Which Cooperative Ownership Model Performs Better? A Financial-Decision Aid Approach

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ABSTRACT

In this article the financial/ownership structures of agribusiness cooperatives are analyzed to examine whether new cooperative models perform better than the more traditional ones. The assessment procedure introduces a new financial decision-aid approach, which is based on data-analysis techniques in combination with a preference ranking organization method of enrichment evaluations (PROMETHEE II). The application of this multicriteria decision-aid approach allows the rank ordering of cooperatives based on the most prominent financial ratios. The financial ratios were selected using principal component analysis. This analytical procedure reduces the dimensionality of large numbers of interrelated financial performance measures. We assess the financial success of Dutch agribusiness cooperatives for the period 1999–2010. Results show that there is no clear-cut evidence that cooperative models used to attract extra members' investments and/or outside equity perform better than the more traditional models. This suggests that ownership structure of cooperatives is not always a decisive factor for their financial success. [EconLit citations: Q130, G320, C440]. © 2013 Wiley Periodicals, Inc.

1. INTRODUCTION

Cooperatives have long-been criticized for their inefficient decision-making process and their capital constraints (e.g., Cook, 1995; Karantininis & Nilsson, 2007). The latter occurs because agribusiness cooperatives have traditionally adhered to exclusive members' ownership in the form of direct investments or retained patronage refunds (Barton, 1989; Knoeber & Baumer, 1989). However, many cooperatives, to successfully adapt to the industrialization of agricultural and food markets, relaxed their traditional finance principle (Cook & Chaddad, 2004). The extent to which cooperatives relax this definitional principle influences their ownership/financial structure, ranging from a traditional (collective) to a more individualized, IOF-like (investor-owned firm) structure (Benos, Kalogeras, Verhees, & Pennings, 2009; Kalogeras et al., 2007). That is, numerous cooperatives in the US and EU allow for individualized equity shares, invite nonmember parties to partially finance their operations, and publicly list parts of their equity

Agribusiness, Vol. 29 (1) 80–95 (2013)
Published online in Wiley Online Library (wileyonlinelibrary.com/journal/agr).

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DOI: 10.1002/agr.21323

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stock (Bijman & van Bekkum, 2005; Kalogeras, Pennings, van der Lans, Garcia, & van Dijk, 2009). A question that arises is whether the individualization of the ownership structure is driving the financial performance, that is, whether the cooperative's ownership structure is a decisive determinant of success.

In the literature on the performance of cooperatives and IOFs, two main approaches have been proposed. The first is the neoclassical approach, which deals with the efficiency of the two organizational forms, and consequently the influence on their functioning in the marketplace (e.g., Fulton & Giannakas, 2001; Notta & Vlachvei, 2007). The second approach compares the financial ratios of cooperatives and IOFs (e.g., Gentzoglanis, 1997; Harris & Fulton, 1996). The identification of differences in ratios allows for a comparison of the financial performance of both organizational forms. These studies often emphasize the superiority in terms of financial performance of the IOF-like models. However, agribusiness cooperatives experienced an inherently dynamic restructuring process (Kalogeras et al., 2009), and to adapt to agricultural industrialization (Chaddad & Cook, 2004) have increasingly been involved in value-adding processing, branding and market-oriented activities and strategies (Benos et al., 2009). Hence, new cooperative models have emerged that relaxed their financial equity constraints by attracting extra members' investments and/or outside equity (Chaddad & Cook, 2004; van Bekkum & Bijman, 2006). As a consequence, property, ownership, and residual claim rights are redistributed in the intraorganizational cooperative environment (Iliopoulos, 1998). The new models vary between the polar forms of the traditional cooperative model and the IOF-like model.

The objective of this article is to assess the financial performance of agribusiness cooperative models with different ownership characteristics, i.e., traditionally organized, member–investor, and publicly listed cooperatives. To the best of our knowledge, this is the first empirical study that compares the financial performance of agribusiness cooperative models with different equity structures. Further, this study expands the current literature (e.g., Baourakis, Doumpos, Kalogeras, & Zopounidis, 2002; Bijman & van Bekkum, 2005) on country-specific cooperative performance. We evaluate the performance of selected agribusiness cooperative models established and operating in The Netherlands. More specifically, we investigate which specific models perform better than others. This allows insights into how the organizational reform of cooperatives is linked to their financial viability. Nilsson and Gunnarsson (2000) argued that the turnover of Irish cooperatives that acquired equity capital from the Dublin Stock Exchange increased significantly. In addition, Bijman and van Bekkum (2005) provide similar insights for the Dutch agribusiness cooperatives based on descriptive case-study results.

To address our objective, we apply a newly developed multicriteria decision-aid methodological framework. This framework provides a ranking of the selected cooperative models based on their financial performance. Particularly, it provides insights on how cooperatives outrank their peers, and hence whether newly emerged cooperative models have contributed to this. These results show that there is no clear-cut evidence supporting the premise that the more IOF-like cooperative models perform better than the more traditional ones.

The remainder of this article is structured as follows. In section 2, we briefly discuss relevant theoretical foundations. The decision context is presented in section 3, and section 4 we describe the specifications of our modeling framework. In section 5 we present the results; in section 6 conclusions are drawn and research challenges are mentioned.

2. THEORETICAL BACKGROUND

The economic and institutional environment of agribusiness cooperatives changed dramatically (Cook, 1995; Karantininis & Nilsson, 2007): The markets have been liberalized, consumer demands have become more stringent, legislation on food quality and safety has been tightened, technological development is not standing still, and global agricultural food grades and standards are being introduced. As a result, cooperatives have become more market oriented, instead of producer driven, to adapt to the industrialization, meet the new standards within the food supply chain, and compete in globalized liberal markets (Cook & Chaddad, 2004).

According to Cook (1997), the success of user-oriented agricultural firms (i.e., cooperatives) depends on their ability to (a) understand the property-rights constraints faced in attempting internationalization, (b) upgrade their sustainable competitive advantages, (c) develop globalization or multidomestic strategies, and (d) create new institutions that simultaneously facilitate the enhancement of member-investor needs. Therefore, competitive strategies are launched, such as value-added processing, global expansion, and brand-name development (Bijman & Ruben, 2005). Yet, the adaptation of these new strategies requires restructuring of the cooperatives' financial structure and substantial capital investments (Baourakis et al., 2002).

The emergence of new cooperative structures has been addressed by several cooperative scholars over the last 20 years (Benos et al., 2009; Bijman & van Bekkum, 2005; Chaddad & Cook, 2004; Cook & Chaddad, 2004; Harte, 1997; van Bekkum & Bijman, 2006; van Dijk, 1997; Kalogeras, Pennings, van Dijk, & van der Lans, 2007; Nilsson & Gunnarsson, 2000). Most of these studies examine the re-engineering of cooperative organizational forms from various theoretical angles: transaction-cost economics (e.g., Hendrikse & Veerman, 2001a), agency theory (Vitaliano, 1983), incomplete contracting theory (e.g., Hendrikse & Veerman, 2001b), industrial organizational economics (e.g., Bijman, 2002), and behavioral economics (e.g., Kalogeras et al., 2007, 2009).

Chaddad and Cook (2004) discuss new cooperative models based on residual control rights and residual claim rights typologies. Their work distinguishes seven organizational models (see Table 1). The first model is the traditional cooperative, which is restricted to members only, where shares are redeemable, the benefits go to patrons, and there are nonproportional member investments. The last model, conversion or demutualization, implies the overall change of the ownership structure to a corporate profit-oriented, proprietary organization. In this latter model, the residual claim rights and control rights are reassigned among stakeholders.

The work of van Bekkum and Bijman (2006) discusses 50 cases of agribusiness cooperatives that started experimenting with innovative capital and ownership structures over the past 20 years. The least innovative structural change was considered the possibility of appreciable and/or internally tradable shares. That is, members can capture part of the cooperatives' increasing value over time. In addition, cooperatives can issue externally tradable subordinate bonds. The advantage is that the bonds qualify as debt and no member control is lost. Furthermore, external investors can obtain a stake at a subsidiary or group level. Then, there is the option of listing preferred stock. Finally, the cooperatives can convert into farmer-owned limited-liability companies. All these structures have the benefit that control is maintained at the member level. Moreover, van Bekkum and Bijman (2006) considered two general categories of publicly listed cooperatives: (a) cooperatives that convert to IOFs as part of their listing process, the so-called converted listed cooperatives, and (b) cooperatives that deliberately decided to retain as much of their collective structure as possible, thus creating hybrid ownership forms, which are known as hybrid listed cooperatives.

At a more empirical level, studies dealing with the evaluation of the performance of cooperatives versus IOFs followed two main approaches: (a) studies based on the concept of economic efficiency, and (b) studies analyzing financial ratios. Porter and Scully (1987) studied the efficiency of cooperative firms by means of a production function and concluded that dairy cooperatives were less efficient than dairy IOFs. Akridge and Hertel (1992) used a multiproduct variable cost function to compare the performance of farm supply cooperatives and IOFs. Their results suggest that cooperatives are not inefficient compared to their IOF-counterparties. Sergaki and Semos (2006) studied the parameters that determine the efficiency level of the agricultural cooperative unions compared to IOFs in Greece. They provide evidence that the efficiency of cooperatives is influenced differently than the efficiency of IOFs by factors such as economic size, leverage, business risk, and profitability.

Other empirical studies focused on the comparison of the financial ratios between cooperatives and IOFs. Lerman and Parliament (1990) compared performance in the American fruit and vegetables and dairy industry. They showed that cooperatives in both industries were not inferior to comparable IOFs in terms of return on equity, debt to equity ratio, and ratio of earnings to interest. However, for the fruit sector, the managerial turnover ratios indicated

TABLE 1. Structural Attributes of Cooperative Organizational Models

Attributes	Traditional cooperative	Proportional investment cooperative	Member-investor cooperative	New generation cooperative	Cooperative with capital seeking entities	Investor-share cooperatives	Investor-oriented firm
Control							
Voting rule	1 Member 1 Vote	Proportional	Proportional	Proportional	Proportional	Proportional	Proportional
Management	Board of Directors (BoD)	BoD	BoD & professionals	BoD & professionals	BoD, professionals & external supervisory body	BoD, professionals & external supervisory body	BoD, professionals & external supervisory body
Ownership							
Claim to ownership rights:	Members only	Members only	Members only	Members only	Members only	Members and nonmembers	Members and nonmembers
Preferred shares							
Transferability of rights	No	No	No	Yes	Yes	Yes	Yes
Tradeable rights	No	No	No	Yes	Yes	Yes	Yes
Redeemable rights	Yes	Yes	Yes	No	Yes	Yes	Yes
Appraisal of rights	No	No	Yes	Yes	Yes	Yes	Yes
Cost/benefit							
Net income	Through price	Through price in proportion to patronage	Through price in proportion to shareholdings and dividends	Through price based on expected patronage and dividends	Through price and dividends	Through price and dividends	Through price and dividends

Note. Source: Based on Cook and Chaddad (2004); expanded by Kalogeras et al. (2009).

a lower performance compared to IOFs. The dairy cooperatives were found to perform better based on the results of those ratios. Moreover, Oustapassidis, Vlachvei, and Karantininis (1998) show that dairy cooperatives were no less efficient than their IOF counterparts. Harris and Fulton (1996) analyzed the financial performance of Canadian cooperatives and IOFs and found that cooperatives were at least as liquid as IOFs; the profitability of cooperatives in the retail grocery and fish sector was found to be higher, and cooperatives involved in the fruit and vegetables, feed, and grain-handling sector performed better than IOFs selling and marketing similar products. This study also provided evidence that cooperatives were at least as productive as IOFs, that the leverage within cooperatives was sector specific, and that the growth rates between cooperatives and IOFs were comparable.

Further, Gentzoglanis (1997) compared the financial performance of dairy cooperatives and IOFs in Canada. His results indicated that the economic and financial performance was comparable, and no major differences could be found in terms of profitability, productivity, and the use of new technologies. However, significant differences in liquidity and working capital management were found. Hardesty and Salgia (2004) confirmed the results found by Lerman and Parliament (1990), indicating that there were no significant differences between the financial performance of cooperatives and IOFs in the agribusiness sector in the United States. The only significant difference found was that cooperatives showed lower levels of leverage. A more advanced methodological and modeling framework using the financial ratios analysis as a starting point was introduced by Kalogeras, Baourakis, Zopounidis, and van Dijk (2005). The study applied a multicriteria decision-aid system to rank-order the financial performance of Greek cooperatives using several categories of financial ratios as a data pool. The same methodology was used by Zopounidis, Schiniotakis, and Baourakis (2006) to analyze the performance of the agricultural unions in Crete, Greece. These studies focused on the evaluation and rankings of the financial performance of cooperative firms, aiming at identifying strengths and imperfections associated with the financial structure of cooperatives.

Most studies so far focused on the strict difference in performance measures between cooperatives and IOFs. This study expands the literature by focusing on the performance of cooperatives with differing financial/ownership attributes. We follow closely the methodological framework introduced by Kalogeras et al. (2005), and apply a multicriteria decision-aid approach. Although there are some arguments (e.g., Nilsson & Gunnarsson, 2000) that the transformation of a cooperative firm into a publicly listed company increases turnover substantially, there is no clear-cut evidence on the performance of different cooperative organizational models with different financial/ownership structures. This study makes a first attempt to explore whether the financial success of cooperative models with different equity structures is based on the type of ownership model/financial structure of a cooperative. More specifically, this study empirically tests whether cooperative models with IOF-like financial attributes perform better than cooperatives with a more traditional organization structure.

3. DECISION CONTEXT

The dataset consists of 14 agribusiness cooperatives that started as a cooperative or still maintain a (partial) cooperative ownership structure at present. They were selected based on having the largest turnovers between 2007–2012 in the Netherlands (Griffioen, 2012; van Bekkum, 2007). In addition, the selected cooperatives also have a substantial market share in the European and global agribusiness industry. The ownership structure of the selected cooperatives ranges from proportional to IOF-like (see Table 2).

The annual reports and income statements were collected from the Annual Report Database (2011) and Amadeus Database for the period 1999–2010. Missing annual reports and/or income statements were collected directly from the cooperatives. Information about the organizational innovations of these cooperative models was derived from the work of van Bekkum and Bijman (2006), which characterizes several cooperatives by their innovative characteristics (cf. Table 2). As most marketing cooperatives have transformed into farmer-owned

TABLE 2. Selected Dutch Cooperatives' Models and Innovations

Cooperative	Organizational model & innovations	Abbreviations
Agrifirm	Proportional investment cooperative	*PIC*
Avebe	New generation cooperative (appreciable capital structure)	*NGC*
Campina	Investor share cooperative (appreciable capital structure; subordinate bonds)	*ISC*
Cebeco	Investor share cooperative (external investors; bought listed companies)	*ISC*
Cehave	Proportional investment cooperative	*PIC*
CNB	Proportional investment cooperative	*PIC*
DOC Kaas	Proportional investment cooperative	*PIC*
Flora Holland	Proportional investment cooperative	*PIC*
ForFarmers	Cooperative with capital seeking entities (farmer-owned ltd-liability; option of external investors)	*CCSE*
Friesland Foods	Member-investor cooperative (appreciable capital structure; permanent bonds)	*MIC*
Royal Cosun	Proportional investment cooperative	*PIC*
The Greenery	Member-investor cooperative	*MIC*
Vion	Investor-owned firm	*IOF*
ZON	Proportional investment cooperative	*PIC*

Note. Source: Synthesis of van Bekkum and Bijman (2006), cooperatives' archived sources, and personal contacts.
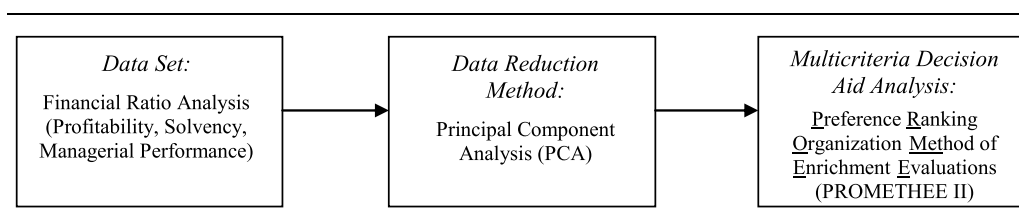

Figure 1   Modeling Framework.

limited-liability companies, our sample consists of those cases considered by van Bekkum and Bijman (2006), qualitative data based on the websites of the selected cooperatives, and personal contact with their financial managers.

4. MODELING FRAMEWORK

Following Kalogeras et al. (2005), the first step in the assessment of the financial viability of cooperatives was the financial ratio analysis. This put into perspective the balance sheet and income statement components of the different cooperatives. Next, a principle components analysis (PCA) was applied to the financial ratios. This procedure revealed the most prominent financial ratios in the dataset. Finally, a multicriteria decision-aid (MCDA) tool was utilized, namely the preference ranking organization method of enrichment evaluations (PROMETHEE II) that rank-ordered the cooperative models with different financial structures based on their financial ratios (Brans & Vincke, 1985). The stages of the modeling framework applied are displayed in Figure 1.

We selected a number of financial ratios that have been found to be useful for indicating the financial performance and risk-bearing ability of the firms (Courtis, 1978) and agribusiness cooperatives (Baourakis et al., 2002; Gentzoglanis, 1997). These ratios could be categorized into three groups: profitability, solvency, and managerial performance ratios. Table 3 depicts the three groups of financial ratios used in this study.

The next step was to identify the most prominent financial ratios out of the fifteen preselected ratios over a period of 11 years. Principle components analysis identified the financial ratios that were most prominent. Specifically, PCA reduced the dimensionality of the dataset by extracting

TABLE 3.   Financial Ratios Used in Multicriteria Analysis

Ratio group	Codification	Financial ratio
Profitability	GPM	Gross profit margin
	NPM	Net profit margin
	ROE	Return on equity
	ROA	Return on assets
	BEP	Basic earning power
Solvency	DR	Debt ratio
	QR	Quick ratio
	CR	Current ratio
	ICR	Interest coverage ratio
	LTLTC	Long-term liabilities to capital
Managerial performance	ITR	Inventory turnover
	ARTR	Accounts receivable turnover
	STLTR	Short-term liabilities turnover
	TATR	Total assets turnover
	FATR	Fixed assets turnover

Note. Source: Synthesis of Courtis (1978), Gentzoglanis (1997), and Kalogeras et al. (2005).

principal components that were uncorrelated and explained as much of the variation in the dataset (Malhotra, 2010). The first component explains most of the variation; the next explains most of the remaining variation, and so on. The process continued until there were as many components as variables used in the analysis. The selection of factors was based on multiple criteria (e.g., Kaiser criterion, scree plot, percentage variance explained, formal testing). This procedure identifies which financial ratios explained most of the variation in the dataset over the examined period (1999–2010).

Finally, the PROMETHEE II was used to rank-order the cooperatives on the basis of their financial ratios. This method is based on the outranking relation theory by Roy (1968), who defined the outranking relation as a binary relation S between alternatives a and b in a given set of alternatives A, such that aSb means that alternative a outranks alternative b. PROMETHEE II also accounted for the indifference between two alternatives. This implies that the choice between alternative a and b could cause indifference or preference for alternative a compared to b. The construction of the rank-ordering through the PROMETHEE II involved the evaluation of the alternatives (cooperatives in a set of criteria—the financial ratios). Each financial ratio was given a decision weight depending on the importance of the financial ratio. Next, the preference for Cooperative A over Cooperative B was calculated for each financial ratio. Finally, the preference index was determined as:

$$\pi(a, b) = \frac{\sum_{i=1}^{n} p_i P_i(a, b)}{\sum_{i=1}^{n} p_i} \tag{1}$$

where p_i is the weight given to criterion i, $P_i(a,b)$ is the preference intensity based on the chosen preference function, n is the number of evaluation criteria, and $\pi(a, b)$ is the preference index (which has a value between 0 and 1). The preference intensity is simply the preference of Cooperative A over Cooperative B (or vice versa) based on the difference between the values of criterion i.
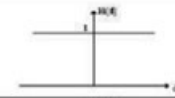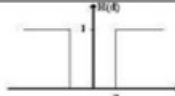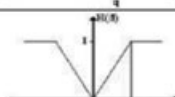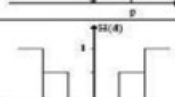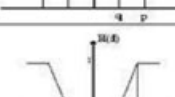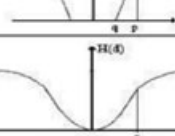
	Graphical form of generalized criteria	Parameters
I. Usual criterion		-
II. Quasi-criterion		q
III.Criterion with linear preference		p
IV.Level criterion		q, p
V. Criterion with linear preference & indifference area		q, p
VI.Gaussian criterion		σ

Figure 2   Forms of Preference Functions. Source: Brans & Vincke (1985).

Brans and Vincke (1985) distinguish between six preference functions (see Figure 2). In this article, the Gaussian preference function was used for all financial ratios. This is a smoothed generalization of the other five functions. This means that there were no discontinuities, which satisfied the properties of the other five functions, and hence led to more stable results. The only requirement is that a parameter σ is known. This is the distance between the origin and the inflexion point of the preference curve. The standard deviation of the criteria was used as an approximation for σ.

The preference indices for all pairs of alternatives (a,b) explained the dominance of the alternatives for specific criteria. Graphically, this could be represented in a value outranking graph. The nodes on the graph represent the alternatives, which are the cooperatives in this case, and the arc between the nodes represent the preference of alternative a over alternative b, when the direction of the arc goes from a to b, or vice versa. The flow of the arc represents the preference index $\pi(a, b)$. Next, a distinction is made between the sum of the flows that left a node and the sum of the flows that entered a node. The former is known as the positive flow $\varphi^{+}(a)$, and the latter is known as the negative flow $\varphi^{-}(a)$.

The positive flow expresses how much one alternative dominates the other alternatives, and the negative flow how much it is dominated by the other alternatives. The difference between the positive and the negative flow, $\varphi(a) = \varphi^{+}(a) - \varphi^{-}(a)$, was the net flow for the node corresponding to alternative a (i.e., Cooperative A). It indicated the overall evaluation measure of the performance in node a. Finally, the alternatives are ranked based on their net flow. The node with the highest net flow is considered the best alternative; the node with the lowest net flow is considered the worst alternative. Thus, cooperatives with the highest net flow have the best financial performance.

TABLE 4.   Frequency of Appearance of Financial Ratios in the Components

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Frequency
Gross profit margin		■	■							■			3
Return on Assets				■		■	■	■	■	■			6
Return on Equity		■											1
Basic earning power	■			■	■	■			■		■	■	8
Net profit margin	■										■	■	3
Debt ratio					■				■	■			3
Current ratio	■		■	■			■				■	■	6
Quick ratio								■					1
Interest coverage	■	■	■	■		■		■		■			7
LT Liabilities to capital		■		■		■		■			■		5
Inventory turnover						■		■		■			3
Accounts Receivable turnover											■		1
ST Liabilities turnover	■		■			■			■		■		5
Total assets turnover		■		■			■		■		■		5
Fixed assets turnover								■					1

5. EMPIRICAL ANALYSIS AND RESULTS

5.1. Principle Components Analysis Results

Data reduction was achieved in 9 out of 11 years, with three to five extracted principal components. In addition, for most years there was a recurrence of groups of ratios in a component. As the correlations between several ratios were high, there was a high probability that these ratios were grouped together in one component. The total variance explained across the years indicated how much the components explained the variance within the data set. Across the years, the total variance explained varies between 85.45% in 1999 to 92.91% in 2002. This result indicates that the components have a significant explanatory power. In addition, communalities were found larger than 0.6 and the eigenvalues for the components were larger than one.

To select the most prominent ratios, the ratios with the highest loading were selected from the rotated component matrix over the years. If a component consisted of ratios that belonged to different groups of ratios (i.e., profitability, solvency, managerial performance), the highest ratio from each group was selected. If the correlation matrix indicated that the ratio with the highest loading was highly correlated with the other ratios in the same component, only the ratio with the highest loading was selected. This is shown in Table 4 for the examined period. The last column indicates the frequency of the most prominent ratio for each year. In the remainder of the analysis, the financial ratios with a frequency of four and higher were used to evaluate the financial viability of the cooperative models with different financial/ownership structures.

5.2. PROMETHEE II Results

To rank order the selected cooperatives on the basis of their performance, a number of steps were taken. First, the preferences indices were calculated. To do so, the decision weights for the criteria had to be known as they are crucial in the preference function of PROMETHEE. We followed closely how Kalogeras et al. (2005) define the weights of the decision criteria. In addition, a robustness check was conducted by creating 25 random scenarios and by calculating an average ranking of all scenarios. This check aimed at resolving the simplification of the decision weights adopted in the methodology.

The weights are numbers that reflected the importance of each criterion. Different weights were used to examine how the ranking changed when different groups of ratios became more important. Table 5 shows the different scenarios used in this method. The last three columns show the weight of the group. For the first scenario, the weight for the profitability ratios (PR)

TABLE 5. Weighting Scenarios for the Application of PROMETHEE II

	RoA	Bep	RoE	CR	IC	TATR	STLTR	Weight PR	Weight SR	Weight MPR
Scenario 1 (1,2,3)	0,33	0,33	0,33	1,00	1,00	1,50	1,50	1	2	3
Scenario 2 (1,3,2)	0,33	0,33	0,33	1,50	1,50	1,00	1,00	1	3	2
Scenario 3 (2,1,3)	0,67	0,67	0,67	0,50	0,50	1,50	1,50	2	1	3
Scenario 4 (2,3,1)	0,67	0,67	0,67	1,50	1,50	0,50	0,50	2	3	1
Scenario 5 (3,1,2)	1,00	1,00	1,00	0,50	0,50	1,00	1,00	3	1	2
Scenario 6 (3,2,1)	1,00	1,00	1,00	1,00	1,00	0,50	0,50	3	2	1
Scenario 7 (1,1,1)	0,33	0,33	0,33	0,50	0,50	0,50	0,50	1	1	1

TABLE 6. Ranking of the Cooperatives Performance for 1999–2010

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average ranking	Cooperative model
Agrifirm	8,85	8,85	9,71	11,71	11,71	11,85	11,57	11,57	12,14	10,14	8,11	8,31	12th	PIC
Avebe	10,00	6,14	4,57	7,42	7,71	8,57	13,14	10,28	6,00	5,29	5,10	5,47	7th	NGC
Campina	10,14	10,28	9,42	9,85	10,42	10,57	9,28	10,42	12,85	9,21	9,12	9,57	11th	ISC
Cebeco	6,28	7,14	13,57	1,57	7,28	3,42	4,85	1,00	2,42	3,61	3,61	3,61	4th	ISC
Cehave	12,85	11,42	7,57	13,28	6,71	6,71	6,00	6,57	6,71	5,57	5,57	5,57	9th	PIC
CNB	1,00	2,00	2,28	4,14	3,14	6,14	5,42	5,42	3,42	4.74	4,28	5,71	2nd	PIC
DOC Kaas	2,00	1,00	1,00	1,42	2,57	3,42	1,57	2,00	1,00	12,87	12,87	13,85	5th	PIC
Fl. Holland	12,85	12,57	12,85	12,57	12,71	12,71	11,57	14,00	14,00	12,78	10,77	10,77	14th	PIC
ForFarmers	3,57	3,57	3,28	4,00	1,14	2,00	1,71	4,42	4,14	5,22	9,42	5,27	3rd	CCSE
Friesl. Foods	7,71	4,57	6,28	8,42	9,00	7,14	6,57	7,57	8,71	5,87	5,56	5,56	6th	MIC
Royal Cosun	4,42	4,00	4,00	5,14	4,71	1,28	4,85	3,28	9,71	3,10	3,25	3,25	1st	PIC
The Greenery	8,42	13,71	9,71	7,42	6,42	9,28	4,85	7,42	10,71	10,21	10,21	10,21	10th	MIC
Vion	4,14	7,85	7,57	5,71	7,42	8,14	9,00	9,14	8,00	8,71	7,26	6,57	8th	IOF
ZON	12,71	11,85	12,28	12,28	14,00	13,85	13,14	11,85	5,14	6,78	6,14	5,75	13th	PIC
Kendall's W	0,926	0,964	0,951	0,926	0,841	0,896	0,861	0,887	0,939	0.979	0.875	0.876	0.889	

was 1, which indicates that this ratio was considered the least important. The solvency ratios (SR) were assigned with a weight equal to 2, which implies that this group was more important. The weight for managerial performance ratios was assigned with a weight equal to 3, making this group of ratios the most important. Then the weight for the individual ratios was determined by dividing the weight by the number of ratios in the group. Thus, for the first scenario, there were three profitability ratios; hence, the weights for each individual profitability ratio were the weight of the group (1) divided by number of ratios (3). There were two solvency ratios; hence, the weights for the individual solvency ratios were the weight of the group (2) divided by the number of ratios (2). The same procedure was applied for the remaining scenarios.

Based on these scenarios, the average ranks over the years were calculated (Method 1). For example, in 1999 there were seven scenarios, and the average rank in 1999 was the weighted average of these seven scenarios. The results of this application for the years 1999–2010 are displayed in Table 6.

To make sure that the ranking was consistent over the years, Kendall's coefficient of concordance (Kendall's W) was calculated. This indicated the agreement among the ratings during a year. Kendall's W ranges from 0 (no agreement) to 1 (complete agreement). As can be seen from Table 6, the coefficient was above 0.841 for every year. Thus, the ranking of the cooperatives was consistent for the scenarios during individual years. In addition, the coefficient for the whole sample period was 0.889, indicating that the ranking was consistent for the whole period (1999–2010). The last column in Table 6 shows the average rank of the cooperatives' performance over all the years.

Further, we conducted a robustness check by defining the decision weights by means of 25 random scenarios (Method 2). Every scenario generated individual weights that varied between

TABLE 7.   Dutch Cooperatives' Performance Based on Both Scenario Methods

Cooperative name	Average ranking method 1	Average ranking method 2	Cooperative model
Agrifirm	12th	13th	PIC
Avebe	7th	7th	NGC
Campina	11th	11th	ISC
Cebeco	4th	4th	ISC
Cehave	9th	9th	PIC
CNB	2nd	2nd	PIC
DOC Kaas	5th	6th	PIC
Flora Holland	14th	14th	PIC
ForFarmers	3rd	3rd	CCSE
Friesland Foods	6th	5th	MIC
Royal Cosun	1st	1st	PIC
The Greenery	10th	10th	MIC
Vion	8th	8th	IOF
ZON	13th	12th	PIC

0 and 1. In addition, the sum of the weights was supposed to be equal to 1. Thus, all criteria in total weighed 100%. This method was used to check whether the results of Method 1 are robust. The average ranking of the selected cooperatives' performance provided the same results. The results indicated only some minor differences among the last five performers as depicted in Table 6. Yet, the top 10 positions were held by the same cooperative models (see Table 7). Based on the 25 scenarios, the average rank over the period 1999–2010 was calculated. The Kendall's W statistic indicated that there is sufficient consistency among the ratings per year as all coefficients are above 0.65. In addition, the Kendall's W for the whole period equals 0.764, and thus shows above average consistency among the ratings.

5.3. Results' Summary and Discussion

The two methods used differ in the way they treat the weights of the criteria. However, comparing the results derived from both methods, the ranking does not differ substantially. From the results presented in Table 7, it can be seen that only four companies exhibited different rankings. These deviations were pair-wise, meaning that the overall change in rank was only one place. Thus, it can be argued that the rankings were consistent in both methods.

The empirical analysis explores whether the newly emerged ownership structures of cooperatives perform better than the more traditional ones. The results show that the top four performers are Royal Cosun (*PIC*), CNB (*PIC*), ForFarmers (*CCSE*), and Cebeco (*ISC*), respectively. In addition, FloraHolland (*PIC*), ZON (*PIC*), Agrifirm (*PIC*), and Campina (*ISC*) are the bottom four performers. Both the top and bottom performers adopted mixed organizational innovations. That is, two cooperatives maintaining a proportional investor ownership structure are top performers, followed by a cooperative with capital-seeking entities and an investor-share cooperative. Yet, three agribusiness cooperatives with a proportional ownership structure and one member-investor cooperative are the worst performers. Hence, there is no clear-cut evidence that the cooperatives with innovative ownership structures perform better than the cooperatives with more traditional structures.

van Bekkum and Bijman (2006) showed that some new cooperative models that adopted ownership innovations exhibit IOF-like equity features in that cooperatives issue subordinate or permanent bonds, outside investors are attracted at a subsidiary and/or group level, or the organizational form is transformed to a limited liability company with the retention of ownership or the full conversion to an IOF. In our sample, the cooperatives Avebe (*NGC*), Campina (*MIC*), Friesland Food (*MIC*), Cebeco (*ISC*), and Vion (*IOF*) were expected to perform better because additional equity provided them with new capital to finance growth opportunities and start capital-intense new projects. However, Vion (*IOF*) is ranked 8th, indicating an average

performance of the company. Cebeco, ranked 4th, has external investors contributing to its equity structure and has adopted the most IOF-like structure. Although these two cooperatives are almost in the top half of the rank-order, they do not significantly outperform the cooperatives with more traditional financial structures.

Another interesting observation concerns Campina, which ranked 11th. Campina introduced multiple innovative structural features to attract new equity. It seems that although Campina has indeed attracted substantial amounts of members' investments and outside equity, this increasing equity has not contributed to the overall performance of the firm. Furthermore, ForFarmers (*CCSE*), ranked 3rd, has performed relatively well over the examined period, but does not clearly outrank cooperatives with a more traditionally organized ownership structure (Royal Cosun and CNB). These results indicate that even cooperatives with a relatively smaller economic size and more traditional ownership structure can be financially viable in terms of profitability, solvency, and managerial turnovers. Royal Cosun and CNB surpassed the other cooperative models mostly in terms of the interest coverage ratio and basic earning power, which resulted in a large overall net flow. At the bottom end of the table, ZON, Agrifirm, and FloraHolland confirm partially the expectations of being the relatively worst performers due to a rather more traditional (proportional) ownership structure. Note that these results do not suggest a bad financial outlook for these cooperatives. The other selected cooperatives simply show a better performance over the examined period.

Overall, these results confirm the general inferences in cooperative economics that even cooperatives with a more traditional financial structure can perform at least as well as IOF-like models (e.g., Hardesty & Salgia, 2004; Lerman & Parliament, 1990). For the selected cooperatives, the results highlight that attracting more members' investments and/or outside equity may help improve the financial position of the business, but it does not automatically imply a structurally better position in terms of performance. Outside equity may provide the possibility to finance growth opportunities and/or improve the financial viability of the cooperative firms. However, consistent with our results, the cooperatives with the largest turnovers are not always the cooperatives with the best financial position. Thus, the cooperatives that adapted ownership innovations may also need to improve the overall performance to take full advantage of the extra member contributions (e.g., preferred shares) and/or outside equity.

6. CONCLUSIONS

Here the financial performance of various cooperatives models was studied by using a combination of multivariate data techniques and a modeling framework from financial engineering. The financial performance of selected agribusiness cooperatives was examined. The ranking, which was based on the financial indicators of the selected cooperatives over 11 years, does not explain the economic outlook of the cooperatives (e.g., financial distress). Rather, it is a comparative ranking among the agribusiness cooperatives based on selected financial ratios that were used as criteria. The rank order shows a mixed ranking of the cooperatives (with or without innovative ownership features) and indicates that there is no clear-cut evidence that the more IOF-like cooperative models perform better than the more traditional ones.

These results raise the question whether converting into an IOF-like ownership structure is indeed profitable to cooperatives. As cooperatives pursue organizational reforms to attract their members' investments and outside equity, they might also ensure that more capital is available for the funding of strategic investments and competitive strategies. Likewise, their market share may be expanded, and their activities in the supply chain may be integrated and better coordinated; hence, their market power may be increased. As a consequence, cooperatives may experience better financial viability. Although the arguments for re-engineering their financial/ownership structure are sound, our results indicate that cooperatives cannot fully exploit their opportunities by attracting further members' and/or outside equity. Our findings may also highlight that small-sized cooperatives that maintain a more traditional ownership structure (i.e., PIC) than others and at the same time are more homogeneous, in terms of

produce and member characteristics, perform better. This finding may signal that these cooperatives may experience less difficulty in protecting their internal social capital and thereby enhancing their member investments (Nilsson, Svendsen, & Svendsen, 2012). Further, large and heterogeneous cooperatives may have to consider restoring their stocks of social capital and reinforcing member involvement, bonding, and commitment.

This research focused on 14 agribusiness cooperatives selected on the basis of their turnover and market shares. These selected cooperatives operate in the same industry, but do not all operate in the same sectors. Future research may expand the research design of this study by comparing the performance of cooperatives across and within sectors. The comparison of cooperatives with similar markets and business purposes may reveal useful information regarding the financial performance of the same clusters of cooperatives. Furthermore, the comparisons of the performance of different cooperative models within sectors may show what cooperative models perform better than others in each sector. The structural and dynamic characteristics of each sector (horticultural vs. dairy) and the relevant market conditions (perfect competitive vs. oligopolistic markets) may influence the financial viability of cooperatives over time.

The literature on cooperative performance has mainly focused on quantitative data analysis. This research also uses income statements and balance sheets to derive relevant accounting data for the calculation of the financial ratios, which allow the comparison of cooperatives' financial viability over time. However, such an approach does not take into account qualitative dimensions regarding the strategic behavior of cooperatives over time. For instance, cooperatives may pursue strategies that do not enhance their financial performance in the short term, and hence may negatively affect their ranking. Our results do not provide clear-cut evidence supporting the better financial performance of the new IOF-like cooperative models. This might be because the boards of directors (BoD) or professional managers of these cooperatives invested the additional capital in new projects. As a result, records on the cash flows that were not available in specific accounting years did not immediately contribute to the financial performance of the examined cooperatives. The collection and systematic analysis of qualitative data may allow us to gain crucial insights regarding the strategic behavior of cooperatives over time, showing, for example, where the additional capital has been invested and when these investments pay off. A methodological framework is being developed to account for both quantitative and qualitative information regarding the performance of cooperative models over time. This framework may enrich our understanding regarding the cooperatives' financial viability and strategic behavior over time.

REFERENCES

AGD. (2008). Increasing Interest for Cooperatives. Retrieved December 17, 2008, from http://www.agd.nl/1064691/Nieuws/Artikel/Belangstelling-voor-coperaties-neemt-toe.htm
Amadeus Database (1999–2010). Available online at: https://amadeus.bvdinfo.com/version-2012119/home.serv?product=amadeusneo

Annual Report Database (1999–2010). Available online: http://www.eur.nl/edsc/english/get_started/annual_reports/

Baourakis, G., Doumpos, M., Kalogeras, N., & Zopounidis, C. (2002). Multicriteria analysis and assessment of financial viability of agribusinesses: The case of marketing cooperatives and juice producing companies. Agribusiness, 18, 543–558.

Barton, D. (1989). What is a cooperative? In D. Cobia (Ed.), Cooperatives in agriculture (pp. 1–20). Englewood Cliffs, NJ: Prentice Hall.

Benos, T., Kalogeras, N., Verhees, F.J.H.M., & Pennings, J.M.E. (2009, June). Marketing cooperatives' re-engineering: Influences among organizational attributes, strategic attributes and performance. Paper presented at the international workshop, Rural Cooperation in the 21st Century: Lessons from the Past, Pathways to the Future, Rehovot, Israel.

Bijman, W.J.J., & Ruben, R. (2005). Repositioning agricultural cooperatives in the North and the South: Where do the twain meet? Paper presented at Agrifocus Workshop, Deventer, November 2005, The Netherlands.

Bijman, W.J.J., & van Bekkum, O-F. (2005, September). Cooperatives going public, motives, ownership and performance. Paper presented at the International Conference on Economics and Management of Networks (EMNet), Budapest, Hungary.

Bijman, W.J.J. (2002). Essays on agricultural cooperatives: Governance structure in fruit and vegetable markets. ERIM PhD Series Research in Management. The Netherlands: Erasmus University Rotterdam.

Brans, J.P., & Vincke, Ph. (1985). A reference ranking organization method: The PROMETHEE method for multiple criteria decision-making. Management Science, 31, 647–656.

Chaddad, F.R. & Cook, M.L. (2004). Understanding new cooperative models: An ownership-control rights typology. Review of Agricultural Economics, 26, 248–360.

Cook, M.L., & Chaddad, F.R. (2004). Redesigning cooperative boundaries: The emergence of new models. American Journal of Agricultural Economics, 6, 1249–1253.

Cook, M.L. (1997). Organizational structure and globalization: The case of user oriented firms. In J. Nilsson & G. van Dijk, (Eds.), (Strategies and structures in the agro-food industries (pp. 77–93). Assen, The Netherlands: Van Gorcum.

Courtis, J.K. (1978). Modeling a financial ratios categoric framework. Journal of Business Finance and Accounting, 5, 371–386.

Fulton, M.E., & Giannakas, K. (2001). Organizational commitment in a mixed oligopoly: Agricultural cooperatives and investor-owned firms. American Journal of Agricultural Economics, 83, 1258–1265.

Gentzoglanis, A. (1997). Economic and financial performance of cooperatives and investor-owned firms: an empirical study. In J. Nilsson & G. van Dijk (Eds.), Strategies and structures in the agro-food industries (pp. 171–182). Assen, The Netherlands: Van Gorcum.

Griffioen, C. (2012). The top 100 cooperatives by NCR. Coöperatie, 610, 23–25.

Hardesty, S., & Salgia, V. (2004, November). Comparative financial performance of agricultural cooperatives and investor-owned firms. Paper presented at the Annual Meeting of NCR-194, Research on Cooperatives, Kansas City, MO.

Harris, A., & Fulton, M. (1996). Comparative financial performance analysis of Canadian cooperatives, investor-owned firms, and industry norms. Occasional Paper Series. Saskatoon, Canada: Centre for the Study of Cooperatives.

Harte, L.N. (1997). Creeping privatisation of Irish cooperatives: A transaction cost perspective. In J. Nilsson & G. van Dijk (Eds.), Strategies and structures in the agro-food industries (pp. 31–53). Assen, The Netherlands: Van Gorcum.

Hendrikse, G.W.J., & Veerman, C.P. (2001a). Marketing cooperatives and financial structure: A transaction costs economics analysis. Agricultural Economics, 26, 205–216.

Hendrikse, G.W.J., & Veerman, C.P. (2001b). Marketing cooperatives: An incomplete contracting perspective. Journal of Agricultural Economics, 52, 53–64.

Iliopoulos, C. (1998). A study of the property rights constraints in U.S. Agricultural cooperatives: Theory and evidence. Unpublished doctoral dissertation, University of Missouri-Columbia.

Kalogeras, N., Baourakis, G., Zopounidis, C., & van Dijk, G. (2005). Evaluating the financial performance of agri-food firms: A multicriteria decision-aid approach. Journal of Food Engineering, 70, 365–371.

Kalogeras, N., Pennings, J.M.E., van der Lans, I.A., Garcia, P., & van Dijk, G. (2009). Understanding heterogeneous preferences of cooperative members. Agribusiness, 5, 90–111.

Kalogeras, N., Pennings, J.M.E., van Dijk, G., & van der Lans, I.A. (2007). The structure of marketing cooperative: A members' perspective. In K. Karantininis & J. Nilsson (Eds.), Vertical markets and cooperative hierarchies (pp. 73–92). Dordrecht, The Netherlands: Springer Academic Publications.

Karantininis, K., & Nilsson, J. (2007). Vertical markets and cooperative hierarchies: The role of cooperatives in the agro-food industry. Dordrecht, The Netherlands: Springer Academic Publications.

Knoeber, C.R., & Baumer, D.L. (1983). Understanding retained patronage refunds in agricultural cooperatives. American Journal of Agricultural Economics, 6(3), 30–37.

Lerman, Z., & Parliament, C. (1990). Comparative performance of cooperatives and investor owned firms in US food industries. Agribusiness, 6, 527–540.

Malhotra, N.K. (2010). Marketing research: An applied orientation. Upper Saddle River, NJ: Pearson Education.

Nilsson, J., & Gunnarsson, P. (2000). The PLC cooperatives in the Irish dairy sector. In J. Bircahll (Ed.), The world of cooperative enterprise 2000. Oxfordfordshire, UK: Plunkett Foundation, pp. 1–9.

Nilsson, J., Svendsen, G.L.H., & Svendsen, G.T. (2012). Are large and complex agricultural cooperatives losing their social capital? Agribusiness, 28, 187–204.

Notta, O., & Vlachvei, A. (2007). Performance of cooperatives and investor-owned firms: The case of the Greek dairy industry. In K. Karantininis & J. Nilsson (Eds.), Vertical markets and cooperative hierarchies (pp. 275–285). Dordrecht, The Netherlands: Springer Academic Publications.

Oustapassidis, K., Vlachvei, A., & Karantininis, K. (1998). Growth of investor-owned and cooperative firms in Greek dairy industry. Annals of Public and Cooperative Economics, 69, 399–417.

Porter, P.K., & Scully, G.W. (1987). Economic efficiency in cooperatives. Journal of Law and Economics, 30, 489–512.

Roy, B. (1986). Classification and choice in presence of multiple points of view: The electre method. R.I.R.O., 8, 57–75.

Sergaki, P., & Semos, A. (2006). The Greek unions of agricultural cooperatives as efficient enterprises. Agricultural Economics Review, 7(2), 15–27.

van Bekkum, O.F. (2007). The Top 100 European Cooperatives. Coöperatie, 593, 22–23

van Bekkum, O.F., & Bijman, W.J.J. (2006, June). Innovations in cooperative ownership: Converted and hybrid listed cooperatives. Paper presented at the 7th International Conference on Management in Agrifood Chains and Networks, Ede, The Netherlands.

van Dijk, G. (1997). Implementing the sixth reason for co-operation: New generation cooperatives in agribusiness. In J. Nilsson & G. van Dijk (Eds.), Strategies and structures in the agro-food industries (pp. 94–110). Assen, The Netherlands: Van Gorcum.

Vitaliano, P. (1983). Cooperative enterprise: Alternative conceptual basis for analyzing a complex institution. American Journal of Agricultural Economics, 65(5), 1078–1082.

Zopounidis, C., Schiniotakis, N., & Baourakis, G. (2006). Financial analysis and economic aspects of the agricultural unions of Crete. Agricultural Economics Review, 7(2), 66–74.

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