How structure & board composition influence the financial performance of farm credit associations

by

Benjamin Hugh Ramsey

B.S.C.J, Washburn University, 2007
M.C.J., Washburn University, 2010

A THESIS

Submitted in partial fulfillment of the requirements

for the degree

MASTER OF AGRIBUSINESS

Department of Agricultural Economics

College of Agriculture

KANSAS STATE UNIVERSITY

Manhattan, Kansas

2026

Approved by:

Major Professor
Dr. Joe Parcell

ABSTRACT

The Farm Credit System (FCS) is a nationwide network of fifty-five borrower-owned financial cooperative associations playing a critical role in providing credit to U.S. agriculture and rural communities. Despite the system's size and economic importance, there has been limited empirical research examining how governance structures influence the financial performance of Farm Credit associations. This study addresses that gap by analyzing the relationship between governance structure, board choices and financial performance across U.S. Farm Credit associations.

Impact on financial performance, as measured by the return on equity, is the focus of this thesis. Using panel data from Farm Credit Administration (FCA) association annual reports covering the period from 2015 through 2024, this research evaluates governance variables including board size, female board representation, board compensation, chief executive officer tenure, member allocation of earnings, and senior leadership structure. Also, bank capital structure characteristics evaluated are characteristics known to impact performance such as size (e.g., assets), policy (e.g., capital ratio), financial structure (e.g., debt-to-asset), and cost (e.g., net interest rate margin and loss ratio). The dataset includes thirty-seven associations, including five of the seven associations affiliated with AgVantis, Inc. This distinction allows for examination of whether shared technology and service platforms influence governance effectiveness and financial outcomes in the AgVantis shared services consortium.

Results indicate that financial structure and operational efficiency are the primary determinants of return on equity across Farm Credit associations. Net interest margin and

loss ratio demonstrates the strongest and most consistent relationships with performance, while permanent capital ratio and leverage also contribute positively to several specifications. Governance variables exhibit more conditional effects. Senior leadership team size is positively associated with financial performance, and board size is negatively associated with return on equity among non-AgVantis associations. However, CEO tenure, female board representation, and board compensation do not consistently demonstrate statistically significant relationships. AgVantis affiliation appears more closely associated with reduced dispersion in performance outcomes than with higher average profitability.

These findings suggest that governance influences financial outcomes indirectly through strategic and operational channels rather than as a standalone driver of profitability. The study contributes empirical evidence to cooperative governance research and provides practical insights for Farm Credit association boards, borrower-owners, and regulators seeking to sustain financial strength and long-term member value within the Farm Credit System.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGMENTS

I would first like to express my sincere appreciation to Kansas State University and the Master of Agribusiness (MAB) Program for providing an educational experience that challenged me professionally and academically. The faculty and structure of the program pushed me to think more critically about agriculture, finance, and leadership, and I am grateful for the opportunity to be part of a program that is so highly respected within the agricultural industry. I am especially grateful to Dr. Parcell for the significant time and attention he dedicated to guiding this research. His mentorship, detailed feedback, and commitment to academic excellence greatly improved both this thesis and my development as a researcher.

I am also deeply thankful to High Plains Farm Credit for supporting me throughout this academic journey. I would specifically like to thank our Chief Executive Officer, Kevin Swayne, our Chief Lending Officer, Rob DeWeese, and the High Plains Farm Credit Board of Directors for their encouragement, flexibility, and belief in continued professional development. Their support made it possible for me to balance the demands of a professional career with the rigor of graduate-level coursework and research.

To my family, I owe the greatest gratitude. To my wife, Jenny, thank you for carrying so much of the load at home during this process. There were many days, nights, and weekends when I was studying, writing, or working on coursework, and you kept our household moving forward while continuing to provide the love, patience, and encouragement I needed to finish this degree. Your support made this achievement

possible. To my sons, Eli and Ryan, thank you for your understanding, your encouragement, and for reminding me what truly matters in life. You are my greatest motivation.

Finally, I would like to honor my late grandfather, Dr. R.H. Spencer. He instilled in our family a deep pride in Kansas State University and a love for the purple that still runs strong today. His passion for Kansas State helped shape the path that led me here. Though he is not here to see this milestone, his influence continues to guide me, and I am proud to carry forward the legacy he began.

CHAPTER I: INTRODUCTION

The Farm Credit System (FCS) is a nationwide network of borrower-owned cooperative associations[1] that has been integral to financing American agriculture for more than a century. Established in 1916 through the Federal Farm Loan Act, the FCS was designed to address the chronic lack of access to affordable credit in rural America. Twelve Federal Land Banks were established initially to provide long-term credit. Additional agricultural credit acts expanded the FCS loan authority to short-term loans, cooperatives, and expanded the reach of the FCS geographically. More than a century later, the FCS has grown into a nationwide network consisting of four district banks and fifty-five associations that collectively manage hundreds of billions of dollars in agricultural and rural lending. Despite this lending size and significance to rural America, the FCS continues to operate under cooperative principles. This cooperative ownership model makes the governance of Farm Credit associations distinctive and critical.

Governance in Farm Credit associations therefore plays a uniquely important role. Boards of directors in these associations are elected by member-borrowers, and their decisions directly influence financial outcomes, member satisfaction, and the resilience of the cooperative. Some associations also allow for appointed outside members to be appointed on their Boards of directors. Unlike shareholder-owned banks that prioritize stockholder returns, Farm Credit associations must balance profitability with member

[1] A cooperative, as used in this thesis, refers to a member-owned and democratically controlled business structure in which individuals or organizations jointly own and operate an enterprise, sharing in both its risks and benefits. Cooperative principles typically emphasize user-ownership, user-control, and service at cost, distinguishing them from investor-owned firms.

benefits, which creates tension in governance design. Boards must determine how to allocate earnings between retained capital, which supports long-term stability, and patronage refunds, which provide direct value to members. These choices highlight the challenge of achieving both profitability and member benefit simultaneously.
While the Farm Credit Administration (FCA) mandates certain requirements such as the inclusion of at least one or two outside directors (depending on asset size) and the inclusion of a financial expert, the actual effectiveness of these governance features in driving profitability remains unclear. For example, it is unknown whether larger boards dilute accountability or whether smaller, more agile boards better support decision-making. Similarly, the impact of diversity, director tenure, and the presence of independent directors on cooperative financial performance is still underexplored.

Another challenge lies in balancing cooperative principles with financial efficiency. Because borrower-owners expect both affordable credit and patronage distributions, governance decisions directly affect farm-level financial outcomes across rural America. This creates a broader public interest in ensuring that Farm Credit association boards are effective, since the stability of these associations' influences credit availability for agriculture nationwide. Little empirical research has directly studied the governance-performance relationship in the Farm Credit System. Most existing work focuses on either agricultural cooperatives or commercial banks, leaving Farm Credit associations relatively underexamined.

The central challenge being investigated in this thesis is how the structure and composition of boards of directors influence the financial performance of Farm Credit associations. Performance is viewed through the lens of return on equity (ROE) as this

measure is a standardized financial performance measure common across businesses. The study will examine governance-performance relationships and evaluate whether board characteristics such as size, compensation level, and male-to-female ratio; CEO compensation and tenure; and leadership structure lead to stronger financial performance. This objective moves beyond prior cooperative governance research by focusing specifically on how financial performance is affected.

This research makes several important contributions. From an academic perspective, it extends the governance literature by examining a sector that merges cooperative ownership with banking functions. Prior research has shown that governance influences profitability in agricultural cooperatives and commercial banks, but Farm Credit associations sit at the intersection of these two business model forms. By analyzing Farm Credit associations, the present research provides a unique contribution to cooperative governance studies and adds evidence to broader debates about the role of boards in shaping financial outcomes.

From a practical perspective, the significance of the current research is substantial. As of June 30, 2025, the Farm Credit System reported approximately $557 billion in total assets (Farm Credit Administration, 2025, Major Financial Indicators table, p.2). Given the scale of capital involved, understanding whether and how board structures influence financial performance is critical to ensuring that associations remain competitive, resilient, and aligned with their member-owners' needs. This research will also provide guidance on whether regulatory requirements are sufficient or whether additional reforms may be warranted. For example, if higher director compensation is

positively correlated with improved outcomes, this could justify more research in those areas.

The results of this study will provide valuable insights for several groups of decision makers including:

1. Borrower-owners: Member-borrowers elect most directors, and this research will clarify how different board structures impact financial performance. This will allow members to make more informed decisions when voting in director elections.
2. Association managers and board chairs: The findings will inform FCA board development and recruitment strategies. For instance, if smaller managerial teams are shown to enhance financial performance, then associations may prioritize streamlining governance structures. If board gender diversity and financial expertise are linked to improved outcomes, boards can adjust recruitment and training accordingly.
3. Regulators (FCA): The research will shed light on whether FCA's governance mandates, such as requiring outside directors and financial experts, meaningfully contribute to association performance. Regulators may use this evidence to assess the adequacy of current requirements and consider possible adjustments.

Beyond these general governance-performance considerations, an important comparative dimension of this thesis involves differences between associations aligned with AgVantis Inc and those that operate independently. AgVantis Inc is a privately held software development and technology services company headquartered in Wichita, KS. This thesis will include a comparative analysis of associations that utilize AgVantis for technology solutions, and those that do not. AgVantis provides technology, loan

accounting, and support services to a select group of associations, potentially influencing both their cost structures and governance dynamics. The seven associations currently aligned with AgVantis include High Plains Farm Credit, Golden State Farm Credit, Colusa-Glenn, Premier, Oklahoma AgCredit, Western Kansas, and Western Oklahoma. For this study, only the associations High Plains Farm Credit, Golden State Farm Credit, Colusa-Glenn, Oklahoma AgCredit, and Western Oklahoma reported sufficient information to be included.

By comparing these associations to non-AgVantis peers of similar size, this research will assess whether reliance on a shared service provider shapes governance effectiveness, financial outcomes, or member value distribution. This comparison is particularly relevant because AgVantis associations may exhibit distinct operating efficiencies, risk management practices, or board oversight requirements compared to independent associations. Evaluating these differences will provide a deeper understanding of how external service relationships interact with governance structures, potentially highlighting advantages or constraints unique to AgVantis-affiliated associations.

CHAPTER II: LITERATURE REVIEW

2.1 Review of the Literature

The literature review surveys prior research relevant to how governance structures and board characteristics influence the performance of cooperative financial institutions. The selected works span from 2009 to 2024 and reflect both theoretical and empirical approaches across agricultural cooperatives and broader banking contexts.

Bond (2009) provided one of the earliest quantitative investigations into the relationship between cooperative financial performance and the characteristics of cooperative boards of directors. His work analyzed financial ratios alongside board composition metrics, finding that larger boards and those with more independent members tended to be associated with stronger performance, though the effects varied depending on which financial ratios were considered. This study used a sample size of 176 U.S. agricultural cooperatives including those associated with marketing, supply, and service. The timeframe of this study ranges from the early to mid-2000's. While the study was limited in its sample scope and did not fully account for regional economic differences, it set an important foundation by directly linking governance structure to cooperative outcomes, making it particularly relevant to this thesis.

Building on Bond's research, Franken and Cook (2013) examined how board structure and process affected cooperative performance in U.S. agricultural marketing and supply cooperatives, including grain, dairy, and farm supply organizations. Drawing on survey data and performance indicators, they showed that clear governance processes, transparency in decision-making, and investment in board training significantly improved cooperative efficiency and member satisfaction. This survey was sent to 1,000 U.S. agricultural cooperatives representing over 90% of U.S. cooperative business volume.

They received 460 responses back and after matching financial data and cleaning incomplete responses, the final analysis was done on 367 cooperatives. This survey was completed in 2010 using performance data from 2005-2010. Their findings highlight the importance of governance processes themselves, not just board composition.

Zivkovic and Hudson (2015) explored the relational dynamics between managers and boards of directors in agricultural cooperatives. Their case-based empirical approach demonstrated that stronger manager-board relationships, built on trust and communication, correlated with better cooperative financial performance. This survey targeted 148 agricultural cooperatives in Texas, specifically their managers and board chairmen. Out of 296 potential responses, they received 76 total comprised of 46 managers and 30 chairmen. Sixty percent of responses came from cotton gin cooperatives while the remaining 40% were production, marketing, and supply cooperatives. This study took place in 2014 with financial data from 2011-2013. While the study lacked a broad quantitative scope, it emphasized that governance is not purely structural but also behavioral.

More recently, Jamaluddin et al. (2023) conducted a systematic literature review synthesizing global research on cooperative governance and performance. The review primarily focused on agricultural producers, marketing, and supply cooperatives rather than financial cooperatives. They found that board skills, transparency, and governance structures consistently contributed to cooperative success, with strong evidence of a positive relationship between governance quality and financial outcomes. However, their review also noted gaps in the literature specific to the U.S. agricultural finance sector.

This was an international study completed on 250 agricultural cooperatives in Malaysia. Their survey was completed in 2022 with financial data from 2019-2021.

Da Silva, Baggio, and Santos (2022) advanced the field of cooperative governance structure on financial performance by specifying an economic model, and testing for statistical significance, of how governance and performance are connected within agricultural cooperatives. Using case data from Latin America, they demonstrated that performance improves when governance mechanisms such as board oversight, accountability structures, and professionalization are aligned with cooperative strategies. They analyzed 110 Brazilian agricultural cooperatives including both production and marketing co-ops although they emphasized the governance-performance model rather than breaking them down into USDA-style categories such as marketing, supply, and service. Their data was collected from official cooperative databases and complemented with governance index scoring from the period of 2010-2019.

Finally, Awad, Gharios, Khalaf, and Seissian (2024) studied board characteristics and stock performance in banks across the Middle East and North Africa (MENA) region. Employing regression analysis of publicly traded banks, they found that independent directors and gender diversity on boards were positively associated with stock performance, while larger boards produced mixed results. Although this study falls outside the cooperative finance context and reflects a different regulatory environment, it strengthens the general argument that board composition has measurable financial impacts.

Across these studies, consistent themes emerge. Board composition, governance processes, and manager-board relationships all significantly influence financial

performance. Yet a clear gap remains when it comes to directly analyzing cooperative financial organizations known as Farm Credit associations. Most existing work either focuses on farm supply or marketing cooperatives, international settings, or non-cooperative banks. Few studies pair board characteristics with the performance metrics that are central to present Farm Credit association analysis. Moreover, little empirical work isolates governance effects from confounding regional or structural factors, such as shared technology systems. This thesis addresses this gap by analyzing a comparative panel of associations, AgVantis and non-AgVantis, and linking governance variables directly to performance outcomes in the U.S. Farm Credit System.

2.2 Theoretical Framework

This study is grounded in governance theory, which provides the conceptual foundation for understanding how boards of directors influence the performance of organizations. Governance theory emphasizes that boards serve multiple functions, including monitoring management on behalf of stakeholders, providing strategic direction, and securing critical resources. In the context of Farm Credit associations, where member-borrowers both own and rely upon the institution, governance theory offers an especially relevant lens because it captures the unique tension between profitability, stability, and member service that these associations must balance (da Silva, Baggio, & Santos, 2022; Jamaluddin et al., 2023).

Governance theory draws from several complementary perspectives, the first of which is agency theory, which views boards as mechanisms for aligning the interests of managers with those of owners by reducing information asymmetry and monitoring potential self-interested behavior (Bond, 2009). In Farm Credit associations, member-

elected directors and outside directors are expected to ensure that management decisions remain accountable to borrower-owners. The second perspective, stewardship theory, suggests that managers may be intrinsically motivated to act in the best interests of members, and that boards can enhance performance by supporting, advising, and empowering management rather than merely constraining it (Franken & Cook, 2013). This perspective is highly relevant for cooperative institutions where long-term relationships and shared values are central. A third element, resource dependence theory, emphasizes the board's role in connecting the cooperative to external expertise, networks, and legitimacy. For Farm Credit associations, outside directors and financial experts required by regulation may serve this role by bringing specialized knowledge and credibility to the boardroom (Awad, et al., 2024).

Applying governance theory to Farm Credit associations allows for a structured examination of how board composition and structure may influence financial outcomes. The theory suggests that variations in board size, independence, tenure, diversity, and CEO duality may directly affect how effectively boards monitor, guide, and resource their institutions. For example, larger boards may bring broader expertise, but risk diluted accountability, while smaller boards may promote efficiency but lack diversity of perspective (Bond, 2009; Awad et al., 2024). Similarly, the presence of independent and outside directors may strengthen oversight and resource acquisition but could also reduce alignment with member-borrower priorities.

Governance theory is particularly well suited to this study because it bridges financial and cooperative objectives. Unlike investor-owned banks, Farm Credit associations must simultaneously pursue profitability and member value, often measured

through patronage refunds. Governance theory helps explain how boards navigate this dual mandate by balancing control with strategic decision-making. It also provides a framework for evaluating whether regulatory requirements, such as the mandated inclusion of outside directors and financial experts, meaningfully improve outcomes or create unintended trade-offs (Franken & Cook, 2013; Zivkovic & Hudson, 2015).

Finally, governance theory provides a lens through which to consider the comparative dimension of this thesis. Associations that contract with AgVantis for technology services may exhibit different governance dynamics than those operating independently. Resource dependence theory suggests that reliance on a shared service provider could alter the board's role in overseeing operations and strategy (Jamaluddin et al., 2023). By applying governance theory, this study is positioned to test whether structural and compositional differences across boards are associated with measurable differences in financial performance and member value in the Farm Credit System.

Cooperative organizational structure further shapes government expectations and performance outcomes within the Farm Credit System. As borrower-owned financial cooperatives, Farm Credit associations operate under principles that emphasize member control, patronage-based value distribution, and long-term service reliability rather than pure profit maximization. Cooperative theory suggests that board decision-making must balance financial performance with member service objectives, potentially creating different strategic incentives compared to investor-owned financial institutions. Within this framework, variations in board composition, director expertise, and external service relationships, such as technology or operational partnerships, may influence how effectively associations align operational efficiency with member value creation.

Accordingly, incorporating cooperative theory alongside governance and resource dependence perspectives strengthens the analytical foundation for evaluating whether structural differences across associations translate into measurable differences in financial performance, patronage capacity, and long-term system sustainability.

CHAPTER III: DATA AND METHODOLOGY

3.1 Data

Three model specifications are estimated using regression analysis: all associations in the dataset, non-AgVantis associations, and AgVantis associations. The data summary statistics and bivariate graphical analysis of each variable are described in this sub-section.

This study relies on data gathered from Farm Credit Administration (FCA) financial reports (Farm Credit Administration [FCA], 2025) and various Farm Credit association annual reports covering the years 2015 through 2024. This data provides a consistent picture of both the governance characteristics and financial performance of Farm Credit associations across the country. Using data that is already audited and publicly available ensures accuracy while allowing comparisons among a diverse set of institutions. The dataset is structured as an unbalanced panel, meaning the same associations are followed across several years. This approach makes it possible to see how performance changes on average over time. It also helps to control for factors that don't change much year to year such as geography or overall cooperative mission. Out of the fifty-five Farm Credit associations in the United States there were thirty-seven with sufficient data available from 2015 to 2024 to be included in this research. Furthermore, out of the seven FCA's associated with AgVantis, five of those are included in the data, those being High Plains Farm Credit, Golden State Farm Credit, Colusa-Glenn, Oklahoma AgCredit, and Western Oklahoma.

The first model includes all associations represented in the dataset and contains 340 observations (see Table 3.1 summary statistics). The dataset is then divided into AgVantis and non-AgVantis associations with 49 and 291 observations, respectively (see

Tables 3.2 and 3.3 summary statistics). The distinction matters because shared technology and administrative services could influence both board effectiveness and bottom-line results (Franken & Cook, 2013; Jamaluddin et al., 2023). Before any analysis, the data has been cleaned and standardized. Outliers were double-checked to confirm accuracy, and missing observations were dropped when necessary to keep the dataset consistent.

Governance variables include CEO years in position (i.e., *tenure*), *senior leadership team size*, number of board members (i.e., *board size*), number of female board members (i.e., *female board members*), level of board compensation (i.e., *board compensation*). These indicators reflect both the composition and behavior of boards and have been emphasized repeatedly in cooperative governance research (Bond, 2009; Franken & Cook, 2013; Zivkovic & Hudson, 2015).

One variable chosen that straddles governance and financial structure of the association is the level of *allocated retained earnings*. Management would recommend to the board for approval both to hold allocated retained earnings and the level of allocated retained earnings. Because Farm Credit associations are member-owned, patronage is an indicator of member value creation. This addition ties back to the cooperative principle of returning value to members, as discussed by da Silva, Baggio, and Santos (2022). Patronage was not included due to the high correlation between patronage and member retained earnings for those associations holding member retained earnings. For financial structure variables, the key variables chosen include cost and efficiency related variables of *loss ratio* and *net interest margin*, size specified as *assets*, and financial structure specified as the *debt-to-asset* ratio.

Table 3.1. Summary Statistics of Full Dataset

	Mean	Median	Mode	Standard Deviation	Sample Variance	Range	Minimum	Maximum	Count
Return-on-Equity	10.74%	10.32%	10.00%	2.88%	0.08%	21.77%	-1.39%	20.38%	340
Net Interest Margin	0.03	0.03	0.03	0.00	0.00	0.03	0.01	0.04	340
Allocated Retained Earnings (billions $)	$0.11	$0.02	$0.00	$0.19	$0.04	$0.96	$0.00	$0.96	340
Assets (billions $)	$3.10	$1.21	$0.74	$5.13	$26.32	$34.56	$0.16	$34.72	340
Board Compensation (000s)	$23.63	$20.09	$37.25	$13.37	$178.77	$85.65	$4.80	$90.45	340
Board Size (persons)	12.61	12.00	10.00	4.46	19.93	21.00	6.00	27.00	340
CEO (years in position)	7.24	5.13	2.00	6.46	41.70	34.83	0.17	35.00	340
Debt-to-Asset	81%	82%	81%	4%	0%	22%	65%	87%	340
Female Board Members (persons)	1.39	1.00	1.00	1.13	1.28	6.00	0.00	6.00	340
Loss Ratio	0.02	0.01	0.00	0.07	0.01	0.64	-0.29	0.35	340
Permanent Capital Ratio	18.09%	17.27%	17.27%	4.16%	0.17%	28.28%	11.85%	40.13%	340
Senior Leadership Team Size (persons)	6.10	6.00	4.00	2.37	5.64	15.00	2.00	17.00	340

Table 3.2. Summary Statistics of non-AgVantis Associations

	Mean	Median	Mode	Standard Deviation	Sample Variance	Range	Minimum	Maximum	Count
ROE	10.98%	10.50%	10.00%	2.91%	0.08%	21.77%	-1.39%	20.38%	291
Net Interest Margin	0.03	0.03	0.03	0.00	0.00	0.02	0.02	0.04	291
Allocated Retained Earnings (billions $)	$0.12	$.02	$ -	$0.21	$0.04	$0.96	$ -	$0.96	291
Assets (billions $)	$3.39	$1.17	$0.74	$5.49	$30.11	$ 34.56	$0.16	$34.72	291
Board Compensation (000s)	$25.00	$22.22	$37.25	$13.73	$188.54	$82.27	$8.18	$90.45	291
PPI Inflator	0.84	0.76	0.74	0.11	0.01	0.28	0.72	1.00	291
Board Size (persons)	12.52	11.00	9.00	4.68	21.87	21.00	6.00	27.00	291
CEO (years in position)	7.14	5.50	2.00	6.20	38.39	34.83	0.17	35.00	291
Debt-to-Asset	80.79%	81.65%	81.12%	4.02%	0.16%	22.16%	65.27%	87.43%	291
Female Board Members (persons)	1.43	1.00	1.00	1.18	1.40	6.00	0.00	6.00	291
Loss Ratio	0.03	0.01	0.00	0.07	0.01	0.64	-0.29	0.35	291
Permanent Capital Ratio	18.35%	17.68%	17.27%	4.37%	0.19%	28.28%	11.85%	40.13%	291
Senior Leadership Team Size (persons)	6.15	6.00	4.00	2.50	6.26	15.00	2.00	17.00	291

Table 3.3. Summary Statistics of AgVantis Associations Affiliation

	Mean	Median	Mode	Standard Deviation	Sample Variance	Range	Minimum	Maximum	Count
ROE	9.30%	9.27%	8.57%	2.22%	0.05%	11.91%	2.34%	14.25%	49
Net Interest Margin	0.03	0.03	0.03	0.00	0.00	0.02	0.01	0.03	49
Allocated Retained Earnings (billions $)	$0.02	$-	$ -	$ 0.05	$ 0.00	$0.14	$-	$0.14	49
Assets (billions $)	$1.36	$.36	$ -	$ 0.62	$0.39	$2.44	$0.36	$ 2.80	49
Board Compensation (000s)	$15.49	$13.49	$-	$6.68	$44.56	$31.03	$4.80	$35.83	49
PPI Inflator	0.84	0.76	0.74	0.11	0.01	0.28	0.72	1.00	49
Board Size (persons)	13.14	13.00	14.00	2.88	8.29	13.00	9.00	22.00	49
CEO (years in position)	7.83	4.00	1.75	7.89	62.18	25.50	0.50	26.00	49
Debt-to-Asset	80.99%	81.45%	#N/A	2.37%	0.06%	9.82%	74.40%	84.21%	49
Female Board Members (persons)	1.10	1.00	1.00	0.68	0.47	2.00	0.00	2.00	49
Loss Ratio	0.00	0.00	0.00	0.06	0.00	0.35	-0.24	0.11	49
Permanent Capital Ratio	16.51%	16.30%	14.01%	2.00%	0.04%	8.36%	13.53%	21.89%	49
Senior Leadership Team Size (persons)	5.80	6	6	1.38	1.92	6	3	9	49

To provide an initial visual assessment of relationships between financial performance, governance characteristics, and financial attributes of the associations, bi-variate analysis was carried out using scatter plots. These help to motivate the econometric modeling to follow.

These graphical representations allow for an intuitive examination of cause-and-effect relationships between governance and association financial attributes and financial performance as measured by ROE. Visual inspection is an important preliminary step in panel data analysis because it can reveal clustering patterns, potential outliers, and general directional relationships that may inform later model specification. While scatter plots alone do not establish causation, they provide valuable descriptive context that complements the quantitative modeling approach that follows. Each bivariate analysis includes a linear trend line to validate, or provide insight, into the relationship between the selected variable and ROE.

Net interest margin reflects the operational efficiency of the association. The relationship between net interest margin and ROE is negative (or an inverse) so that a higher net interest margin tends to be associated with a lower ROE (Figure 3.1). The magnitude of the negative (inverse) relationship is highlighted by the -0.473 slope of the linear trendline.

Total assets reflect the overall scale of the Farm Credit association and serve as a proxy for institutional size. Larger associations may benefit from economies of scale, greater portfolio diversification, and broader market reach. The relationship between assets and ROE appears slightly negative, suggesting that larger associations may experience marginally lower returns on equity on average (Figure 3.2). The trendline

indicates a modest inverse relationship, although the dispersion of observations suggests that size alone does not strongly determine financial performance.

The debt-to-asset ratio reflects the leverage structure of the association and indicates how much of the institution's assets are financed through borrowed funds. In lending institutions, higher leverage can amplify returns if assets are deployed efficiently. The relationship between debt-to-asset ratio and ROE is positive, indicating that associations operating with higher leverage tend to report higher return on equity (Figure 3.3). The positive slope of the trendline suggests that balance sheet leverage plays a role in enhancing financial performance.

Loss ratio measures credit quality and the level of loan losses relative to the total loan portfolio. This variable reflects the effectiveness of credit risk management within the association. The relationship between loss ratio and ROE is negative, indicating that higher credit losses tend to be associated with lower return on equity (Figure 3.4). The downward slope of the trendline highlights the importance of maintaining strong portfolio quality in sustaining financial performance.

Permanent capital ratio reflects the capital strength of the association and represents the level of retained capital available to absorb potential financial stress. Strong capital positions often enhance institutional stability and support long-term lending capacity. The relationship between permanent capital ratio and ROE is positive, suggesting that associations with stronger capital buffers tend to generate higher returns on equity (Figure 3.5). The positive slope of the trendline indicates that well-capitalized associations may be better positioned to generate sustainable financial performance.

Allocated retained earnings represent a strategy used by some associations to retain a portion of earnings while assigning ownership of those funds to borrower-members. This practice supports capital accumulation while maintaining the cooperative principle of member ownership. The relationship between allocated retained earnings and ROE appears positive, indicating that associations allocating retained earnings tend to exhibit higher financial performance (Figure 3.6). The upward trendline suggests that this capital management strategy may support stronger returns.

Board size and board compensation are determined by the governance of the associations. Board size reflects broad based involvement across the association with many studies looking previously at optimum board size. Board compensation reflects the opportunity cost incentive to encourage members to run for board seats and to assure good quality candidates run for board seats (i.e., the opportunity cost of spending time on the association board versus undertaking in farm management activities). Both factors are found to be positively correlated with ROE (Figure 3.7). Both Board size and board compensation are included in the regression analyses because the variables should not be correlated with each other.

CEO tenure and compensation reflect organization management stability with CEO's length of tenure and the board's perception of performance by the CEO's compensation. Both CEO tenure and compensation are found to be positively related to ROE (Figure 3.8). Because CEO tenure and compensation tend to be positively correlated, i.e., the longer one is employed the higher their salary, only CEO tenure is used in the regression analyses later in the thesis.

Female board representation reflects diversity within the governance structure of Farm Credit associations. Board diversity has been widely studied in corporate governance literature as a potential contributor to improved decision-making and broader perspectives in strategic oversight. The relationship between the number of female board members and ROE appears slightly positive, although the dispersion of observations suggests that the relationship is relatively weak (Figure 3.9). The modest upward slope of the trendline indicates that greater female representation may be associated with marginal improvements in financial performance.

Senior leadership team size reflects the depth and specialization of the association's management structure. Larger leadership teams may allow for greater division of responsibilities, enhanced strategic capacity, and improved oversight of complex lending operations. The relationship between leadership team size and ROE is positive, suggesting that associations with larger leadership teams tend to exhibit stronger financial performance (Figure 3.10). The upward slope of the trendline indicates that managerial depth may contribute to improved organizational outcomes.

Figure 3.1. ROE (vertical axis) versus Net Interest Margin

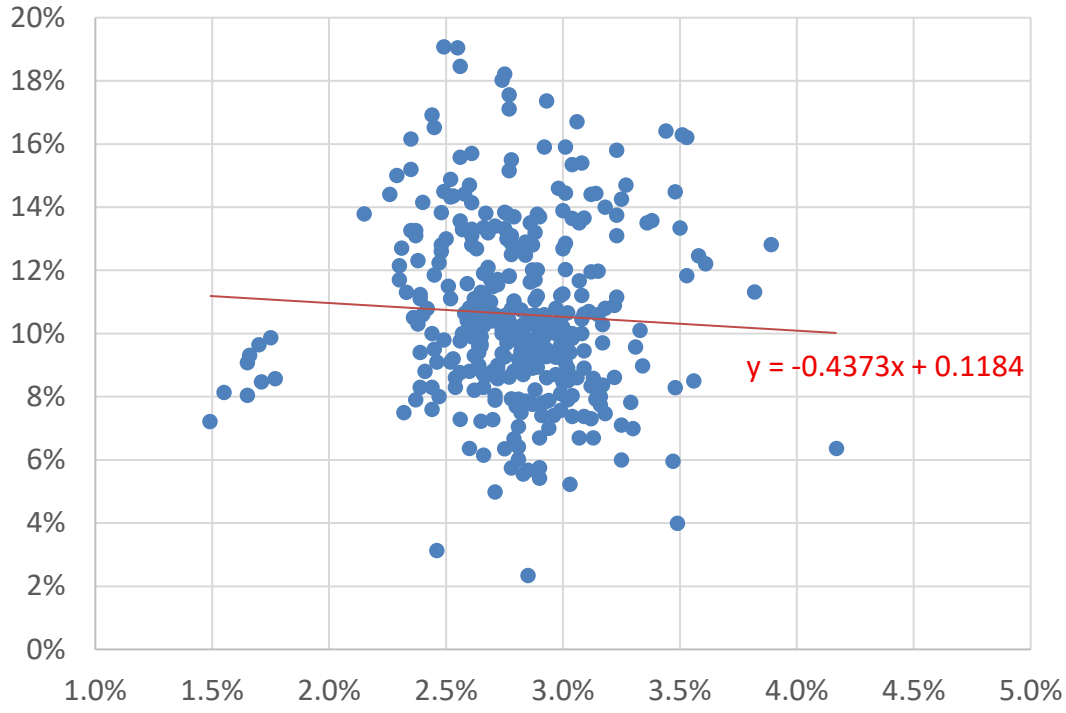


Figure 3.2. ROE (vertical axis) versus Assets ($ 000)

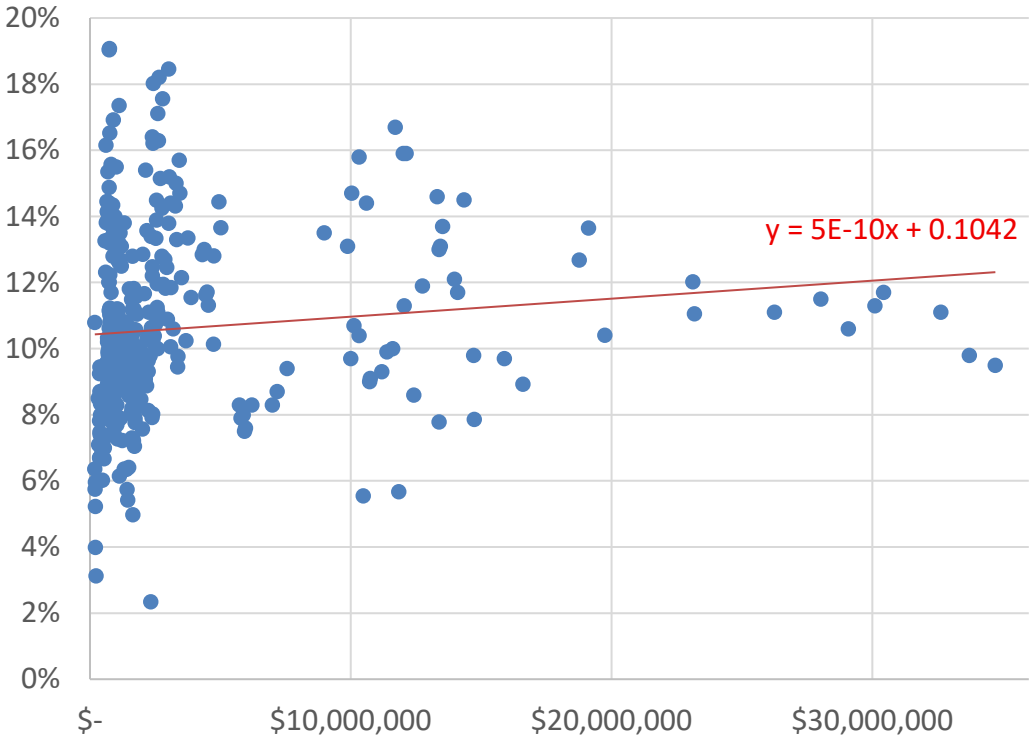


Figure 3.3. ROE (veritical axis) versus Debt-to-Asset

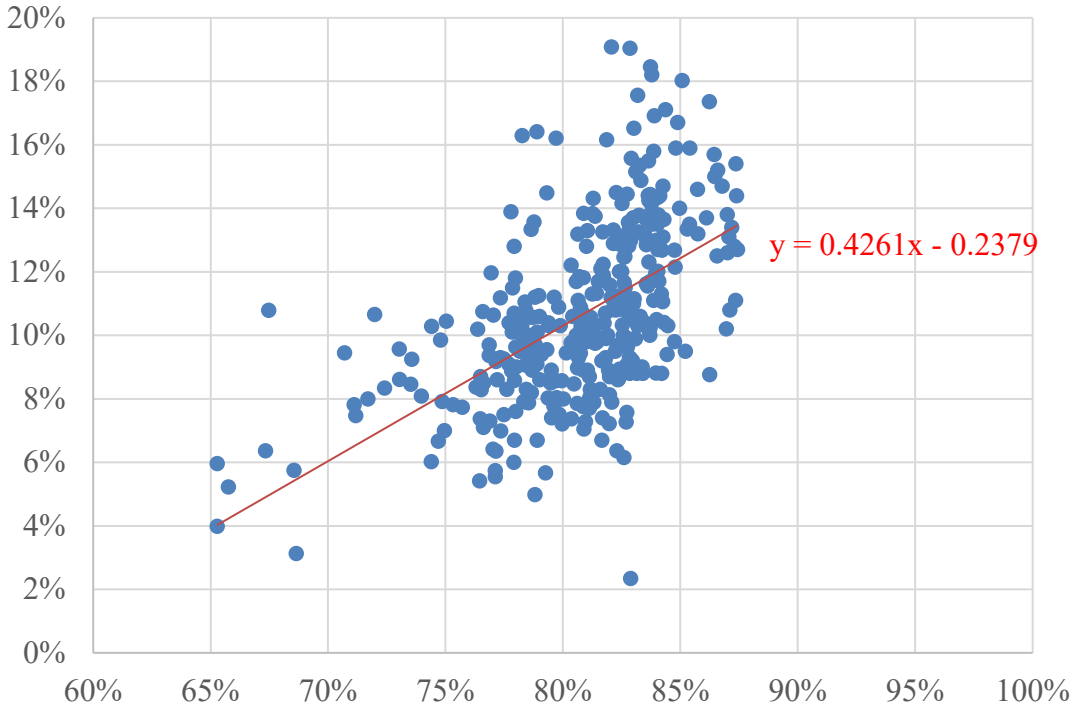


Figure 3.4. ROE (veritical axis) versus Loss Ratio

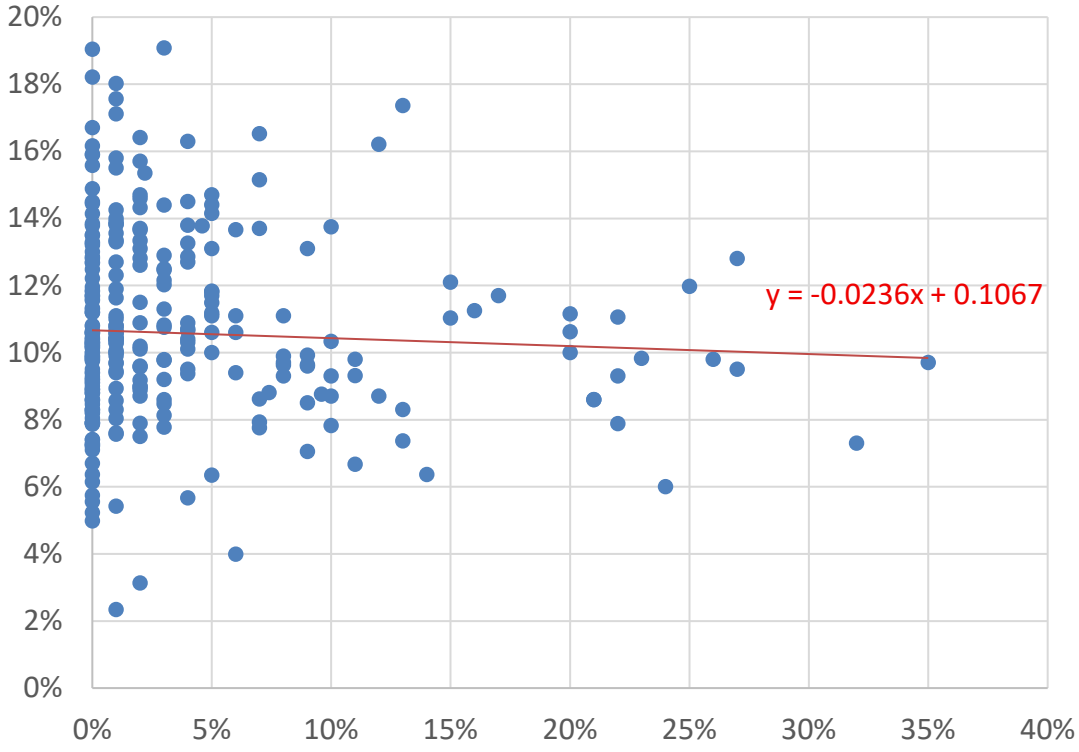


Figure 3.5. ROE (veritical axis) versus Permanent Captial Ratio

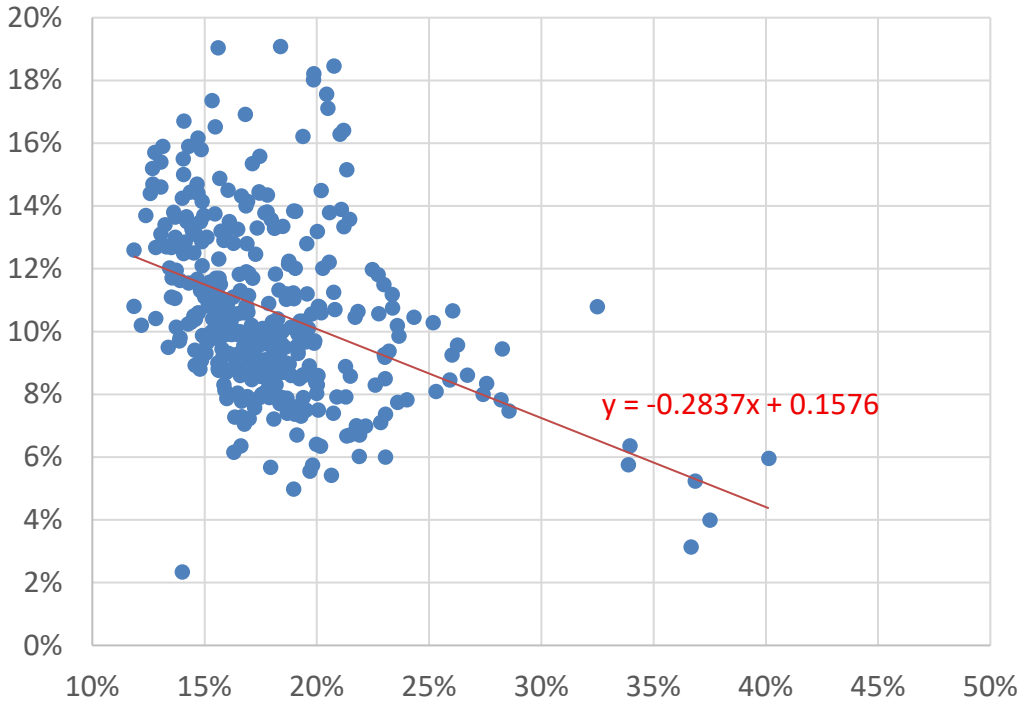


Figure 3.6. ROE (vertical axis) versus Allocated Retained Earnings (000) – When Allocating as a Strategy

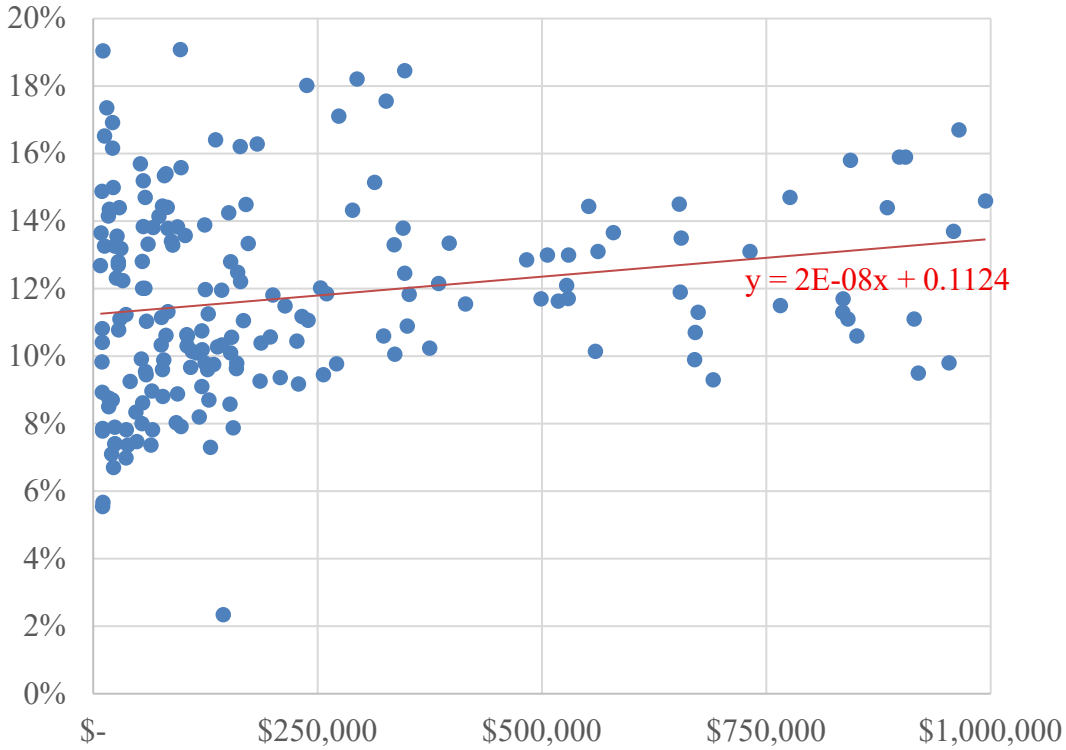
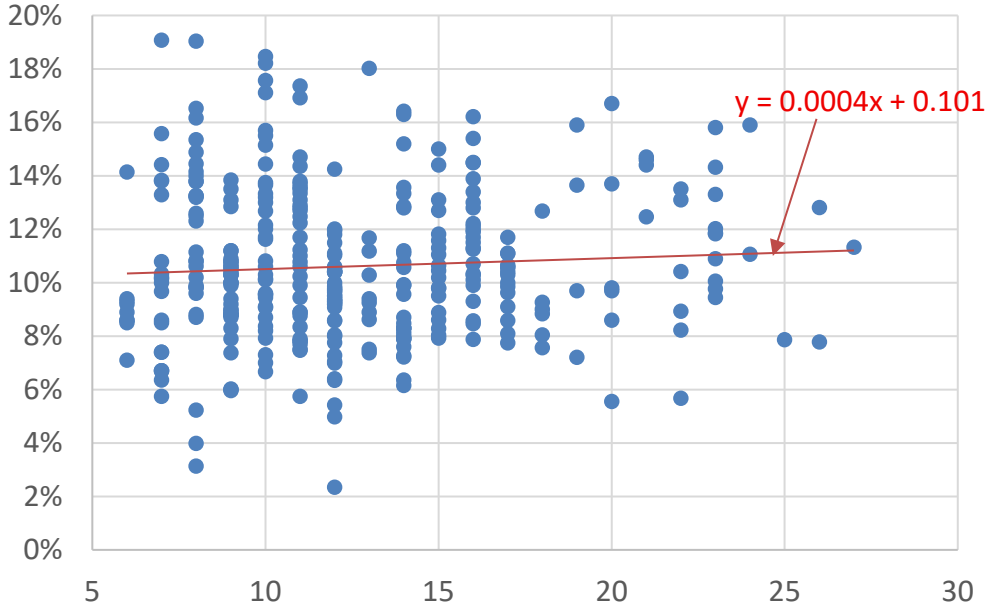


Figure 3.7. ROE (vertical axis) versus Board Size and Board Compensation ($s)



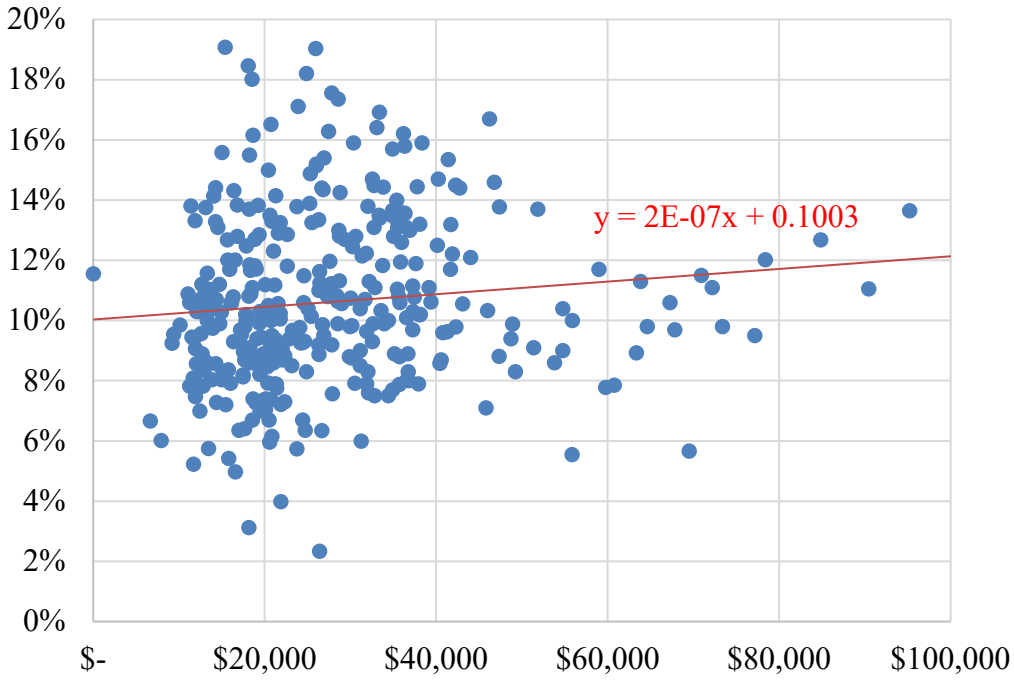
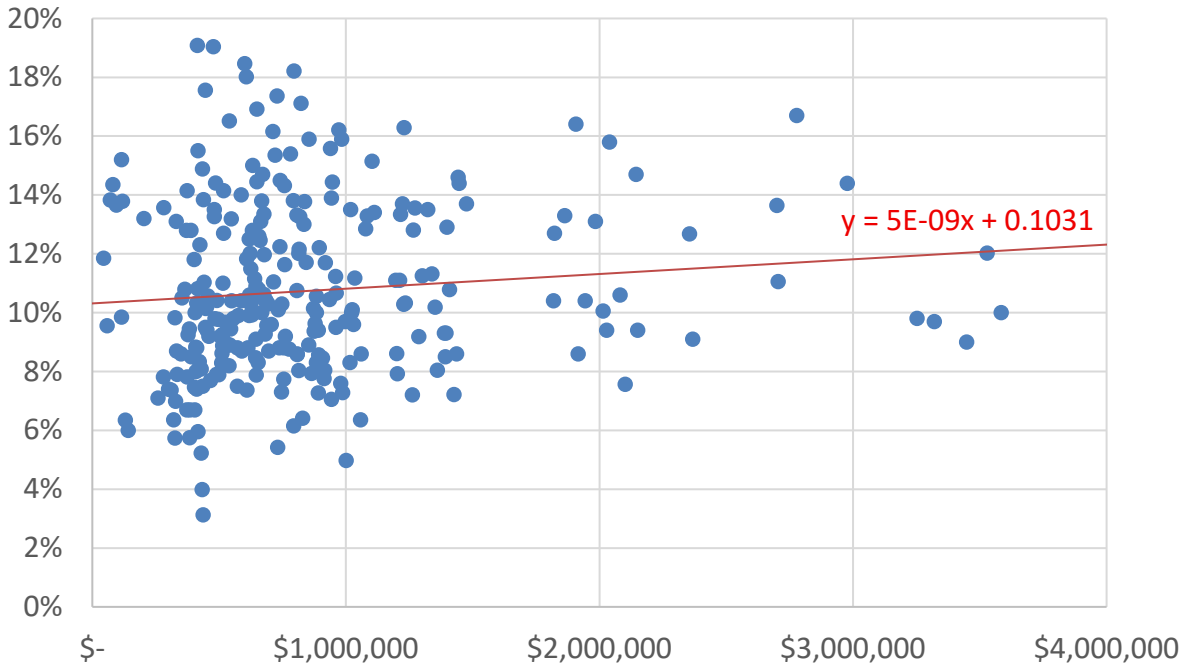


Figure 3.8. ROE (vertical axis) versus CEO Compensation and CEO Tenure



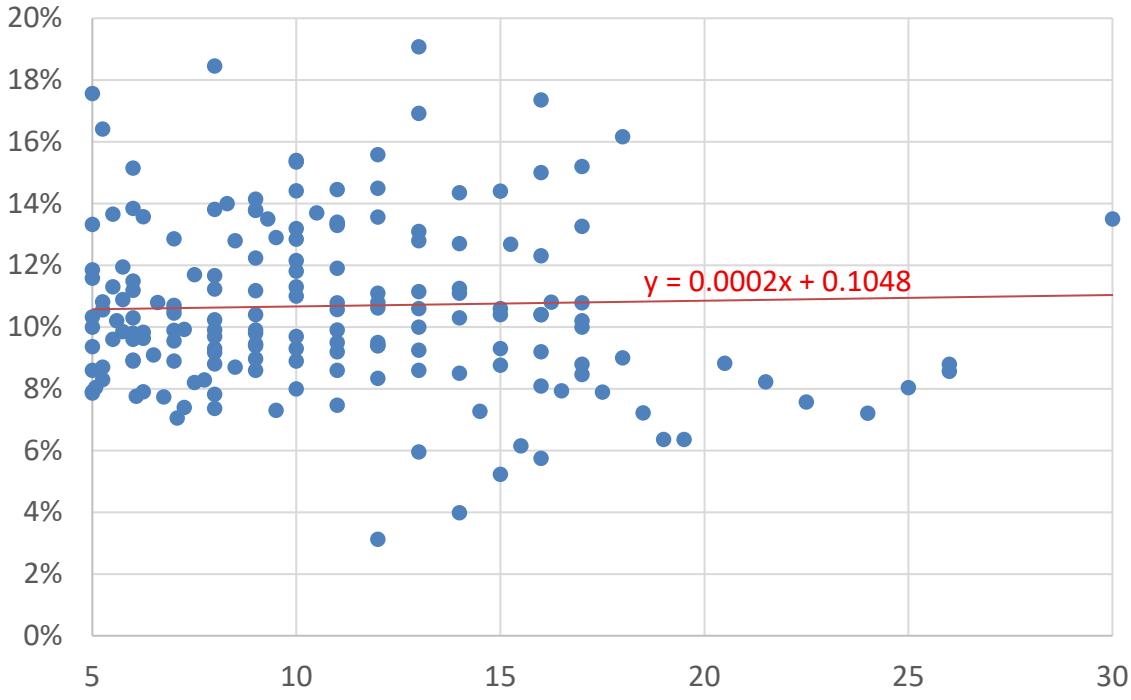


Figure 3.9. ROE (vertical axis) versus # of Females on Board

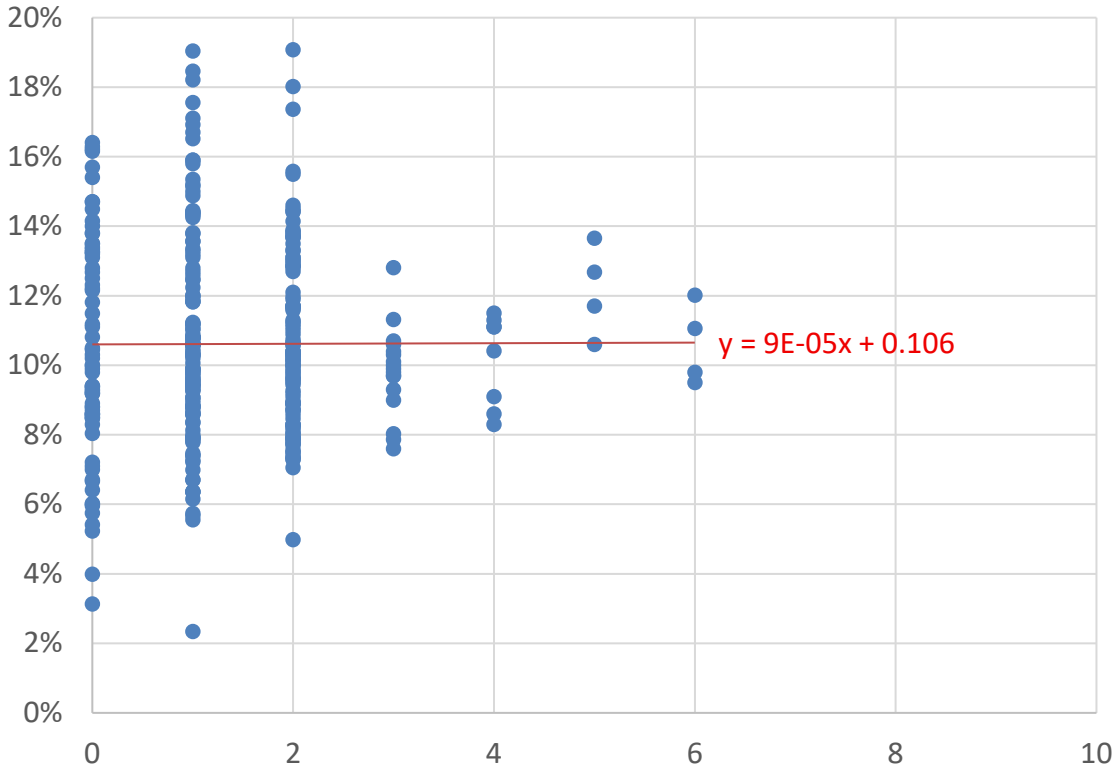
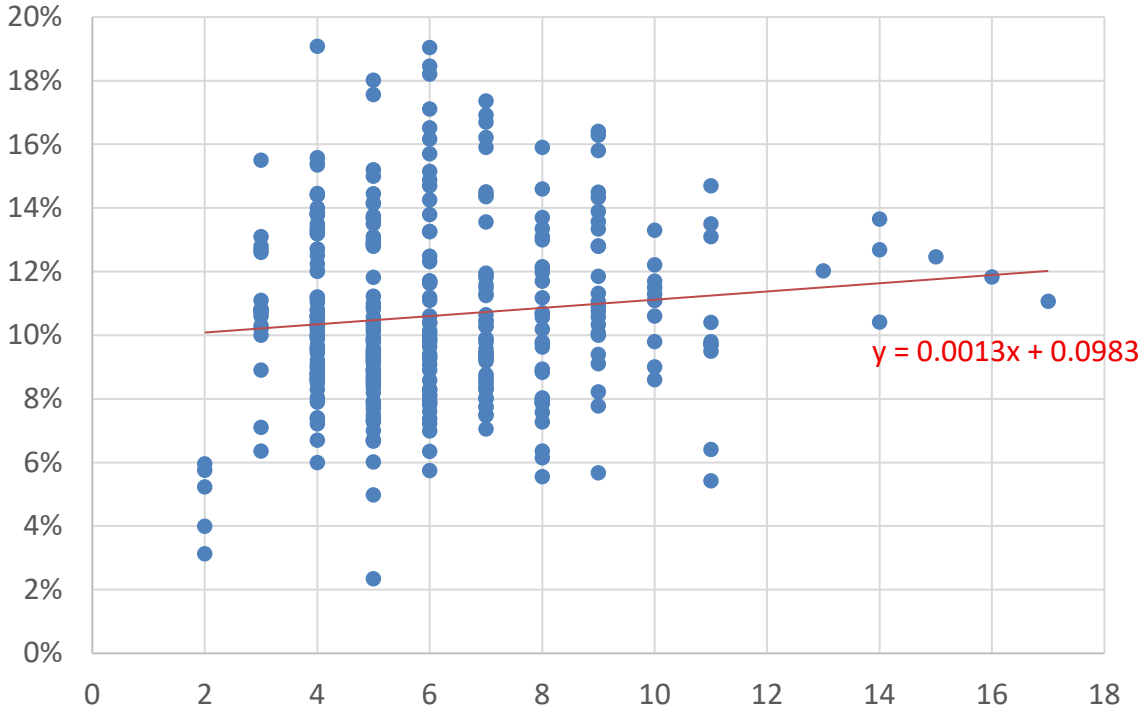


Figure 3.10. ROE (vertical axis) versus Size of Leadership Team



Across the scatter plot analysis, the relationships between governance characteristics and return on equity (ROE) appear more nuanced than initially anticipated. While certain financial structure variables such as net interest margin, loss ratio, and capital position display clearer directional relationships with ROE, governance variables including board size, CEO tenure, board compensation, and female board representation exhibit weaker and less visually distinct linear trends. In most cases, the dispersion of observations suggests substantial variation across associations, indicating that no single governance characteristic independently explains financial performance.

Overall, the visual evidence suggests that governance characteristics likely influence financial performance through interacting and conditional effects rather than simple bivariate relationships. The absence of strong single-variable patterns underscores the importance of controlling financial structure, scale, and capital composition when evaluating governance-performance dynamics. These exploratory findings provide descriptive context and motivate the formal econometric panel modeling presented in the following section, where governance variables are evaluated within a multivariate framework that accounts for both cross-sectional and time-series variation across Farm Credit associations.

3.2 Multivariate Regression Methodology

To isolate specific cause-effect relationships between individual variables and ROE, while holding other variables constant, this study uses multivariate regression analysis to evaluate to what extent governance characteristics are associated with financial performance among Farm Credit associations. Multivariable regression analysis allows for the isolating of individual causality while accounting for the simultaneous change in the variables expressed above and visualized in Figures 3.1 – 3.10.

The goal is to determine whether the degree of relationship governance structure and decision with return on equity (ROE) after controlling for the financial and operational factors that traditionally drive profitability in lending institutions.

The analysis uses panel data covering the years 2015 through 2024. Observations are organized by association *i* and year *t*. The primary econometric equation is written as:

$$\begin{aligned} ROE_{\{it\}} = \beta_0 &+ \beta_1 Net\ Interest\ Margin_{\{it\}} + \beta_2 Assets_{\{it\}} + \beta_3 LossRatio_{\{it\}} \\ &+ \beta_4 DebtToAsset_{\{it\}} + \beta_5 PermanentCapital_{\{it\}} \\ &+ \beta_6 AllocatedRetainedEarnings_{\{it\}} + \beta_7 Board\ Compensation_{\{it\}} \\ &+ \beta_8 BoardSize_{\{it\}} + \beta_9 CEO\ Tenure_{\{it\}} \\ &+ \beta_{10} Female\ Board\ Members_{\{it\}} + \beta_{11} SeniorLeadershipSize_{\{it\}} \\ &+ \varepsilon_{\{it\}} \end{aligned}$$

ROE is selected as the dependent variable because it provides a standardized measure of financial performance across associations of varying attributes. While Farm Credit associations operate under a cooperative mandate emphasizing member value in addition to profitability, ROE remains a widely accepted indicator of institutional strength and financial sustainability.

Financial control variables are included to ensure that estimated governance effects are not simply capturing differences in financial structure. Net interest margin measures core lending efficiency and pricing performance. Loss ratio reflects credit risk management and portfolio quality. The debt-to-asset ratio captures leverage and balance sheet structure. The permanent capital ratio controls for regulatory capital strength and long-term solvency. Total assets serve as a proxy for scale and potential economies of size.

Governance variables are drawn from cooperative governance theory and prior empirical literature. Allocated retained earnings are included because retention decisions are influenced by board policy and directly affect capital accumulation and member

equity. Board size is included to evaluate potential tradeoffs between breadth of expertise and coordination costs. Senior leadership team size measures managerial depth and organizational specialization. CEO tenure reflected leadership continuity and accumulated institutional knowledge. Female board representation serves as a proxy for diversity within governance structures. Board compensation is included as an indicator of director professionalization and engagement. Together, these variables allow assessment of whether observable governance characteristics are associated with variation in financial performance after financial fundamentals are held constant.

An important limitation of this study is that these models do not include fixed effects for time (year) or individual associations. Regression models were estimated using Microsoft 365 Excel. Consequently, a limiting factor in this analysis is that regression analysis in Microsoft 365 Excel allows for only up to sixteen explanatory (X) variables. Eleven explanatory variables are used for this analysis; therefore, eliminating inclusion of fixed effects for time or association-by-association uniqueness (e.g., type of agriculture, weather, or governance attributes not captured in this analysis). Further analysis of these models should include fixed effects for time and individual associations.

The three models are estimated in Excel Microsoft 365. The first includes the full sample of thirty-seven associations for when data is available, totaling 340 observations. Because different associations have varying years of data included, the dataset is unbalanced. The dataset is then separated into non-AgVantis associations (291 observations) and AgVantis-affiliated associations (49 observations). Estimating separate regressions allows governance-performance relationships to differ across institutional structures rather than imposing a single relationship across all associations.

Ordinary least squares estimation is applied to each model. Model fit is evaluated using R-squared, adjusted R-squared and individual coefficient significance levels. By structuring the analysis in this way, the methodology directly tests whether governance characteristics contribute explanatory power beyond financial structure and operational efficiency. This approach provides a practical and economically grounded framework for evaluating governance-performance relationships within the Farm Credit System and allows meaningful comparison between shared-service and independent institutional structures.

CHAPTER IV: RESULTS

4.1 Summary of Observations in AgVantis and out of AgVantis

To conserve space the scatter plot exhibits comparing AgVantis member associations and non-AgVantis members associations are not shown here. However, when observations are separated by AgVantis affiliation, differences in clustering patterns can be observed visually becoming more apparent. AgVantis-affiliated associations tend to exhibit tighter dispersion around mean ROE values, while non-affiliated associations demonstrate broader variability. This pattern may reflect operational standardization, cost structure efficiencies, or strategic alignment associated with shared technology and administrative services. However, considerable overlap remains between the two groups, reinforcing that affiliation alone does not deterministically drive performance outcomes.

The descriptive statistics reveal differences between AgVantis-affiliated associations and those operating independently, although the distinctions are not as stark as one might initially expect (see Table 3.1 – 3.3). Over the 2015–2024 period, non-AgVantis associations reported a higher average return on equity than their AgVantis counterparts. At the same time, independent institutions exhibited greater dispersion in outcomes. Some achieved relatively strong returns, while others experienced more modest performance. AgVantis associations, in contrast, tended to cluster more tightly around their mean ROE and their performance was less volatile across the sample years. This pattern suggests a difference not necessarily in peak performance, but in variability. The independent group shows a wider range of results; the affiliated group appears more compressed.

Scale differences are also evident. On average, non-AgVantis associations managed larger asset bases. AgVantis institutions were generally smaller in size, though there is overlap between the two groups, while board compensation levels follow a similar pattern, with independent associations reporting higher average compensation. Whether this reflects scale, complexity, or governance philosophy cannot be determined from descriptive data alone, but the distinction is consistent across the sample period. Capital structure measures are more comparable. Debt-to-asset ratios are broadly similar across both groups, indicating that leverage strategies do not appear to differ meaningfully by affiliation. Permanent capital ratios, however, are modestly higher among non-AgVantis associations. The difference is not dramatic, yet it suggests that independent institutions may operate with slightly stronger capital buffers on average.

Governance composition variables present a mixed picture while board size varies within both groups, though AgVantis institutions tend to have somewhat larger boards on average. Female board representation remains relatively low across the full dataset, with limited dispersion between affiliation categories. CEO tenure varies substantially at the individual association level but does not display a clear systematic difference between AgVantis and non-AgVantis groups.

Taken together, the descriptive evidence does not point to a single structural advantage associated with either model. Instead, it suggests that AgVantis affiliation may be associated with greater consistency in outcomes, while independent associations demonstrate a broader range of performance. These patterns provide context for the econometric analysis that follows, where financial controls are introduced to determine

whether the observed differences persist once underlying balance sheet structure and operational variables are considered.

4.2 Multivariate Regression Observations

While the descriptive comparisons in Section 4.1 highlight structural differences between AgVantis and non-AgVantis associations, the regression analysis provides a clearer indication of where explanatory power resides. Once financial structure and operational variables are introduced, the primary drivers of return on equity become more apparent. Across the full sample and within the non-AgVantis subsample, net interest margin consistently demonstrates a positive and economically meaningful relationship with ROE. This result aligns with the fundamental mechanics of a lending institution: spread management remains central to profitability. Similarly, loss ratio exhibits a negative association with ROE, reinforcing the importance of credit discipline and portfolio quality in sustaining financial performance.

Capital measures also contribute to explaining variation in returns. Permanent capital ratio and debt-to-asset ratio display positive relationships with ROE in several specifications, particularly among non-AgVantis associations. Within the regulatory framework of the Farm Credit System, moderate leverage combined with adequate capital strength appears to support higher returns. These results suggest that balance sheet management, rather than board composition, accounts for much of the variation in financial outcomes across associations.

Governance variables present a more nuanced picture. Senior leadership team size is positively associated with ROE in the full sample and among independent associations. This finding suggests that managerial depth and organizational

specialization may enhance operational effectiveness. The relationship is not overwhelming in magnitude, but it is consistent enough to indicate that management structure plays a role in translating strategy into measurable financial performance. Board size, however, demonstrates a statistically significant negative association with ROE within the non-AgVantis subsample. Larger boards in independently operated associations appear correlated with slightly weaker financial outcomes. One possible interpretation is that coordination costs or slower decision-making processes may reduce responsiveness in more complex governance structures. Notably, this relationship does not appear in the AgVantis subsample. In affiliated associations, board size does not exhibit statistical significance once financial controls are included. This difference may suggest that shared service structures reduce the marginal impact of board composition by standardizing operational processes.

Other governance characteristics such as CEO tenure, female board representation, and board compensation, do not consistently demonstrate statistically significant relationships with ROE. These findings should not be interpreted as evidence that such characteristics are irrelevant. Rather, they indicate that their influence may be indirect or long-term in nature, affecting strategic posture, culture, or resilience without producing measurable year-to-year shifts in return on equity. Cooperative governance may shape institutional trajectory in performance over time in ways that extend beyond short-term financial ratios.

The comparison between AgVantis and non-AgVantis associations reinforces this interpretation. Governance variables tend to show stronger marginal effects within independent institutions than within the affiliated group. AgVantis associations display

tighter dispersion in outcomes, and governance coefficients are generally weaker and less precisely estimated. Part of this result may be attributable to the smaller sample size. However, it is also consistent with the idea that shared service arrangements reduce institutional heterogeneity. When core systems, accounting platforms, and administrative processes are standardized, variation in governance structure may exert a narrower influence on financial performance.

Taken together, the evidence suggests that financial fundamentals dominate in terms of factors that impact the financial performance of Farm Credit Associations. Lending efficiency, credit quality, capital adequacy, and balance sheet structure explain a substantial share of variation in return on equity. While governance-related factors do matter, their effects are conditional and institutional rather than universal. Boards appear most influential when they support disciplined financial management and effective execution, rather than when structural characteristics alone differ.

Table 4.1. Unbalanced Panel Multivariate Regression Output of Factors Affecting Variation in Return on Equity (ROE), all Available Associations with Data Available, 2015-2024

Regression Statistics	
R Square	0.45
Adjusted R Square	0.43
Observations	340

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-53.71%	0.08	-6.72	0.00	-0.69	-0.38
Association Financial Attributes						
Net Interest Margin	78.04%	0.39	2.01	0.05	0.02	1.54
Assets (billions $)	-0.09%	0.00	-1.77	0.08	0.00	0.00
Debt-to-Asset	70.52%	0.08	8.61	0.00	0.54	0.87
Loss Ratio	-3.38%	0.02	-1.94	0.05	-0.07	0.00
Permanent Capital Ratio	26.87%	0.07	3.66	0.00	0.12	0.41
Governance Attributes						
Allocated Retained Earnings (billions $)	3.61%	0.01	4.30	0.00	0.02	0.05
Board Compensation (000s)	-0.02%	0.00	-1.65	0.10	0.00	0.00
Board Size	-0.05%	0.00	-1.33	0.18	0.00	0.00
CEO (years in position)	-0.02%	0.00	-0.90	0.37	0.00	0.00
Female Board Members	0.05%	0.00	0.32	0.75	0.00	0.00
Senior Leadership Team Size	0.30%	0.00	3.45	0.00	0.00	0.00

Note: gray shaded indicates statistically significant variables

Table 4.2. Unbalanced Panel Multivariate Regression Output of Factors Affecting Variation in Return on Equity (ROE), Non-AgVantis Associations with Data Available, 2015-2024

Regression Statistics	
R Square	0.50
Adjusted R Square	0.48
Observations	291

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-52.90%	0.08	-6.29	0.00	-0.69	-0.36
Association Financial Attributes						
Net Interest Margin	22.90%	0.48	0.48	0.63	-0.71	1.17
Assets (billions $)	-0.09%	0.00	-1.67	0.10	0.00	0.00
Debt-to-Asset	71.37%	0.08	8.41	0.00	0.55	0.88
Loss Ratio	-4.54%	0.02	-2.54	0.01	-0.08	-0.01
Permanent Capital Ratio	25.26%	0.08	3.28	0.00	0.10	0.40
Governance Attributes						
Allocated Retained Earnings (billions $)	2.68%	0.01	3.17	0.00	0.01	0.04
Board Compensation (000s)	-0.04%	0.00	-2.73	0.01	0.00	0.00
Board Size	-0.03%	0.00	-0.79	0.43	0.00	0.00
CEO (years in position)	0.01%	0.00	0.69	0.49	0.00	0.00
Female Board Members	0.04%	0.00	0.28	0.78	0.00	0.00
Senior Leadership Team Size	0.41%	0.00	4.72	0.00	0.00	0.01

Note: gray shaded indicates statistically significant variables

Table 4.3. Unbalanced Panel Multivariate Regression Output of Factors Affecting Variation in Return on Equity (ROE), AgVantis Associations with Data Available, 2015-2024

Regression Statistics	
R Square	0.45
Adjusted R Square	0.31
Observations	49

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	15.86%	0.62	0.26	0.80	-1.09	1.41
Association Financial Attributes						
Net Interest Margin	127.88%	0.73	1.75	0.09	-0.20	2.76
Assets (billions $)	0.49%	0.01	0.57	0.57	-0.01	0.02
Debt-to-Asset	0.92%	0.65	0.01	0.99	-1.30	1.32
Loss Ratio	1.85%	0.05	0.36	0.72	-0.09	0.12
Permanent Capital Ratio	-53.01%	0.75	-0.71	0.48	-2.04	0.98
Governance Attributes						
Board Compensation (000s)	-0.04%	0.00	-0.62	0.54	0.00	0.00
Board Size	0.05%	0.00	0.30	0.76	0.00	0.00
CEO (years in position)	-0.03%	0.00	-0.59	0.56	0.00	0.00
Female Board Members	0.33%	0.01	0.50	0.62	-0.01	0.02
Senior Leadership Team Size	-0.47%	0.00	-1.37	0.18	-0.01	0.00

Note: gray shaded indicates statistically significant variables. The variable "Allocated Retained Earnings" was not included in this model because data shows only one of the AgVantis Associations included, allocates retained earnings.

CHAPTER V: CONCLUSIONS

This study offers several strengths. The use of a ten-year panel dataset allows for examination of both cross-sectional and temporal variation, strengthening inference relative to a single-year analysis. The integration of governance variables with financial controls provides a direct test of whether board characteristics retain explanatory power beyond core operational drivers. Separating AgVantis and non-AgVantis associations enables comparative evaluation of shared-service institutional models within a regulated cooperative financial system. Finally, by focusing specifically on Farm Credit associations, the research addresses a gap in empirical literature that has historically emphasized agricultural marketing cooperatives or investor-owned financial institutions.

At the same time, several limitations remain. The AgVantis subsample is relatively small, which constrains statistical precision and may limit detection of weaker governance effects. Governance quality is proxied through observable structural characteristics rather than behavioral measures such as board engagement, training, or decision-making processes. Return on equity, while standardized and comparable, does not fully capture member value in a cooperative setting where patronage and long-term service reliability are also central objectives. Additionally, potential endogeneity between governance design and financial performance cannot be fully ruled out. Stronger institutions may adopt governance structures rather than governance structures independently driving performance. Future research could build upon these findings by incorporating measures of patronage distribution, director experience profiles, or board development practices. Alternative econometric techniques could further address possible endogeneity concerns. A longer time horizon, particularly including more recent

macroeconomic shifts, may also provide additional insight into how governance interacts with capital strategy during periods of financial stress.

Despite these limitations, the implications of this research are constructive for the Farm Credit System. The findings reinforce that disciplined financial management remains the foundation of institutional strength. At the same time, governance structure influences how that discipline is implemented. For borrower-owners, the results underscore the importance of electing directors who possess financial literacy and strategic awareness. For boards and management teams, the evidence highlights the value of operational efficiency, credit quality oversight, and appropriate management depth. For regulators, the results suggest that structural mandates alone are unlikely to drive performance without continued emphasis on board effectiveness and strategic alignment.

The Farm Credit System plays a central role in financing American agriculture and rural communities. As a borrower-owned cooperative network managing hundreds of billions of dollars in assets, its sustainability depends on balancing profitability, capital resilience, and member value. This research contributes positively to the industry by providing empirical evidence specific to Farm Credit governance, clarifying where performance variation originates, and distinguishing between financial fundamentals and structural governance features. By grounding cooperative governance theory in measurable financial outcomes, the study supports more informed decision-making at the board, management, and regulatory levels and contributes to the long-term stability and competitiveness of the Farm Credit System.

WORKS CITED

Awad, A. B., Gharios, R., Khalaf, B. A., & Seissian, L. A. (2024). Board Characteristics and Bank Stock Performance: Empirical Evidence from teh MENA Region. *Risks, 12*(81). Retrieved from https://doi.org/10.3390/risks12050181

Bond, J. K. (2009). Cooperative Financial Performance and Board of Director Characteristics: A Quantitive Investigation. *Journal of Cooperatives*.

da Silva, F. F., Baggio, D. K., & Santos, D. F. (2022). Governance and performance model for agricultural cooperatives. *Estudios Gerenciales, 38*(165), pp. 464-478. Retrieved from https://doi.org/10.18046/j.estger.2022.165.5238

Farm Credit Administration. (2025, June 30). Retrieved from Major Financial Indicators: https://www.fca.gov/bank-oversight/major-financial-indicators

Franken, J. R., & Cook, M. L. (2013). Impact of Board Structure and Process on Cooperative Peformance. *Agricultural & Applied Economics Association's 2013 AAEA & CAES Joint Annual Meeting.* Washington, DC, United States.

Jamaluddin, F., Saleh, N. M., Abdullah, A., Hassan, M. S., Hamzah, N., Jaffar, R., . . . Embong, Z. (2023, July-September). Cooperative Government and Cooperative Performance: A Systematic Literature Review. *SAGE Open, 13*(3), pp. 1-21. Retrieved from https://doi.org/10.1177/21582440231192944

Zivkovic, S., & Hudson, D. (2015, February 12). Impact of relationship between managers and board of directors on performance of agricultural cooperatives. *Southern Agricultural Economics Association (SAEA).* Atlanta, GA, United States.