Overview of Financial Ratios for the Sample

Ratio	CoBank Guideline	Mean	Weighted Mean	Median	Standard Deviation
Liquidity					
Current Ratio	1.80	9.86	2.60	1.52	133.99
Interest Coverage	3.00	-3.49	9.22	5.43	471.22
Working Capital to Sales	0.07	0.10	0.06	0.07	0.19
Solvency					
Debt to Assets	0.50	0.47	0.60	0.46	0.23
Debt to Equity	0.45	2.39	1.65	0.82	14.13
Ownership Ratio	0.50	0.53	0.40	0.54	0.23
Term Debt to Fixed Assets	0.50	0.63	0.44	0.17	6.80

Table 9 Distribution of Ownership, Governance, and Capital Ratings

Rating	Category	Frequency	Percentage	Cumulative %
Ownership				
	0.00-9.99	151	40.92	40.92
	10.00-19.99	128	34.69	75.61
	20.00-29.99	4	1.08	76.69
	30.00-39.99	56	15.18	91.87
	40.00-49.99	3	0.81	92.68
	50.00-59.99	19	5.15	97.83
	60.00-69.99	1	0.27	98.10
	70.00-79.99	6	1.63	99.73
	80.00-89.99	0	0.00	99.73
	90.00-100.00	1	0.27	100
Governance				
	0.00-9.99	3	0.81	0.81
	10.00-19.99	14	3.79	4.61
	20.00-29.99	45	12.20	16.80
	30.00-39.99	133	36.04	52.85
	40.00-49.99	54	14.63	67.48
	50.00-59.99	48	13.01	80.49
	60.00-69.99	53	14.36	94.85
	70.00-79.99	9	2.44	97.29
	80.00-89.99	8	2.17	99.46
	90.00-100.00	2	0.54	100
Capital				
	0.00-9.99	6	1.63	1.63
	10.00-19.99	6	1.63	3.25
	20.00-29.99	15	4.07	7.32
	30.00-39.99	28	7.59	14.91
	40.00-49.99	103	27.91	42.82
	50.00-59.99	117	31.71	74.53
	60.00-69.99	60	16.26	90.79
	70.00-79.99	28	7.59	98.37
	80.00-89.99	4	1.08	99.46
	90.00-100.00	2	0.54	100

Figure 8 Bubble Chart for the Ownership Rating and the Governance Rating

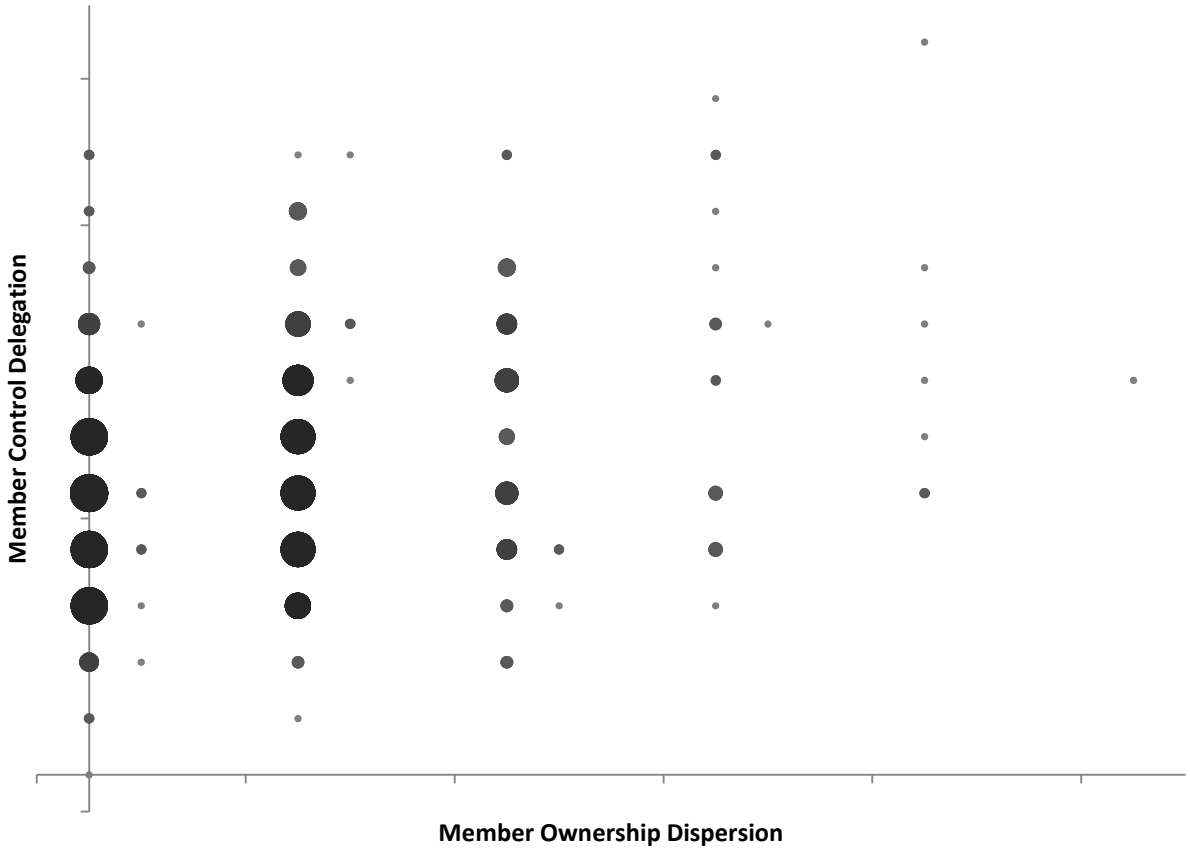

Figure 9 Scatter Plot for the Ownership Rating and the Capital Rating

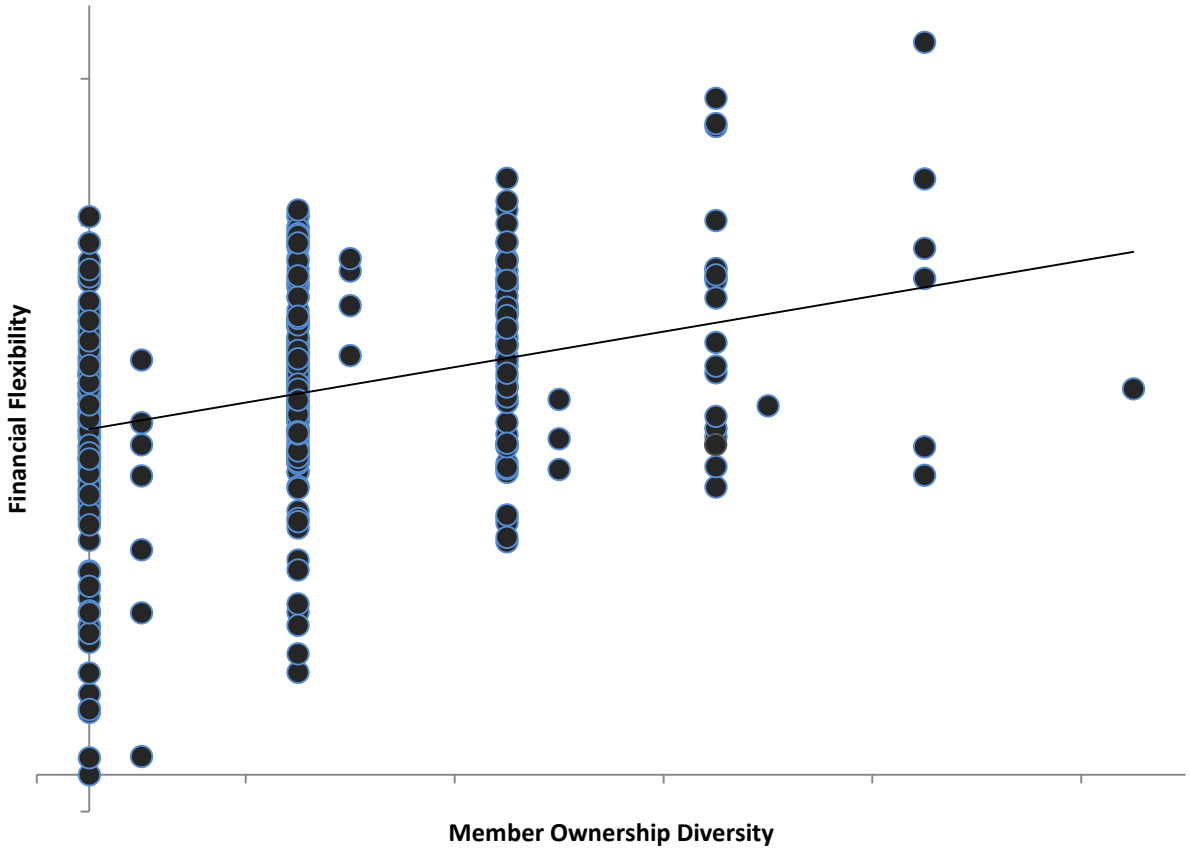

Figure 10 Scatter Plot for the Governance Rating and the Capital Rating

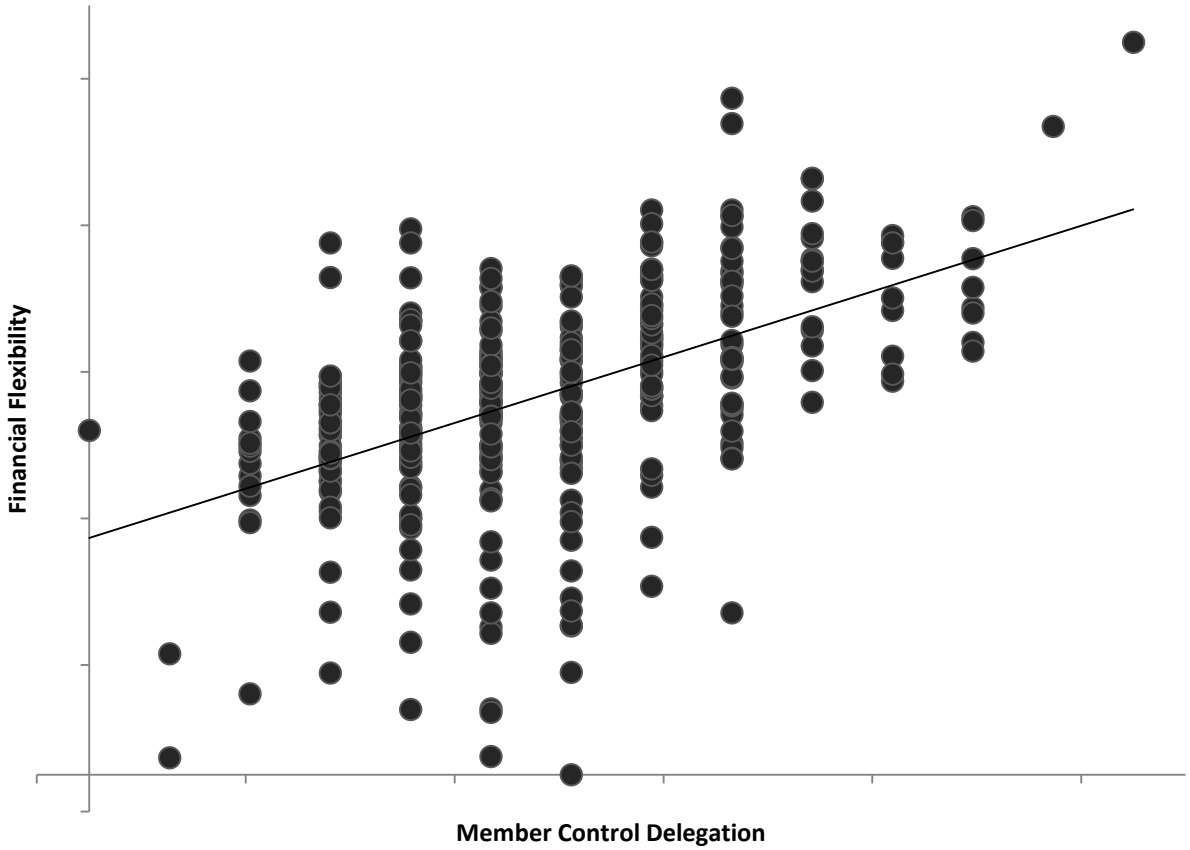

Table 10 Probit Model Estimation with Ownership Structure as the Criterion

	Model I			Model II		
Predictor	β	S.E.	p	β	S.E.	p
Intercept 1	1.264	0.949	0.183	0.525	1.005	0.601
Intercept 2	2.298	0.952	0.016	1.589	1.006	0.114
Intercept 3	2.337	0.952	0.014	1.631	1.006	0.105
Intercept 4	3.083	0.958	0.001	2.417	1.011	0.017
Intercept 5	3.149	0.958	0.001	2.488	1.011	0.014
Intercept 6	3.820	0.970	<.0001	3.178	1.023	0.002
Intercept 7	3.885	0.972	<.0001	3.251	1.025	0.002
Intercept 9	4.731	1.037	<.0001	4.135	1.091	0.000
Local (=base)						
Regional	0.045	0.155	0.773	0.148	0.165	0.370
National	-0.237	0.326	0.468	-0.090	0.338	0.789
International	-0.465	0.355	0.191	-0.224	0.373	0.548
Total Members	0.022	0.042	0.606	0.025	0.045	0.579
Total Employees	-0.014	0.096	0.888	0.067	0.101	0.507
Federated	0.202	0.140	0.147	0.219	0.143	0.127
Exporter	0.531	0.261	0.042	0.447	0.268	0.096
Supply	0.094	0.247	0.703	0.113	0.255	0.659
Marketing	0.013	0.267	0.961	0.042	0.273	0.878
Processing	0.290	0.186	0.117	0.336	0.193	0.081
Multi-Purpose	-0.093	0.297	0.753	-0.150	0.303	0.621
Governance Rating	0.105	0.048	0.028			
Capital Rating	0.072	0.051	0.163	0.070	0.054	0.196
Voting-Patronage Proportionality				0.210	0.139	0.129
Small Board Size (=base)						
Medium Board Size				-0.022	0.160	0.892
Large Board Size				-0.576	0.224	0.010

Board Independence		0.004	0.051	0.936
CEO Independence		0.034	0.155	0.829
Small Management (=base)				
Medium Management		-0.325	0.203	0.110
Large Management		-0.581	0.245	0.018
Extra Large Management		-0.349	0.270	0.196
Manager Independence		0.080	0.168	0.635
Committee Formation		0.091	0.032	0.004
Sector Fixed Effects	Yes	Yes		
N	368	358		
Pr > ChiSq	<.0001	<.0001		
AIC	1008.14	981.64		
-2 Log Likelihood	930.14	885.64		
McFadden R^2	0.18	0.22		
Veall-Zimmermann R^2	0.22	0.27		
McKelvey-Zavoina R^2	0.39	0.28		
% Concordant	67.3	70.2		

Table 11 Probit Model Estimation with Governance Structure as the Criterion

	Model III			Model IV		
Predictor	β	S.E.	p	β	S.E.	p
Intercept 1	-2.145	0.937	0.022	-2.354	0.965	0.015
Intercept 2	-1.260	0.914	0.168	-1.491	0.944	0.114
Intercept 3	-0.337	0.908	0.711	-0.563	0.939	0.549
Intercept 4	0.980	0.907	0.280	0.795	0.937	0.397
Intercept 5	1.514	0.908	0.095	1.330	0.938	0.156
Intercept 6	2.133	0.910	0.019	1.941	0.940	0.039
Intercept 7	3.300	0.925	0.000	3.169	0.955	0.001
Intercept 8	3.723	0.935	<.0001	3.640	0.967	0.000
Intercept 9	4.788	0.998	<.0001	4.796	1.036	<.0001
Local (=base)						
Regional	0.084	0.146	0.566	0.174	0.151	0.249
National	0.227	0.302	0.452	0.300	0.321	0.351
International	0.078	0.327	0.813	0.299	0.343	0.384
Total Members	0.024	0.039	0.547	0.033	0.042	0.441
Total Employees	0.413	0.089	<.0001	0.366	0.096	0.000
Federated	-0.267	0.131	0.041	-0.270	0.136	0.046
Exporter	0.214	0.258	0.408	0.056	0.277	0.840
Supply	-0.414	0.235	0.077	-0.473	0.243	0.051
Marketing	0.613	0.253	0.016	0.432	0.265	0.104
Processing	-0.131	0.178	0.463	-0.144	0.185	0.438
Multi-Purpose	-0.403	0.281	0.153	-0.253	0.293	0.389
Ownership Rating	0.079	0.036	0.030			
Capital Rating	0.046	0.046	0.324	0.074	0.050	0.138
Outside Ownership				0.270	0.121	0.026
Equity-Patronage Proportionality				-0.238	0.122	0.050
Outside Transferability				0.781	0.432	0.071

Inside Transferability		0.110	0.218	0.615
Equity Appreciability		-0.029	0.213	0.892
Equity Redeemability		-0.134	0.118	0.257
Preferred Stock Availability		-0.072	0.138	0.601
Outside Ownership of Preferred Stock		0.430	0.229	0.060
Open Membership		-0.235	0.125	0.060
Subsidiary(ies)		0.245	0.155	0.113
Outside Ownership of Subsidiary(ies)		-0.030	0.180	0.869
Sector Fixed Effects	Yes	Yes		
N	368	355		
Pr > ChiSq	<.0001	<.0001		
AIC	1198.94	1162.09		
-2 Log Likelihood	1118.94	1062.09		
McFadden R^2	0.45	0.48		
Veall-Zimmermann R^2	0.47	0.50		
McKelvey-Zavoina R^2	0.47	0.51		
% Concordant	77.8	78.7		

Table 12 Probit Model Estimation with Capital Structure as the Criterion

	Model V			Model VI		
Predictor	β	S.E.	p	β	S.E.	p
Intercept 1	-0.564	0.973	0.562	-0.439	1.074	0.683
Intercept 2	-0.260	0.962	0.787	0.045	1.050	0.966
Intercept 3	0.044	0.952	0.963	0.400	1.037	0.700
Intercept 4	0.366	0.943	0.698	0.629	1.030	0.541
Intercept 5	1.239	0.925	0.181	1.452	1.012	0.152
Intercept 6	1.655	0.920	0.072	1.832	1.008	0.069
Intercept 7	2.176	0.915	0.017	2.409	1.003	0.016
Intercept 8	2.822	0.912	0.002	3.095	1.001	0.002
Intercept 9	3.979	0.913	<.0001	4.277	1.003	<.0001
Intercept 10	4.993	0.920	<.0001	5.365	1.010	<.0001
Intercept 11	6.147	0.932	<.0001	6.682	1.025	<.0001
Intercept 12	7.162	0.947	<.0001	7.814	1.043	<.0001
Intercept 13	8.059	0.962	<.0001	8.826	1.061	<.0001
Intercept 14	9.384	0.990	<.0001	10.289	1.097	<.0001
Intercept 15	10.630	1.028	<.0001	11.739	1.142	<.0001
Intercept 16	11.805	1.092	<.0001	12.807	1.202	<.0001
Intercept 17	12.392	1.131	<.0001	13.396	1.244	<.0001
Intercept 18	13.549	1.240	<.0001	14.395	1.343	<.0001
Intercept 19	14.564	1.364	<.0001	15.387	1.482	<.0001
Local (=base)						
Regional	-0.041	0.146	0.777	0.002	0.163	0.992
National	-0.434	0.308	0.158	-0.422	0.339	0.213
International	0.027	0.330	0.935	0.027	0.362	0.940
Total Members	0.008	0.039	0.832	-0.037	0.046	0.426
Total Employees	1.422	0.081	<.0001	1.459	0.091	<.0001
Federated	0.120	0.131	0.361	0.085	0.141	0.549

Exporter	0.565	0.267	0.034	0.563	0.294	0.055
Supply	0.076	0.236	0.749	0.163	0.254	0.521
Marketing	0.067	0.256	0.793	0.126	0.275	0.646
Processing	-0.436	0.180	0.015	-0.404	0.195	0.039
Multi-Purpose	0.362	0.283	0.201	0.166	0.303	0.583
Ownership Rating	0.029	0.037	0.436			
Governance Rating	0.091	0.046	0.047			
Outside Ownership				0.040	0.121	0.742
Equity-Patronage Proportionality				0.120	0.126	0.345
Outside Transferability				-0.335	0.442	0.448
Inside Transferability				-0.027	0.227	0.907
Equity Appreciability				0.150	0.227	0.511
Equity Redeemability				-0.076	0.123	0.535
Preferred Stock Availability				-0.052	0.146	0.724
Outside Ownership of Preferred Stock				-0.445	0.241	0.065
Open Membership				0.111	0.131	0.396
Subsidiary(ies)				0.358	0.166	0.031
Outside Ownership of Subsidiary(ies)				0.498	0.191	0.009
Voting-Patronage Proportionality				0.292	0.142	0.039
Small Board Size (=base)						
Medium Board Size				0.191	0.158	0.228
Large Board Size				0.042	0.217	0.848
Board Independence				0.079	0.052	0.132
CEO Independence				-0.102	0.153	0.506
Small Management (=base)						
Medium Management				0.145	0.197	0.461
Large Management				0.387	0.254	0.128
Extra Large Management				0.629	0.279	0.024
Manager Independence				0.083	0.170	0.627

Committee Formation		0.035	0.033	0.279
Sector Fixed Effects	Yes	Yes		
N	368	345		
Pr > ChiSq	<.0001	<.0001		
AIC	1173.04	1092.39		
-2 Log Likelihood	1073.04	954.39		
McFadden R^2	0.85	0.87		
Veall-Zimmermann R^2	0.79	0.81		
McKelvey-Zavoina R^2	0.88	0.88		
% Concordant	91.8	92.4		

Table 13 Testing of Hypotheses

Hypothesis	Result
H1: Diversity and dispersion of member ownership forces the adoption of a non-traditional governance structure	Accepted
H2: Sacrifice of member control facilitates the adoption of an ownership structure with less member ownership	Accepted
H3: Member control delegation is driven by outside investment in common or preferred stock inside or outside the cooperative or in other equity instruments	Accepted
H4: As compared to the classical cooperative, financial flexibility is higher in cooperative modes of organization in which ownership is transferable and appreciable	Rejected
H5: As compared to the classical cooperative, cooperative modes of organization with mixed member and investor ownership have greater financial flexibility	Rejected
H6: Financial flexibility is greater for cooperative modes of organization in which decision management is not assumed by the board of directors	Accepted
H7: No organizational modes exist with a combination of low member ownership diversity, low member control delegation, and high financial flexibility	Accepted
H8: No organizational modes exist with a combination of high member ownership diversity, high member control delegation, and low financial flexibility	Accepted