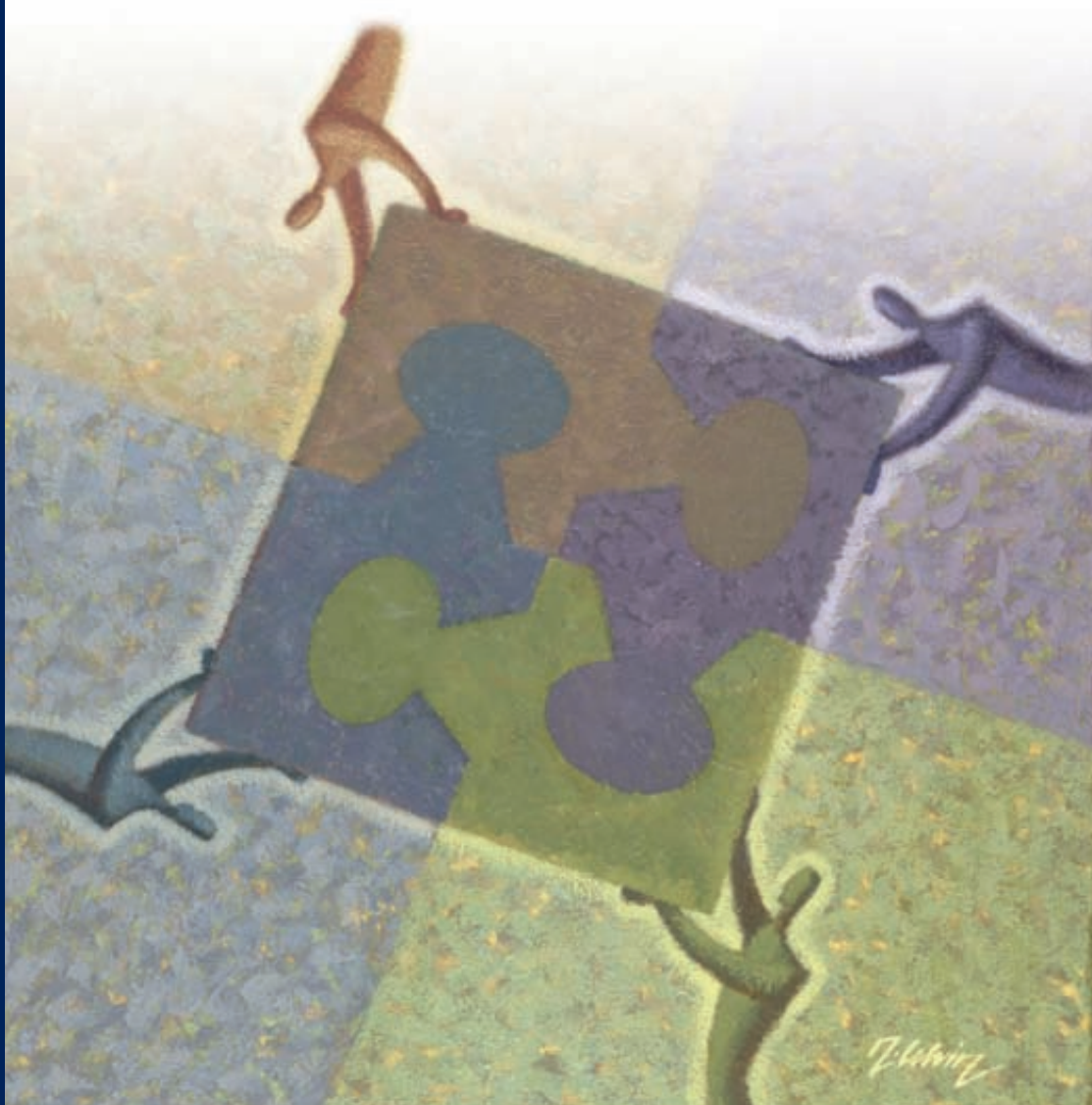
LI FENG

Motivation, Coordination and Cognition in Cooperatives



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Motivatie, coördinatie en cognitie in coöperaties

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Li Feng
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Doctoral Committee

Promoter:
Prof.dr. G.W.J. Hendrikse

Other members:
Prof.dr. S.B. Neto
Prof. dr. K. Karantininis
Dr. E. Verwaal

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To My Parents

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Chapter 1
On the Nature of Cooperatives: A System of Attributes Perspective

There is at present no (satisfactory) way of characterizing organizations in terms of continuous variation over a spectrum.

Ward (1967, p38)

1.1 Introduction

The nature of a cooperative has been debated frequently. An important contribution is Emelianoff (1948), triggering the debate in the 1950s and 1960s. Three views are distinguished in the debate. The extension of the farm view maintains that the cooperative is just an association of firms, not a new firm per se; it has no entrepreneurial unit (Phillips 1953; Trifon 1961). The vertical integration view advocates that member firms are integrated with the downstream production stage. It entails that several stages in the production process are brought under one entrepreneurial control (Phillips 1953, p79). The firm view suggests that a cooperative is itself a business enterprise and an economic entity; a new decision-making body is created by the formation of a cooperative (Helmberger & Hoos 1962, p290; Robotka 1947, p103). A cooperative is viewed as a special type of firm capable of making entrepreneurial decisions just as any private corporation (Savage 1954).

This article highlights marketing cooperatives. A marketing cooperative is collectively owned by many independent farmers as input suppliers. Members not only hold formal authority and take responsibilities over the cooperative, but also share its costs and revenues. Part of their assets and activities are combined and coordinated by the cooperative. Meanwhile, members are independent in the sense they do not necessarily collaborate with each other on other aspects of their individual farms. They advance the interests of their own farm enterprises. Members of a cooperative have therefore two roles. On the one hand, they are the patrons of the cooperative who provide inputs. They grow produce and deliver it to the downstream stage where the produce is processed or marketed. On the other hand, they collectively possess residual rights over the cooperative and make vital decisions upon important issues regarding it.

The next section briefly reviews the old debate. Section 1.3 introduces the concept of a system of attributes in order to formulate a unified account of the various positions. Section 1.4 highlights a number of subsequent contributions. Section 1.5 concludes with directions for further research.

1.2 The old debate

Two positions have been distinguished in the literature on the nature of a cooperative: the cooperative as extension of the farms or as a firm (Cook 1994; Oustapassidis, Vlachvei & Karantininis 1998). Among the most cited articles from the 1940s to 1960s, Phillips (1953) and Trifon (1961) emphasize the nature of a cooperative as extension of farms, while Robotka (1947), Savage (1954), and Helmberger & Hoos (1962) argue in favour of the firm position. On closer inspection of these articles and later research, we identify vertical integration as a third view regarding the nature of a cooperative (Phillips 1953; Robotka 1947; Trifon 1961). We address these contributions in chronological order.

Referring to a cooperative both as 'an extension of their entrepreneurial functioning' (Robotka 1947, p113) and as 'concerted integration' (Robotka 1947, p102), Robotka (1947) does not make explicit the distinction between the extension of the farm view and the vertical integration view. The non-profit feature of the cooperative provides support for the former perspective, while the collective ownership of upstream farmers over downstream assets characterized in the article can be seen as an argument for the latter position. However, more important is his observation that 'a new economic entity emerges when a cooperative association is formed, because participants must agree to submit to group decisions questions relating to the activity being coordinated' (Robotka 1947, p113). This crucial last point leads us to classify this paper in support of the cooperative as a firm position.

Phillips (1953) is also equivocal on the distinction among the three positions. On the one hand, he mentions both 'concerted integration' (p85) and the analogy of a cooperative as a plant of a multi-plant firm: 'The participating firms are ordinarily vertically integrated in the sense that the output of the joint plant is the raw product input of the individual plants of the participating firms – or alternatively, the output of the individual plants of the participating firms is the raw product input of the joint plant (p79)'; 'Such participating firms are integrated in the sense that several stages in the production process are brought under one entrepreneurial control (p79).'

On the other hand, he asserts that the cooperative is not a new firm (p75] based on the argument that it is not a firm unless it seeks profits for itself, which is an ex parte statement per se. In addition, the author argues that 'the cooperative … has no entrepreneurial unit; its member units each have their entrepreneur' and 'the cooperative association consists of the sum of the multi-lateral agreements among the firms participating in the joint activity' (p76), which fits the extension of farm position.

Phillips' focus on the upstream farm was soon challenged by Savage (1954), a comment on Phillips' work, which considers a cooperative as a firm capable of making entrepreneurial decisions as any other private corporation. 'Though farmers own their cooperatives and control them in the broad sense of the word, they do not make all or most of the entrepreneurial decisions' (p531). 'The delegation of decision rights is the common practice of cooperative. The individual farmers pool certain of their entrepreneurial functions and in doing so they authorized a collective body to perform these functions for them. In the process the farmers create an agency and defer to it some of their individual prerogatives' (p532). Therefore the author concludes that the cooperative should be seen as a 'going concern performing entrepreneurial functions' (p532) and is much more than a formalization of cooperation. In other words, a cooperative is more than an alliance or an association of firms.

While acknowledging that cooperatives resemble to a certain extent the characteristics of vertical integration, i.e., the 'subjugation to external economic control' (Trifon 1961, p216) and the absence of a profit-seeking purpose, Trifon (1961) stresses also that the plurality of interests of the members distinguishes a cooperative from vertical integration, one with a single locus of profit maximization. He claims that the cooperative, as an aggregate of economic units, is 'functioning only as a branch or part of the associated economic units' (p215-216), which is close to the extension of the farm view.

Helmberger & Hoos (1962) denies Phillips' analogy between a cooperative and a vertically integrated firm on the grounds that 'when agricultural producers jointly undertake the creation of a cooperative association, they seek goods and services provided at cost' (p280), rather than a high return on the investments like investors in the usual type of business enterprise. Furthermore, they hold the cooperative, in spite of its different intended

objectives from an Investor Owned Firm (IOF), is a firm, a decision-making entity, given that the 'theory of the firm can be adapted to reflect the cooperative's peculiar economic nature' (p281). Table 1 summarizes these views regarding the nature of a cooperative. Some articles we quote have features of various views and are thus double listed.

	Extension of the farm view (Phillips 1953, Trifon 1961)	Vertical integration view (Phillips 1953, Trifon 1961)	Firm view (Robotka 1947, Savage 1954, Helmberger & Hoos 1962)
The nature of a cooperative	An association of firms, not a new firm	Several production stages brought under one entrepreneurial control	A business enterprise, a new decision making body
Focus of analysis	The member firms	The interaction between members and the cooperative firm	The cooperative firm

Table 1: Three views regarding the nature of a cooperative

1.3 Cooperative as a system of attributes

Milgrom & Roberts (1990) propose that an organization is composed of attributes and can therefore be perceived as a system. An attribute represents a certain aspect of an organization, like an organizational department, an activity undertaken, or a policy carried out by the organization. Examples of attributes are production technology, marketing, sourcing, logistics, communication, personnel, accounting, financing, authority and incentives. An attribute can take multiple values such as "large", "medium", and "small", "weak" and "strong," or "rigid" and "flexible". Figure 1 provides an illustration of a system with three attributes. It represents, for instance, a dairy cooperative characterized by three attributes, x_1 as the product portfolio (with attribute values like 'bulk' or 'specialty' products), x_2 as sourcing ('make' or 'buy'), and x_3 as financing ('retained earnings' or 'certificates'). Hendrikse & Veerman (1997) distinguish eleven attributes regarding marketing cooperatives.

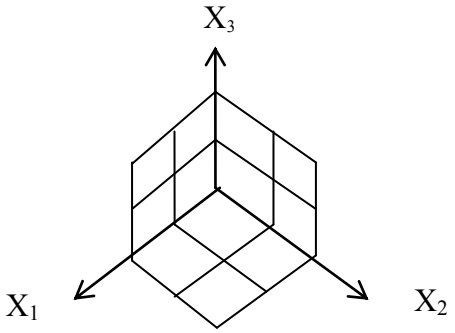

Figure 1: A system of three attributes

The attributes have to be aligned in order to bring their interdependencies and interactions to value. The complementarities, or the positive externalities, among group of activities is thus at the center of the analysis, i.e. systemic effects are highlighted because the payoff associated with the level of one attribute depends on the level of all the other attributes. Exploiting these complementarities requires coordinated action between the separate attributes in order to obtain organizational coherence.

We contrast the three positions regarding a cooperative in two ways. First, we believe that the core of each contention is the analytical emphasis, should it be on the upstream farms, on the downstream processor, or the interaction of the two? Second, the three positions can be distinguished in terms of the number of attributes involved in the upstream and downstream stages. Figure 2 illustrates the differences. The vertical integration view specifies only one attribute, i.e., the transaction between the members and the processor, because all attention is focused on the transaction between the two parties. The upstream and downstream parties are treated as two stages of production that are united through a hierarchy and under one management control. The interaction and vertical relationship between two stages of production are the focus of analysis.

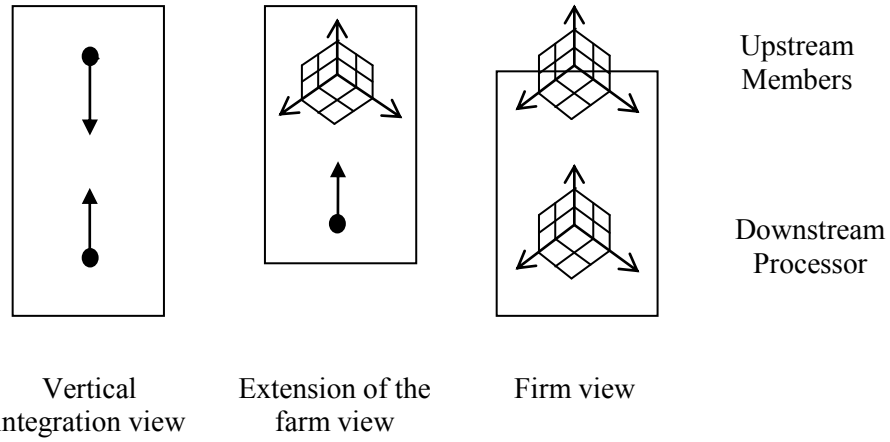

Figure 2: Distinguishing the three positions by the number of attributes

From the extension of the farm view, each upstream farm is an autonomous enterprise consisting of a system of various attributes, while the downstream processor is treated not as an enterprise, but as a stage of production subordinate to the member farms, like a plant of a multi-plant firm (Phillips 1953). With this conception of the cooperative, all of the attention is focused on (the entrepreneurs of) the member firms. The interdependencies between the various activities in the portfolio of a farm enterprise are thus highlighted. The attributes of the upstream farms and their impact on the cooperative are emphasized.

The firm view highlights the downstream party, which is perceived as a business enterprise that forms a system of attributes by itself. Upstream members are also characterized by their own attributes. The synergy between the transaction and financial attributes between members and the downstream entity determines to a large extent the success of the cooperative as a whole.

Table 2 summarizes these observations. From the extension of the farm view and the vertical integration view, the downstream stage consists of only one attribute, i.e., the processing of farm products. Their difference resides in the characterization of the upstream attributes. The extension of farm view emphasizes the upstream attributes and their impact on the downstream stage. From the perspective of the firm view, the core of the cooperative firm consists of the downstream party. It is characterized by

various attributes, where these attributes have to be aligned with various attributes of the members firms.

No. of downstream attributes \ No. of upstream attributes	≥ 2	1
≥ 2	Firm view	--
1	Extension of the farm view	Vertical integration view

Table 2: Characterizing the three views in terms of the number of attributes

The three views regarding a cooperative are distinguished further by the upstream and downstream externalities (table 3). An externality exists when the actions of one party result in benefits or costs for another party. Here the upstream externality refers to the impact of upstream attribute choices on the choices of the downstream party. Examples of downstream problems caused by upstream externalities are the horizon problem and the portfolio problem (Cook 1995). The downstream externality captures the opposite. The source of a downstream externality lies in either the collective decision making feature or a pooling arrangement at the downstream party. Examples of the impact of downstream attributes on the choices made by the upstream members are the influence problem, the control problem, the free rider problem (Cook 2005), and the selection problem (Hendrikse & Bijman 2002). Both upstream and downstream externalities can be positive or negative.[1]

Starting with the simplest case in terms of upstream and downstream externalities, the vertical integration view emphasizes solely the (attributes covering the) exchange between the upstream farms and the downstream

[1] This list of externalities is not exhaustive. For example, an advantage of vertical integration compared to a setting with independent upstream and downstream firms is that the double-marginalization problem is eliminated (Spengler 1950).

processor. It does not reflect externalities at either the upstream or downstream party since vertical integration internalizes externalities. Therefore, this position neglects, on the one hand, the impact of the multiple upstream attributes on the downstream entity, and on the other hand, the downstream externalities on the member farms.

The extension of farm view highlights the externalities of farm enterprises by gearing attention towards the portfolio of farm activities and assets. The investment decisions by farmers, for example, are guided by bringing the farms to value and will therefore have an impact on the decisions of the cooperative. Nevertheless, the downstream stage of production is oversimplified and ignored.

From the perspective of the firm view, the externalities at both the upstream farms and the downstream cooperative firm need to be taken into account. It entails that decisions regarding various attributes of member farms will have an impact on various attributes of the downstream party, and vice versa.

Upstream externality / Downstream externality	Yes	No
Yes	Firm view	--
No	Extension of farm view	Vertical integration view

Table 3: Characterizing the three views in terms of externalities

A graphic illustration of a cooperative consisting of two members and one processor is provided in figure 3. The essence of the agreement members enter into involves a commitment on the part of each of them to submit certain issues to group decisions (Robotka 1947). Each of these member firms remains an independent and autonomous organization in itself. A farmer is represented in the figure by a system of three attributes. As an example, consider a dairy cooperative. The portfolio of a dairy farmer may be characterized by the attributes x_1 as his dairy transaction relationship with the dairy cooperative (‘delivery requirement’ or ‘no delivery

requirement'), x_2 as the ownership of the dairy cooperative ('member' or 'no member'), and x_3 capturing his other farm attributes, e.g. like wheat production ('yes' or 'no'). The boundary of a cooperative is visualized by the rectangle. Within it lie the processor with all its attributes and two attributes of each farmer, i.e. the transaction and ownership attributes. Notice that the core of each member firm is outside the rectangle, indicating that each member firm is an independent and autonomous enterprise. The processor and the part of member farms involved constitute the cooperative as a new system. The formation of a new firm, the plurality of interests of the extension of the farm view, and the transaction as well as ownership relationship between members and the cooperative of the vertical integration view are attributes of the new system.

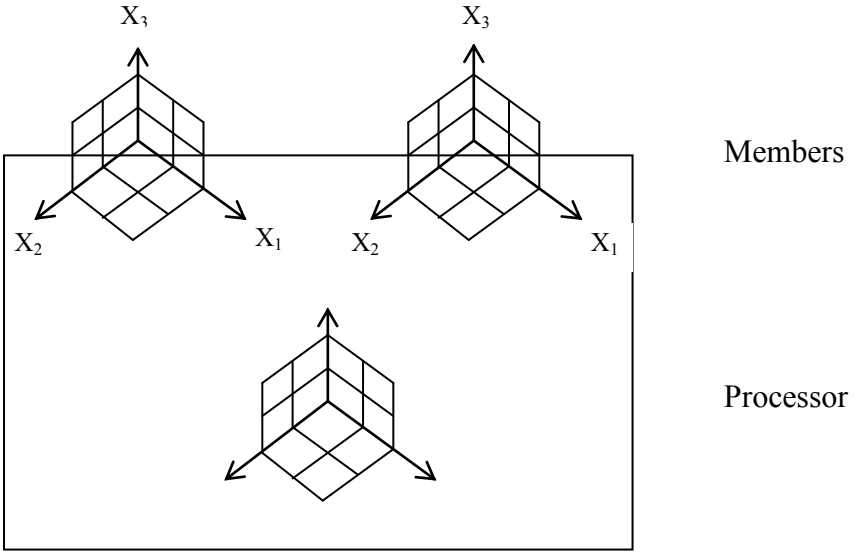

Figure 3: A cooperative as a firm

One way to clarify the nature of a cooperative is to compare a franchise with a cooperative, as in Bonus (1986). Figure 3 identifies the processor as the enterprise, whereas franchising is characterized as "a market contract between legally distinct entities" according to Makadok & Coff (2009). The parties involved in a cooperative (members and downstream enterprise) are also "legally distinct entities", but the relationship between members and the cooperative is looser than the relationship between franchisees and the franchise. There are at least three reasons for this assertion. First, a farmer is usually a member of various cooperatives due to the various crops grown

at the farm, while a franchisee does not operate in multiple franchise systems. A franchisee usually has only one core activity, and consequently only one asset from each franchisee is involved. Second, the outlets as well as the franchisor carry the brand name in a franchise. In cooperatives only the products of the downstream cooperative use the brand name, while the products of the member farms do not. Third, cooperatives and franchises differ in terms of the principal-agent positions. A cooperative has multiple principals (members) and one agent (the cooperative management), while a franchise consists of one party being the principal (franchisor) and many parties being the agents (the franchisees and the in-house managers).[2] Principals dictate formally the terms of the relationship.

Figure 3 allows also for classifying research topics regarding cooperatives. These themes originate at either the member enterprises, the cooperative enterprise, or the relationship between the member enterprise(s) and the cooperative enterprise. Issues originating at the member enterprises are the portfolio problem, horizon problem, and the single origin constraint. Examples of issues originating at the cooperative enterprise due to the joint ownership relationship are the control problem, influence problem, tax benefits, formal versus real authority, member involvement, finance, pooling, and cooperative principles. Finally, issues originating from the transaction relationship between members and the cooperative enterprise are the elimination of double monopoly markup (double marginalization), countervailing power, market access / assurance, contracts (quantity, price, quality), free riding, trust, selection, coordination, complementarities, member commitment, and social capital. Table 4 summarizes this classification of research themes.

[2] In this sense a cooperative is more similar to a cooperative franchise where all outlets collectively own the brand and the business format (Hendrikse & Jiang 2007).

Themes		
originating at member farms	due to joint ownership relationship	due to joint transaction relationship
Portfolio problem Horizon problem Single origin constraint	Control problem Influence problem Tax benefits Formal/real authority Member involvement Finance Pooling Cooperative principles	Double monopoly markup Countervailing power Market access / assurance Contracts Free riding Trust Selection Coordination Complementarities Member commitment Social capital

Table 4. Classifying research themes

1.4 Subsequent views

The debate is still addressed, explicitly or implicitly, due to conceptual developments. Section 1.4.1 focuses on the distinction between decision and income rights. Section 1.4.2 highlights the view of researchers addressing cooperatives from the perspective of transaction cost economics.

1.4.1 Income and Decision Rights

Nowadays a governance structure is delineated into ownership rights, income rights, and decision rights (Baker, Gibbons & Murphy 2008; Grossman & Hart 1986; Hansmann 1996; Hart & Moore 1990). Ownership rights specify the formal rights regarding the use of assets. Income rights address the question 'How are benefits and costs allocated?' They specify the rights to receive the benefits, and obligations to pay the costs, associated with the use of an asset, thereby creating the incentive system faced by decision makers. Finally, decision rights address the question 'Who has control (regarding the use of assets)?'[3]

[3] These rights were distinguished earlier in agricultural economics literature. The 1987 USDA study 'Positioning Farmer Cooperatives for the Future' listed them prominently in the three basic principles defining a cooperative enterprise: user-owner, user-control, and user-benefits (Dunn 1988). They are present in the definition 'A cooperative enterprise is one which belongs to the people who use its services, the control of which rests with all the members, and the gains of which are distributed to the members in proportion to the use they made of its services.'

Each governance structure represents a unique allocation of ownership, income, and decision rights to the involved parties. We focus on different allocations of income and decision rights, while keeping the allocation of ownership rights fixed. The reason for staying with one ownership structure is that the three views on the nature of a cooperative have in common that members confirm the ownership over the downstream stage. Therefore, the allocation of income and decision rights is used to characterize the three views regarding the nature of a cooperative, as well as the market and a producer association.[4]

Suppose there are two farmers, A and B, and a processor, C, and five assets {A, a, B, b, C}. Farmer A owns {A, a}, while farmer B owns {B, b}. Asset A represents the core activity of farm A, asset B the core activity of farm B, and asset C is the only asset of processor C. Assets {a, b} are valuable only if they are used together in a coordinated fashion. The decision rights concerning the assets are d_A, d_a, d_B, d_b and d_C, while the profits generated from these assets are represented by the income rights π_A, π_a, π_B, π_b and π_C. The allocation of decision and income rights characterizing the various governance structures are presented in table 5.

(U.S. Government 1937).

[4] The Association is often referred to as bargaining cooperative.

	Party A holds	Party B holds	Party C holds	Party A & B hold jointly
Cooperative (extension of farm view)	d_A, d_a, π_A, π_a	d_B, d_b, π_B, π_b	--	d_C, π_C
Cooperative (vertical integration view)	--	--	--	$d_A, \pi_A, d_a, \pi_a,$ $d_B, \pi_B, d_b, \pi_b,$ d_C, π_C
Coordinated cooperative (firm view)	d_A, π_A	d_B, π_B	--	$d_a, \pi_a, d_b, \pi_b,$ d_C, π_C
Uncoordinated cooperative (firm view)	d_A, π_A, d_a	d_B, π_B, d_b	--	$\pi_a, \pi_b,$ d_C, π_C
market	d_A, d_a, π_A, π_a	d_B, d_b, π_B, π_b	d_C, π_C	--
Association	d_A, π_A	d_B, π_B	d_C, π_C	d_a, π_a, d_b, π_b

Table 5: Characterizing governance structures in terms of income and decision rights

The core of the extension of the farm view is that each member not only owns all his assets, but also has complete individual control over the income and decision rights over these assets. Vertical integration is featured in the literature generally by concepts such as common governance and leadership, joint planning, centralized decision making, and transfer of decisions to a distinct entity in charge of coordinating their actions. All the income and decision rights are pooled together. From the firm view, members pool together only some of their assets {a, b}, while retaining complete autonomy with respect to all their other activities. As owners, they possess the income rights associated with the cooperative assets. The decision rights are generally exercised by them in an indirect way through voting for the board of directors, who then selects the presiding officers and hires a CEO to manage the cooperative. Furthermore, many cooperatives use quantity (e.g. a delivery requirement) as a mechanism of coordination between upstream growers and the downstream processor. We label this governance structure as a coordinated cooperative. An uncoordinated cooperative refers to a cooperative without delivery obligation, namely, each upstream farm decides upon the quantity it will deliver to the

downstream processor. This governance structure uses price as a coordination mechanism. So the decision rights over the assets {a, b} are retained with the members, while the profits generated from them are pooled in the cooperative.

The allocation of decision rights and income rights in a market and an association are also specified in table 5. In market transaction, each party possesses all the rights concerning their own assets and no assets are pooled. Two farmers may decide to form an association, which either grades, packages, handles, and stores the products together; or bargains, negotiates and contracts as an entity with processors or retailers with respect to the processing, shipping or marketing of the output. They join their assets {a, b} and transact together with another party C.

The separation of ownership rights and decision rights which are prominent in a cooperative in fact also prevail in IOFs. A typical IOF assigns its formal rights of control to its owners, capital providers, while the real authority is usually exerted by the hired management of the firm. The income rights allocation in cooperatives and IOFs are also essentially the same. From the perspective of decision rights and income rights allocation, a cooperative is comparable to a conventional firm, which is always analyzed as an autonomous entity, rather than the extension of the investors or investing firms. Notice that this feature is recognized in the legal vestment of IOFs and cooperatives. They are both incorporated in most countries.

Despite of the similarity, a cooperative is not identical to an IOF. To highlight the differences, we present in figure 4 an investor owned dairy enterprise. Its difference with figure 3 is that the investors have only one attribute involved with the dairy enterprise. The delivery of milk is not a relevant attribute of the investors, i.e. x_1 has to represent another aspect of the portfolio of activities or assets of the investors. In other words, a cooperative is distinguished from an IOF by the attribute that its owners are also its input suppliers or buyers. This difference is recognized in their incorporation. IOFs and cooperatives are usually incorporated in different ways. Summarizing, a cooperative is conceptualized as a firm consisting of attributes capturing (1) the processor as a system of attributes; (2) many farmers collectively own the cooperative enterprise, i.e. the vertical integration aspect; (3) usually multiple attributes of a farm enterprise are

involved, i.e. the extension of the farm aspect.

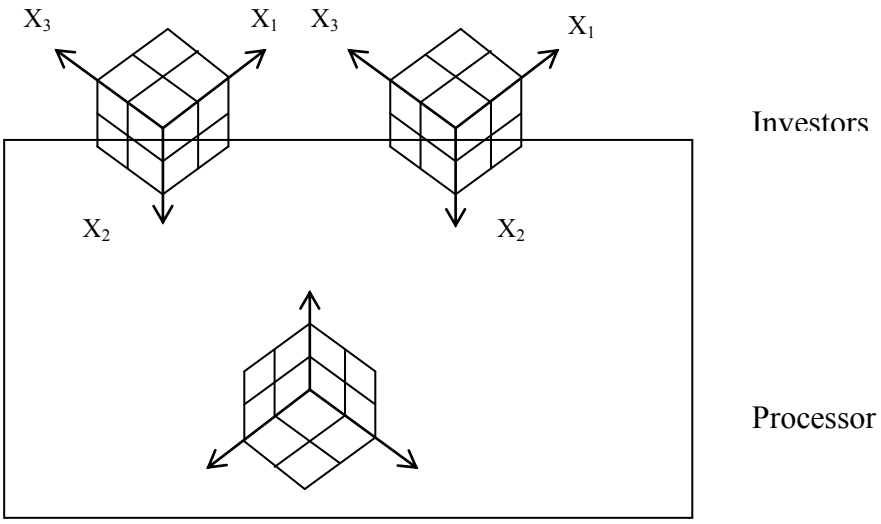

Figure 4: An investor owned firm

1.4.2 Transaction Cost Economics

An influential approach to governance is transaction cost economics (Williamson 1991). It distinguishes three generic governance structures: market, hybrid, and hierarchy. The governance structure market is populated with firms, like the IOF in figure 4 and the firm view represented in table 3. A hierarchy is similar to vertical integration in table 3. Ménard (2007) characterizes a hybrid by pooling resources, contracting with members, and competition among members. A hybrid represents the extension of the farm view.

Williamson (2004) explicitly dismisses the view that characterizes a cooperative as vertical integration. He associates vertical integration with ownership by one party, while collective ownership is a crucial aspect of a cooperative. By highlighting the collection of growers, rather than the downstream enterprise, he takes a position close to the extension of farm view. This is in line with Bonus (1986, p335) when he summarizes his position as 'The cooperative association is a hybrid organizational mode …', although he states later on the same page that a cooperative is '… a firm jointly owned by the holders of transaction-specific resources'.

Ménard (2007) categorizes the cooperative as a hybrid. According to this paper, what distinguishes a hybrid from a hierarchy is that 'they maintain distinct and autonomous property and decision rights regarding most assets' (p5). Yet 'they simultaneously share some strategic resources, which require a tight coordination going far beyond what the price system can provide and thus makes them different from a pure market arrangement' (p5). These observations depict an association rather than a coordinated cooperative according to table 3. Both governance structures involve pooling of assets, but what distinguishes the latter from the former is the downstream stage of production. A cooperative as a hierarchy emphasizes an enterprise owned by the upstream members.

The title 'Cooperative Enterprise' indicates already that Vitaliano (1983) characterizes a cooperative as a firm. This is reinforced by referring to the cooperative as a 'modern, complex cooperative corporation' (p1078) and 'an economic organization whose residual claims are restricted to the agent group that supplies patronage under the organization's nexus of contracts (i.e., the member-patrons) and whose board of directors is selected by this same group' (p1079). The first sentence of chapter 7 of Hansmann (1996, p120) is outspoken about the cooperative being a firm by stating 'there are three common types of producer-owned enterprise: investor-owned, worker-owned, and farmer-owned'. It elaborates on his previous position (Hansmann 1988, p270) that 'a standard business corporation is normally owned by investors, persons who lend capital to the firm, and is in a sense nothing more than a special type of producer cooperative -- a lenders' cooperative, or capital cooperative.' Hendrikse & Veerman (2001a) are in line with this view by classifying a cooperative as a hierarchy.

1.5 Conclusions and further research

Conceptual developments since the observation by Ward, cited at the beginning of this article, have allowed us to review an old debate about the nature of a cooperative. The literature is classified in terms of three views: a cooperative as an extension of the farm, as vertical integration, and as a firm. Using the system of attributes perspective, we have formulated a framework that provides a unified account of the differences between these views. They differ by the upstream and downstream externalities being delineated, the number of upstream and downstream attributes being considered, and the allocation of income and decision rights.

Clarifying the nature of a cooperative is important because it will frame the subsequent analysis and results. The results may assist in formulating public policies, particularly competition policies that either grant cooperatives a special status, or classify them as anti-competitive in terms of a cartel or a vertical restraint. Recent discussions on the legal status of cooperatives in the European Union are an illustration (Ménard 2007). Cooperatives may also benefit because these concepts may be helpful in addressing a variety of issues, like member commitment, transfer prices, sourcing, restructuring, and diversification.

We favor the cooperative as a firm position, highlighting that a cooperative is collectively owned by many independent farmers as input suppliers. It follows that the decisions regarding at least some attributes of member farms are made by the individual farmer only, while the decisions regarding the other attributes and the attributes of the cooperative are made by the members collectively. This view entails some preferences about future research on cooperatives.

First, future research may pay explicit attention to the unique aspects of the members owning the cooperative compared with investors as owners of an IOF. A cooperative is supposed both to serve member interests and to generate maximum value in processing. Nearly always being user oriented (Barton 1989), a cooperative is designed for the former task, and because the organizational structure required for the two tasks is different, it is expected to have an impact on the latter task. An example is a feature of cooperatives known as the portfolio problem. An important consideration of members in the diversification decision of a cooperative may be spreading of risks of their individual farm portfolio, which may result in members '… will pressure cooperative decision makers to rearrange the cooperative's investment portfolio, even if the reduced risk portfolio means lower expected returns' (Cook 1995, p1157). It implies that a cooperative diversifies most likely in a different way than an IOF. More information about the relationship between the farm portfolio of members and the product portfolio of a cooperative seems therefore desirable. Census data may shed light on this relationship. Another example of the upstream externalities on the cooperative firm is that a farmer is usually a member of various cooperatives. These cooperatives may be one-product cooperatives, or multiple-product cooperatives. For example, sugar cooperative Royal Cosun (Netherlands) processes (mainly) sugar beets and (some) vegetables.

Some of the members have a transaction and investor relationship with Royal Cosun regarding the sugar beets, while they only have a transaction relation with Royal Cosun regarding the other vegetables. The desirability of this arrangement is not clear.

Second, collective ownership of a cooperative requires a method for collective decision-making. Most cooperatives adhere to a one-member-one-vote scheme, but sometimes votes are weighted by volume of patronage. A problem with these democratic decision-making procedures is that they may yield decisions that are (collectively) inefficient in the sense that they do not maximize aggregate member surplus (Hart & Moore 1996). It entails that decision power is to a certain extent allocated independently of quantity or quality. Analyzing collective ownership requires therefore that a model specifies at least two members and a downstream party. This is a necessity to investigate the plurality of interests prevailing in cooperative decision making.

Third, the efficient choice of governance structure (ownership, decision, and income rights) has to match the situation facing the enterprise. We have highlighted a number of choices regarding income and decision rights, given that the ownership rights are allocated to farmers. These choice possibilities create substantial flexibility within the ownership structure of a cooperative to adapt to new circumstances. In order to remain as important as in the past, cooperatives have to evaluate regularly the balance between their income and decision rights. Other choices regarding ownership rights may also be considered, like contract farming, in order to bring the produce of farms to value.

1.6 Overview of the dissertation

The remainder of this dissertation is devoted to three aspects of the governance of cooperatives. Chapter 2 and 3 start with the motivation issue of cooperative CEOs. Chapter 4 deals with the coordination issue in the production and supply chain. Finally, the effect of limited cognition is explored in chapter 5. The efficient governance structure is identified in each chapter that follows.

We propose in chapter 2 that the differences in the performance of cooperatives and publicly listed firms do not necessarily result from the character or abilities of the management, but from the characteristics of the

governance structures. A multi-task principal-agent model is developed to capture that a cooperative is not publicly listed and that it has to bring the enterprise to value as well as to serve member interests. Results are formulated on the sensitivity of the optimal incentive intensity with regard to the membership composition and to the composition of performance measure. The alignment between the performance measure and the production function is emphasized. It is beneficial for an IOF to implement an equity-based compensation, a pay scheme sensitive to any single performance measure will lead to misalignment and inefficiency in cooperatives. Our results show that the absence of public listing, often believed to be a disadvantage of cooperatives, may make a cooperative the unique efficient governance structure when additional sources of information are available, like accounting information and subjective performance evaluations.

Chapter 3 continues to addresses the motivation issue in the multi-task principal-agent setting. There we focus on the effects of interdependencies between the upstream and downstream activities and strategic performance measure choice. We determine the circumstances when the absence of public listing, often believed to be a disadvantage, makes a cooperative the unique efficient governance structure. Not having a public listing prevents the CEO from choosing the level of the downstream activities too high. Cooperatives are uniquely efficient when the upstream marginal product multiplied with a function increasing in the strength of the chain complementarities is higher than the downstream marginal product.

Chapter 4 addresses the impact of governance structure on the choice of coordination mechanism in a chain. The governance structures cooperative and IOF are distinguished. Whether the price or quantity mechanism is efficient depends on the choice of governance structure and the slopes of the marginal cost (MC) and marginal revenue (MR) curve. We show that the cooperative chooses the efficient coordination mechanism while the IOFs do not always do so. The underlying reason is that the cooperative internalizes the vertical externalities between upstream producers and the downstream processor whereas the IOFs do not. The slope of the MC and MR decides whether the price or quantity mechanism is used in a cooperative. Each governance structure can be uniquely efficient, contingent on the relative accurateness of the MC and MR estimates.

Chapter 5 attempts to gain a better understanding of the governance structure choice in a bounded cognition framework. The influence of governance structures (market, cooperative, forward integration, and backward integration) on the information partition of boundedly rational agents is examined. Our characterization of the governance structures captures on the one hand the way they channel attention and cognition, and on the other hand the distinct ownership distributions. It entails that every governance structure is associated with a specific bias. Each governance structure can be efficient, depending on the probabilities of the various states and the size of the potential benefit and loss. We also show that a cooperative processor is more conservative than other agents in proposal selection when the probability associated with the upstream state is high.

The present dissertation contributes to existing cooperative research in several ways. First, we classify research topics regarding cooperatives into three categories (themes originating at either the member enterprises, the cooperative enterprise, or the relationship between the members and the cooperative enterprise. Some of the topics are addressed subsequently. Second, a cooperative has various special features that distinguish it from other governance structures. We show from various perspectives that these features are in fact desirable, despite the widespread belief that they are not, making the cooperative a uniquely efficient governance structure. Finally, the results are established in a highly stylized model, which provides a start for developing additional arguments for the widespread occurrence of cooperatives. Assumptions can be relaxed to capture a more accurate picture of the cooperative and new hypotheses can be formulated based on our propositions. The dissertation has also implications for the managerial practice of cooperative regarding managerial performance and compensation, supply coordination, and diversification and innovation management.

Chapter 2
Performance Measurement and the Efficiency of Cooperatives versus Publicly Listed Firms

2.1 Introduction

A substantial amount of research has focused on how an optimal performance measure can help rectify the agency problem in IOFs, especially publicly listed companies, whereas the CEO compensation in other governance structures, for example cooperatives, has received hardly attention. This can be justified to a certain extent because the members-CEO relationship in cooperatives is similar to the investors-CEO relationship in IOFs. Traditionally, the cooperative board of directors, democratically chosen by and from the membership, was the main body governing the activities and investments of the cooperative firm. As the cooperative grows, the tasks facing the cooperative management call for strategies or judgment far beyond the experience and competence of most members, professional qualified management is hired to operate the firm. As a result, the members exercise their authority mainly by critically following the policies of the management, rather than by giving it directions (Trifon 1961). Members would like to maximize their benefits derived from the cooperatives, while the management is likely to pursue objectives of organizational growth maximization, subject to continuity and employment security (Vitaliano 1983). This is similar in an IOF.

Despite of the similarities, the situation in cooperatives is more complex than a standard principal-agent relationship. First, it is difficult to assess the top manager's contributions to a company due to the complexity of his tasks (Blanchard et al. 1996). The tasks of a cooperative CEO are even more complex due to the 'cooperative's goal of jointly maximizing member and cooperative returns' (Peterson & Anderson 1996, p376). Members are users in addition to owners of the firm. They have at least two sets of concerns: owner concerns and user concerns. Owner concerns revolve around the security and overall profitability of their investments in the cooperative. User concerns include issues of the pricing and quality of product and services, which influence the profitability of their individual farm enterprise (Staatz 1987). These two concerns are reflected in the members' expectation regarding the management. Given those additional complexities in cooperatives, designing a contract ensuring the mutual

compatibility of a cooperative's goals and the CEO's incentives has to be even more difficult.

Second, a managerial incentive contract is based on a performance measurement system, creating incentives that align the goal of the agent with that of the organization. However, there are no simple indicators of cooperative managerial performance or automatic incentive systems (such as a stock price) to close the gap in interests. Giving a CEO equity, a common way to tie the CEO's wealth to firm performance and thus to alleviate the interests conflict in IOFs, is not feasible in cooperatives. The reason is that a cooperative CEO is not eligible to hold equity in the business and receives only limited benefits from such ownership given the fact that most cooperative stock does not appreciate in value (Trechter et al. 1997). Trechter et al. (1997) document that CEO compensation schemes in cooperatives vary. Some use pre-set performance-based bonuses, some allow for bonuses paid on past performance, and others do not use bonuses.

Third, there is a group of principals whose interests differ. The variety of members embodies aspects like size, location, risk aversion, attitude towards innovation, growth potential, member involvement, and financial contribution to the cooperative. Due to the heterogeneity, the cooperative does not have one locus for profit maximization but a separate locus for each member, giving rise to a host of problems that attend collective choice (Staatz 1987). Problems are manifested in debates not only about pricing, financing and pooling policies, but also in the difficulty to achieve consensus regarding specific performance targets (Hueth & Marcoul 2008). When colliding interests exist among principals, the agent's tasks involve devising workable compromises and acting as a neutral guardian of everybody's priorities (Trifon 1961).

Acknowledging these complexities, some researchers doubt the efficiency of cooperatives and argue that cooperatives suffer from a host of problems unique to this specific form of governance. Stewart (1993) even asserts that a business cannot be successfully run if its customers or suppliers are deeply involved in running it because there is too much conflict of interest. Yet, cooperatives and IOFs coexist in many sectors of most modern economies and compete for market share, especially in the agricultural sector where cooperatives have played an active role for a very long time in

many countries (Hendrikse 2007b).[5] Many of today's cooperatives have existed for decades, and new co-operatives are continually being established throughout the world (Nilsson 2001). These observations inspire the following questions: How is the cooperative CEO compensation determined by the special features of its governance structure? When is a cooperative (with its member ownership and its lack of public listing) uniquely efficient? These questions are addressed with a multi-task principal-agent model.

One way to position the article is that it is in line with the current theoretical developments regarding the principal-agent model. The classic principal-agent model highlights the trade-off between the incentives and risk. The analysis is focussed on one task.[6] One development has been that nowadays a trade-off is considered between the incentives intensity and the allocation of attention among various activities (Baker 2000). The other development is that repeated principal-agent relationships are considered (Gibbons 2005). This article is to be positioned along the former as we consider a model where the agent allocates his attention over upstream and downstream activities. This is also in line with the business management literature stressing that efficient organization requires that managers be given specific objectives and their performance be monitored, measured, and rewarded in relation to them (Drucker 1974). Another way to position the article is that a variety of corporate forms has to be considered when studying the nature of the firm (Hansmann 1985, 1988). A cooperative is viewed as an informative counterfactual for the much studied publicly-listed corporation. Finally, a cooperative has various special features which distinguish it from other governance structures. One of the objectives of research regarding cooperatives is to show that these features may actually be desirable, despite the widespread belief that they are not. In this article we demonstrate that the absence of a public listing, often believed as a disadvantage of cooperatives, can make a cooperative uniquely efficient.

This article is organized as follows. The next section elaborates on various differences between cooperatives and publicly listed firms. Section 2.3

[5] Ballou (2005) studies governance structure variety in the nursing home industry, while Kwoka (2002) analyzes mixed markets in the electric power industry.
[6] Ziv (1993) is an example of this setting with a focus on performance measures and optimal organization.

formulates a multi-task principal-agent model and tailors it to the differences between cooperatives and IOFs. Extensions are analyzed in section 2.4, like the impact of the membership (in terms of size and heterogeneity) and costly performance measurement. Additional information in the performance measure (accounting data and subjective performance measurements) is highlighted in section 2.5. Finally, section 2.6 concludes.

2.2 Comparing cooperatives with publicly listed firms

This section compares cooperatives with publicly listed firms regarding member value (2.2.1) and governance structure (2.2.2).

2.2.1 Member value

Members own a cooperative to achieve certain commercial and social objectives (LeVay 1983; Barton 1989). Peterson & Anderson (1996, p375) observe that 'because of its goal to maximize value to members, a cooperative will consider its members' farm asset returns and not just its own.' This observation is due to members being owners as well as users. Members are concerned with both the value added at the cooperative firm and at their own farm enterprises, and want to motivate their CEO to bring the outputs at both stages jointly to maximum value. In accordance with Hind (1997) who distinguishes corporate-oriented aspirations and member-centered goals, we categorize member value into value added at the cooperative firm and value added to the farm enterprises.

Value added at the cooperative firm

As the owners and investors, and consequently the residual claimants, members receive dividends from the cooperative. Thus they care about the financial performance of the cooperative in the same way as the investors of an IOF. Moreover, the flow of information from the producers to the processor could be better in cooperatives than in IOFs, leading cooperatives to be more responsive to members' needs or to better product specifications. A cooperative usually has a patron list and collects a substantial amount of information about member's preference, needs, production practices, and advice about products and services through periodic member surveys. The members may be more willing to provide higher quality, more frequent, and more truthful information to the cooperative than they would to an IOF (Cook 1994) because as owners they are more assured that the cooperative would not use the information to act opportunistically toward them (Staatz

1987). Another reason lies in the fact that 'exit' is a more expensive option for cooperative members than the patrons of IOFs (Cook 1994). Furthermore, an IOF CEO is usually in a position of strong control over both setting and implementing company policies, while in cooperatives, the board of directors, as representatives of members, are significantly more independent and would go a long way towards monitoring the CEO. They do not feel beholden to question management decisions and to reject its recommendations (USDA, 2002).

Value added to the upstream farms and their owners

Staatz (1987) observes that members are vitally interested in the cooperative's pricing of goods and services, not simply in its overall financial performance. Being users, they are able to exert a higher influence on the operation and management of the firm than the investors of an IOF are, and consequently can receive more favorable prices. Members benefit from the cooperative also in terms of services, which affect the profitability of their individual farm enterprise. For instance, when an individual farmer cannot afford to do consumer research related to the characteristics of farm commodities, it might be feasible for a cooperative to do so. An investor-owned marketing agency has little incentive to do it because it cannot capture the benefits that accrue to farmers (Shaffer 1987). Moreover, the changes in cooperative profits can offset changes in member profits over expected market cycles. Peterson & Anderson (1996) report evidence that some cooperatives take a conservative strategy by 'saving' returns in good economic times for 'payout' in poor economic times. Next to that, cooperatives also prove to be an assured source of supplies (Barton 1989) and a reliable 'home' for farm produce, reducing risk to members (Lang 1994). Members' value as users is also reflected in the cooperative's diversification behaviors. A cooperative never abandons the activities concerning the majority of its members. Farmer cooperatives concentrate their investments in agribusiness and their assets are closely tied to the assets of their members as the members might suffer substantial capital losses if their farming activities were not adequately supported. In addition to the vertical information exchange that benefit the cooperative firm, cooperatives also create a territorially based forum for information exchange (LeVay 1983) where members can more easily communicate among each other. Shared information about safe pest control and other environmental concerns is a prime example (Peterson & Anderson 1996). There are various explanations for the dominance of user value in the

perception of members. On the one hand, the limitation on dividend payments and the members' inability to capture capital gains in a cooperative may account for member's preference to direct benefits in the form of transfer prices (Staatz 1987). On the other hand, the frequency of transactions may play a role. Members are users on an almost daily basis, while being owner-investors only several times a year (tax day, equity redemption day, dividend day). This frequent use interface relative to the investor interface reinforces a constant message that price and quality of the cooperative's services and goods affect the members' bottom line, which is more important (in the short run and for the individual member) than the bottom line of the cooperative (Cook 1994).

Although members join the cooperative primarily for economic reasons, they pursue noneconomic objectives as well, by deriving social value from being 'a member of an association'. 'Benefits of social value include all noneconomic results or outcomes of major interest or importance to stakeholders, including the satisfaction many of them experience through the association, unity, and involvement characteristics of member-controlled organizations. Some members like being involved with others to achieve a common purpose. Some members also like electing or serving as directors' (Barton 1989, p7). Members' social value takes various forms. For example, identity preservation can be a source (Lang 1994). Identity influences economic choices and outcomes, accounting for many phenomena that go beyond a standard economic explanation. Cooperative members have different orientation in life than IOF shareholders. Cooperation is known to appeal to people not merely as a means of running a business but also as an instrument of social amelioration (LeVay 1983). Human beings have a strong need to belong, either to a society or to a profession. Forming a community may appear to be a way of bolstering a sense of self or salving a diminished self-image (Akerlof & Kranton 2000). Through various socialization processes like member training and member relations programs, members work together, learn together, celebrate together, and share their experiences together, generalizing 'feelings of family' to the entire membership. The result is that members feel more cheerful, more confident and stronger, both in the market and in the society.

2.2.2 Governance

Most public-listed firms mitigate principal-agent conflicts via incentive contracts that link pay to performance, whereas the complexity in

measuring cooperative performance often creates vagueness and lack of clarity in the eyes of members (Cook 1994). An optimal incentive contract for cooperative CEOs is therefore most likely different from the contract for an IOF CEO. First of all, the 'plethora of objectives' of members who differ in various aspects makes the identification of the cooperative's objective function one of the most challenging and delicate tasks (Cook 1994). Yamay (1950) realizes that 'the manager of a capitalist enterprise knows what it should try to maximize and for whom, the management of a co-operative society has a choice of what it should try to maximize (or minimize) and for whom'. The shareholders of a public listed firm may be a diverse group as well, but capital markets with a sufficiently rich menu of assets align their interests (Dixit 1997). They are mostly interested in the appreciation of their shares whereas the value of input suppliers is not relevant. In a cooperative, as membership grows more heterogeneous, different groups within the organization pressure management to respond to their particular interests. Because of the broader, more diffuse scope of optimization in a cooperative (Staatz 1987), single indicators such as ROI (Return On Investment) are less meaningful as measures of organizational and managerial performance (Cook 1994). Thirkell (1993) argues that the use of organizational profit for measuring performance in a cooperative is not only unnecessary but also often downright misleading. If the objective is member benefit rather than financial performance of members' investment in the cooperative, then it is member benefit that should be measured, not the cooperative's conventional corporate performance. In other words, market requirements that best serve profitability goals of an IOF may not directly serve the immediate interests of all cooperative members due to member heterogeneity. Simply examining traditional financial statement data will not be adequate. If a pure market-driven approach is taken, members with less marketable inputs may not, compared to other members, feel their needs are well met (Lang 1994).

Secondly, there is no objective third-party indicator (besides members and the CEO) such as secondary markets for cooperative stock to evaluate performance (Cook 1994). Investors of IOFs want to receive the highest possible return on their investment, and this return can be expressed in the stock price. In other words, an IOF CEO's contribution to firm value is equivalent to the change in the shareholders' wealth through appreciation of the stock. Fluctuation in the stock price serves as an influential disciplining mechanism on management, indicating the extent to which the stockholders

are content with current managerial policies. Many firms reinforce the potency by offering stock options to CEOs, making their earnings contingent on the stock's value. Cooperatives lack this external mechanism for disciplining management. There is no public financial assessment of the performance of a cooperative and therefore of its CEO. Members are radically concerned with the surplus in the form of improved terms of trade, i.e. the prices the cooperative pays for the goods from members or it charges for its services. It is therefore difficult to operationalize goals or to assess goal attainment (Nilsson 2001). The prices cannot be used as the sole performance measure, otherwise the CEO may be induced to decapitalize the firm in an attempt to increase his current earning, simply reinforcing the horizon problem (Staatz 1987).

According to Hind (1997), as time progresses and the cooperative ages, the issues of member service benefit would not be the sole goal of the business but that corporate-oriented objectives would become increasingly important. Cooperatives look therefore for alternative measure to stock price to evaluate how the corporate-oriented objectives are fulfilled. Accounting return measures and subjective performance measures are among the options. We will investigate the impact of adding these additional sources of information in the performance measure.

There are a few sources providing information about performance measurement in cooperatives. First, Trechter et al. (1997) observe that some cooperatives use equity redemption as a percentage of total equity and patronage refunds per member as factors of the financial performance measure, and some cooperatives link their CEOs bonuses to accounting measures (such as accounts receivable) that are only weakly related to the cooperatives' long-term goals. There are also cooperatives that do not even set long-term goals or formal long-term planning procedure and goal-setting sessions. Second, in 2008 Michael Cook has indicated to us that his experience with various cooperatives regarding the compensation contract for a cooperative CEO often specifies around 10 performance indicators, one of them being member satisfaction. Third, one cooperative has been willing to provide us with the details of the determinants of the CEO bonus. On October 14, 2008 the head of the personnel department of a dairy cooperative communicated to us that the CEO bonus has a long run and a short run component. The long run component is exclusively related to the milk price relative to a peer group of 6 other cooperatives. It captures two

features of the interests of the members. First, the price received by the dairy farmers is a crucial aspect of the relationship between the farmers and the processor. Four levels of the bonus are specified, related to ranking first, second, third, or lower in the peer group. Second, continuity of the processor is important to the dairy farmers. This is captured to a certain extent by the fact that the ranking is determined as an average over three years. The short run component consists of three indicators related to EBIT (Earnings Before Interest & Tax) and goals formulated with respect to costs.

2.3 Cooperatives versus IOFs

A multi-task principal-agent model (Gibbons 1998) consisting of a two-stage non-cooperative game is presented in this section. In the first stage, the principal chooses the strength of incentives while the agent's optimal choice of activities is determined in the second stage. Assume that the CEO in governance structure *i* (C for cooperative and F for IOF) can take two actions: a_{1i} denoting the action to advance the downstream value, and a_{2i} denoting the action adding value to the upstream producers. The CEO's total contribution to firm value is denoted by y_i. The marginal product of action a_{ji} is f_{ji}. The production function is $y_i = f_{1i}a_{1i} + f_{2i}a_{2i} + \varepsilon$, where ε is a stochastic variable with expected value of 0, representing the noise in the production process that is beyond the agent's control.[7]

Given the difficulty in measuring the overall effect of the CEO's actions on firm value, no compensation contract based on y_i can be enforced in court. From this, it follows that an alternative performance measure p_i becomes necessary. Suppose the technology of performance measurement takes the form of $p_i = g_{1i}a_{1i} + g_{2i}a_{2i} + \phi$, where g_{ji} denotes the performance measurement parameter, i.e. the weight attached to a_{ji}, and ϕ denotes the noise in performance measurement with expected value of 0.

Suppose the compensation contract in governance structure *i* specifies the wage w_i paid to the CEO as a linear function of p_i, i.e. $w_i = s_i + b_i p_i$, where

7 We assume the actions taken by the CEO only have consequences for the principal, which excludes the possibility for tunnelling and the CEO directly benefiting from acting against the interests of the principal.

s_i stands for the salary and b_i for the bonus rate. The CEO's payoff is the difference between the wage and the cost of actions: $U_i = w_i - c_i(a_{1i}, a_{2i})$. Assume that the cost function takes the form of $c_i(a_{1i}, a_{2i}) = (a_{1i}{}^2 + a_{2i}^2)/2$. The principal receives the difference between the CEO's total contribution to firm value and the CEO's wage: $\pi_i = y_i - w_i$. Notice that with this specification, the CEO's incentives are to produce a high value of p_i, not of y_i, whereas the principal does not directly benefit from increased realizations of measured performance p_i, rather, he benefits from increased realizations of the CEO's total contribution y_i. As a result, the incentives may be distorted. To minimize the distortion the principal has to minimize the divergence between p_i and y_i.

The game is solved by backward induction. The CEO's optimal action in the second stage is determined by maximizing his expected utility, i.e. $\max_{a_{1i}, a_{2i}} E(U_i)$, where $E(U_i) = E[w_i - c_i(a_{1i}, a_{2i})] = s_i + b_i(g_{1i}a_{1i} + g_{2i}a_{2i}) - c_i(a_{1i}, a_{2i})$. The first order condition $b_i g_{ji} = \partial c_i / \partial a_{ji}$, j = 1,2, characterizes the CEO's equilibrium actions $a_{ji}^*(b_i) = b_i g_{ji}$. The payoff-maximizing reply in the second stage is anticipated in the first stage when the principal determines the efficient intensity of incentives. Maximizing the expected total surplus $\max_{b_i} E(\pi_i + U_i)$, where $E(\pi_i + U_i) = E[y_i - c_i(a_{1i}, a_{2i})] = f_{1i}a_{1i}^* + f_{2i}a_{2i}^* - c_i(a_{1i}^*, a_{2i}^*)$ results in the efficient bonus rate $b_i^* = \frac{f_{1i}g_{1i} + f_{2i}g_{2i}}{g_{1i}^2 + g_{2i}^2} = \frac{\sqrt{f_{1i}^2 + f_{2i}^2}}{\sqrt{g_{1i}^2 + g_{2i}^2}}\cos(\theta_i)$, where θ_i is the angle between the vectors $f_i \equiv (f_{1i}, f_{2i})$ and $g_i \equiv (g_{1i}, g_{2i})$ as depicted in figure 1.

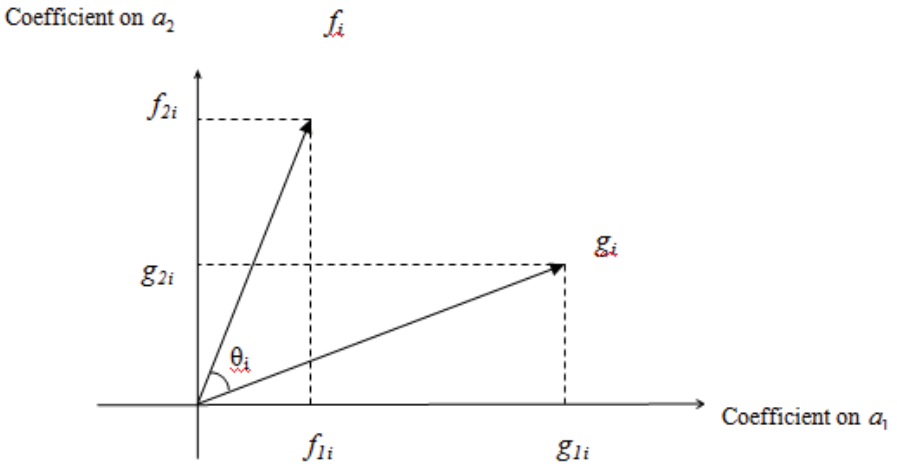

Figure 1: The scale and alignment effect of the performance measure

There are two important features in the expression of efficient bonus rate, scale and alignment. More specifically, $\sqrt{f_{1i}^2+f_{2i}^2}/\sqrt{g_{1i}^2+g_{2i}^2}$ reflects the relative scale of f_i and g_i. A high $\sqrt{f_{1i}^2+f_{2i}^2}/\sqrt{g_{1i}^2+g_{2i}^2}$ indicates that the weights of actions is higher in the production function than in the performance measure. As a result, the firm will optimally increase the incentive intensity based on such a performance measure. Cos(θ_i) captures the alignment effect. To the extent that the performance measure induces CEO's actions less aligned with firm value, θ will increase, and the performance measure will distort incentives more (Baker 2000). As a result, the firm will optimally reduce the incentive intensity.

Next we identify the differences between a cooperative and an IOF in terms of restrictions on the parameters in the production function and performance measure. First, the CEO's contribution to firm value depends on organizational form. In cooperatives, it is equivalent to the change in total member value. Members want to bring both upstream farms and the downstream cooperative to value, i.e. $f_{1C}>0, f_{2C}>0$. Investors of an IOF processor care only about value added to the downstream stage, i.e. $f_{1F}>0, f_{2F}=0$. Second, the performance measures of IOFs and cooperatives differ. It is common in IOFs that the CEO's bonus is paid in the form of firm shares, i.e. $g_{1F}>0, g_{2F}=0$. This instrument is lacking in

cooperatives and we capture this by $g_{1C} = 0$.[8] However, member interests are usually present in the incentive scheme for a cooperative CEO, e.g. by benchmarking the transfer price or production volume. This results in $g_{2C} > 0$. To wrap up, members' plurality of interests is represented by $f_{2C} > 0$, while the absence of patron-members, and therefore serving their interests, in an IOF is represented by $g_{2F} = 0$. The absence of public listing of a cooperative is embodied by $g_{1C} = 0$, while the use of the stock price in an IOF's performance measure is captured by $g_{1F} > 0$. The distinct features of two governance structures are displayed in table 1 and figure 2.

i	F	C
f_{1i}	>0	>0
f_{2i}	0	>0
g_{1i}	>0	0
g_{2i}	0	>0

Table 1: Marginal product and performance measure parameters

8 We are not stating that a cooperative has no information at all about the downstream activities, but our model will focus on the impact of lacking certain information.

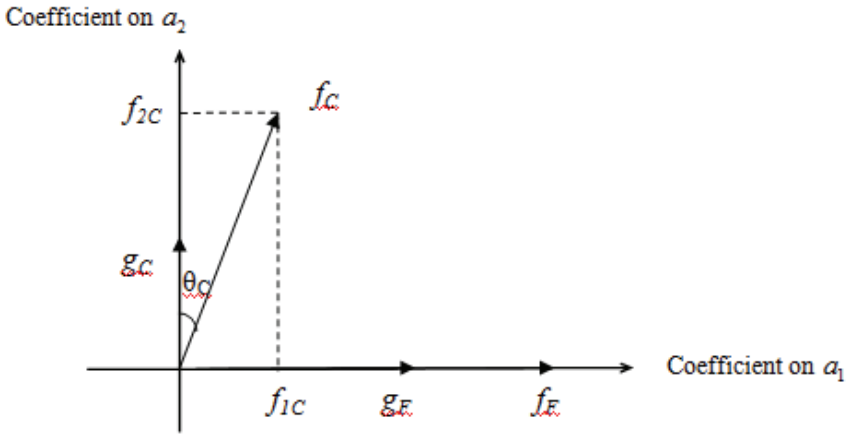

Figure 2: Scale and alignment differences between a coop and an IOF

Plugging these parameter values in the expressions of efficient bonus rates results in $b_F^* = f_{1F} / g_{1F}$, $b_C^* = f_{2C} / g_{2C}$. Subsequently, the CEO's equilibrium actions are determined $a_{1F}^* = f_{1F}$, $a_{2F}^* = 0$ and $a_{1C}^* = 0$, $a_{2C}^* = f_{2C}$. As shown in figure 2, the production function and performance measure are perfectly aligned in an IOF, while they are not in a cooperative. In equilibrium, an IOF CEO has incentives to undertake only a_{1F} because the investors care only about a_{1F} and make the CEO's pay dependent only on a_{1F}. Members of cooperatives, however, appreciate the CEO's actions on both dimensions but are able to compensate only for a_{2C}. Thus, only an incentive to increase a_{2C} is created and no incentive for a_{1C} exists even though it would increase firm value. In other words, when an action increases the member value without simultaneously increasing the performance measure, the CEO has no incentives to pay attention to it. When the available performance measures are incomplete, the incentive contract will lead to problems of distortion, or in 'the folly of rewarding A while hoping for B' (Kerr 1975). With the complex and sometimes ambiguous goals of cooperatives, the incentive contact may provide only a partial representation of its objectives. The misalignment between the performance measure and the production function persuades the CEO to pay unbalanced attention to actions that positively affect their scores on the performance measures, neglecting areas for which performance is not assessed.

A fair comparison of the efficiency of the two governance structures entails comparing the value created by a cooperative with the joint value created by a downstream (D) and an upstream IOF (U). For this purpose, we assume that the marginal product and the performance measurement parameter of each activity remain the same across different governance structure. Therefore the above results become $b_{\mathrm{C}}^{*} = f_2 / g_2$, $b_{\mathrm{D}}^{*} = f_1 / g_1$, $a_{1\mathrm{D}}^{*} = f_1$, $a_{2\mathrm{D}}^{*} = 0$, $a_{1\mathrm{C}}^{*} = 0$, $a_{2\mathrm{C}}^{*} = f_2$. Similarly, the equilibrium results for an upstream IOF are $b_{\mathrm{U}}^{*} = f_2 / g_2$, $a_{1\mathrm{U}}^{*} = 0$, and $a_{2\mathrm{U}}^{*} = f_2$. Simple calculations show that the total surplus of a cooperative and two IOFs are $f_2^2 / 2$ and $(f_1^2 + f_2^2) / 2$ respectively. The total surplus created by a cooperative is always smaller than the surplus created by two IOFs, i.e. the cooperative is inefficient. The behavior of the cooperative CEO is exactly the same as the behavior of the CEO of the upstream IOF. Value would be created in the cooperative by developing downstream activities because $f_{1c} > 0$, but the cooperative CEO will not do so because the performance measure does not put any weight on them. The difference in value creation between the two governance structures is therefore equal to the value created at the downstream IOF. This result is summarized in proposition 1.

Proposition 1: A cooperative is inefficient.

Another way to explain the result is that the cooperative is supposed to serve member interests and to generate maximum value in processing. However, the organizational structures required for the upstream and downstream tasks differ. The cooperative is designed for the former task, and therefore does not always perform the latter task well. The governance structure IOF consists of two separate entities and is tailored to each task separately.

2.4 Extensions

Two extensions are made to address the multiplicity of principals in a cooperative (2.4.1) and the endogeneity of the performance measure (2.4.2).

2.4.1 Society of members: size and heterogeneity

The above model refers to members in general, but no attention has been paid to the composition of the society of members. The results can be best

understood as the extent to which the CEO's interest accords with the average member' interest. Now we turn to explore the impact of membership size and member heterogeneity on the strength of incentives. In the standard principal-agent model, the agent is usually assumed to be risk averse whereas the principal is assumed to be risk neutral. The assumption that the principal is risk neutral will now be relaxed. Members are different from investors of an IOF because the latter are less risk averse or diversify their portfolio to spread risks. Due to the immobility of cooperative capital, members usually exhibit financial commitment to a particular line of business, having all their eggs in one basket (Staatz 1987).

Suppose there are n identical members in the cooperative. The CEO's contribution to member q and to the society of members are $y_{(q)} = \frac{1}{n} f_1 a_1 + \frac{1}{n} f_2 a_2 + \varepsilon$ and $\sum_q y_{(q)} = f_1 a_1 + f_2 a_2 + n\varepsilon$ respectively. Assuming that errors are independent and all members will agree on a single way of evaluating the CEO, the performance measure remains $p = g_1 a_1 + g_2 a_2 + \phi$. Let r denote the CEO's risk aversion, R the risk aversion of each member, v' the variance of ε, and v the variance of ϕ. It can be shown that the joint risk aversion of the members R_0 when they act collusively and pool risks is $\frac{1}{R_0} = \sum_n \frac{1}{R} = \frac{n}{R}$, i.e. the existence of multiple members decreases members' joint risk aversion. The impact on the efficient bonus rate is $b^* = \frac{f_2 g_2}{g_2^2 + v(r - R/n)}$. That is, a larger society of members decreases the efficient bonus rate. This is in line with the results in the standard principal-agent problem regarding risk-aversion. If the agent becomes more risk-averse, the equilibrium compensation scheme specifies a lower incentive intensity and higher base wage. Here it is the increasing ability of a larger membership to bear risks which widens the gap with the risk aversion of the CEO.

Proposition 2: The managerial incentive intensity decreases with the number of members.

Next we relax the assumption of member homogeneity and keep the size of the membership fixed. Hansmann (1996) stresses the importance of a homogeneous membership for the efficiency of decision-making. However,

cooperative members do often not resemble each other in terms of interests. They differ in various dimensions, like age, location, size, investment portfolio, amount of capital investment, attitude towards risk, and being an active or retired member. The result is that members will have different preferences regarding the decisions made by the cooperative. For example, good performance for the inactive or over-invested member is associated with the amount of returned equity, but good performance for the under-invested or new member means the competitiveness of current prices or services (Cook 1994).

The investor and owner role of members entails that they share the same goal, that is, bringing the downstream stage of production to value in order to receive dividends. As independent farmers, each of them derives individual benefits from the cooperative. Suppose n cooperative members differ regarding risk aversion and value the CEO's action a_2 differently. The individual benefit of member q is $y_{(q)} = \frac{1}{n} f_1 a_1 + \frac{1}{n} f_{2(q)} a_2 + \varepsilon_{(q)}$, where $f_{2(q)}$ denotes the value member q assigns to a_2. Consequently the total benefits of the society of members is $\sum_n y_{(q)} = f_1 a_1 + f_2 a_2 + \sum_n \varepsilon_{(q)}$, where $f_2 = \sum_q f_{2(q)}$. Now the joint risk aversion of the members R_0 becomes $\frac{1}{R_0} = \sum_n \frac{1}{R_{(q)}}$, where R_q denotes the risk aversion of member q. The efficient bonus rate becomes $b^* = \frac{f_2 g_2}{g_2^2 + v(r - R_0)}$. It can be shown that if the sum of all members' risk aversions is fixed, R_0 and subsequently the efficient bonus rate is highest when members have identical risk aversions. In other words, the heterogeneity of members' risk aversions leads to lower joint risk aversion and consequently a lower efficient bonus rate.

Proposition 3: Increasing heterogeneity in the members' risk aversions decreases the incentive intensity of a cooperative CEO.

This proposition provides an explanation for the phenomenon that, compared with investors of an IOF, members of a cooperative usually are more homogeneous with regard to their social backgrounds, investment portfolios, attitudes towards risk, and so on. This finding suggests that the

negative relationship between member heterogeneity and the strength of CEO incentives might be one of the considerations regarding the evolution of membership heterogeneity in the course of time. The membership may be quite heterogeneous at the founding stage of a cooperative, but the development of cooperatives are geared towards attracting more homogeneous members and encouraging heterogeneous members to leave in subsequent stages. This reduces the impact of member heterogeneity on the managerial incentive intensity.

2.4.2 Costly performance measure

So far we have assumed that the performance measurement is determined exogenously. Often, however, a principal devotes resources to improve the alignment of the performance measure with the CEO's real contribution. Baker (2000, p419) observes that 'the choice of which performance measure to use (and the weights to place on them) depends on how the amount of distortion and the amount of risk change as one moves from one performance measure to another'. We endogenize the choice of performance measure by assuming that incorporating an additional performance measure is costly.

Take subjective evaluation as an example. The board of a cooperative may develop a performance assessment and flexibly evaluate the CEO's contribution in various dimensions. The design and implementation of this new measure will consume money, time and effort of the personnel department. The misalignment between performance measure and production function is captured by θ, i.e. a smaller θ represents better alignment. Assume that the cost of improving alignment in governance structure i is $c_i(\Delta\theta_i)$, where $\Delta\theta_i$ is defined as the reduction in misalignment in governance structure i. More reduction in misalignment is more costly, i.e. the first order derivative of c_i is positive. It is of course not possible to reduce the misalignment by more than θ. This is captured by defining $c_i(\Delta\theta_i) = \infty$ when $\Delta\theta_i > \theta$.

Section 3 has specified the relationship between the incentive intensity and the alignment between f and g. That is, the reaction function $b^*(\theta)$ states the optimal bonus rate b as a function of alignment θ. By including the cost of alignment, we are able to indentify alignment as a function of the incentive intensity. The reaction function $\theta^*(b)$ is determined by maximizing the

expected total surplus $E(\pi_i + U_i) = E[y_i - c_i(a_i) - c_i(\Delta\theta_i)]$ with respect to $\Delta\theta_i$. In an equilibrium incentive system, the amount of alignment and incentive intensity are determined together by the intersection of the two reaction functions b*(θ) and θ*(b), i.e. the point where the bonus rate is chosen optimally for the given alignment and the alignment is selected optimally for the given bonus rate.

The implications of the equilibrium incentive system are favorable for a cooperative. Consider first the IOF. The inclusion of alignment cost has no impact because there is no scope for reducing misalignment in an IOF due to the production function and performance measure being already perfectly aligned, i.e. $c_i(\Delta\theta_i) = \infty$ when $\Delta\theta_i > \theta=0$. For a cooperative, the equilibrium incentive system cannot be inferior to the old equilibrium because maintaining the old equilibrium is always an option. There are two cases to consider. First, the benefit of improving alignment exceeds the cost of doing so. It is then beneficial for the cooperative to improve the alignment of the performance measure. Thus, the cooperative gains and total surplus is increased. Second, the benefit of improving alignment does not cover the cost of doing so. The cooperative will choose not to improve alignment and the old equilibrium results are maintained. In short, a cooperative can never be worse off if the cost of alignment is taken into account.

2.5 Additional information

Cooperatives lack an important source of information due to the absence of a stock listing. However, they may include other information in the performance measure in order to direct some attention of the CEO to valuable downstream activities. We capture the additional information by introducing a third activity in the model. The production function becomes $y_i = f_{1i}a_{1i} + f_{2i}a_{2i} + f_{3i}a_{3i} + \varepsilon$, the performance measure takes the form $p_i = g_{1i}a_{1i} + g_{2i}a_{2i} + g_{3i}a_{3i} + \phi$, and the cost of actions is $c_i(a_{1i}, a_{2i}, a_{3i}) = (a_{1i}^2 + a_{2i}^2 + a_{3i}^2)/2$. We show in the current section that additional information in the performance measure makes the cooperative uniquely efficient in certain circumstances. We consider public versus accounting data (2.5.1) and subjective performance measurement (2.5.2).

2.5.1 Public versus accounting data

Next to the public listing, there are usually many other sources of information revealing the performance of a firm. We will highlight the informativeness of accounting data regarding the short-term impact of the downstream activities. Accounting measures have advantages as well as disadvantages compared to stock prices. One might argue when accounting measures are used, temporary losses might be allowed to establish sustainable future gains, as the lack of a stock listing makes temporary losses less visible (Hendrikse & Veerman 2001b). However, accounting measures are often criticized for inducing costly myopic behavior. Managers can use the possibility for manipulation provided by the latitude in accounting principles to maximize compensation (Libby, Bloomfield & Nelson 2002), since myopic actions taken to enhance current accounting performance are not easily detected. At the same time, the cautious nature of accounting rules which do not recognize uncertain gains and, in the U.S., require R&D investments to be fully expensed immediately, is also argued to cause myopia (Bushee 1998). For instance, the durable impact of continued training on firm performance is not recognized as an asset by the accounting representation, and only current revenues will pay it off. That is, training expenditure will be matched immediately against them. Cook (1995) claims in the context of cooperatives, that the horizon problem pushes the management to accelerate members' short-term benefits at the expense of long-term earnings. Despite these shortcomings, accounting measures are not completely uninformative.

We decompose a_{1i} into two actions, a_{il} and a_{is}, each denoting the CEO's action to boost long-term and short-term firm value. The marginal product and performance measure parameters of actions are respectively f_{il} and f_{is}, g_{il} and g_{is}. Table 2 shows the distinctions between cooperatives with and without accounting measures in their CEO compensation schemes, where C' stands for a cooperative using accounting measures to evaluate its CEO. It illustrates that a publicly listed firm can use both long-term and short-term incentives; a cooperative using accounting data gives its CEO only short-term incentives regarding the cooperative firm. To conduct a fair comparison on the efficiency of the two governance structures, suppose there is an upstream IOF producer next to the downstream IOF processor which is concerned merely with the value created at upstream stage. We denote the upstream and downstream IOF as F_U and F_D.

i	F_U	F_D	C	C'
f_{il}	0	>0	>0	>0
f_{is}	0	>0	>0	>0
f_{2i}	>0	0	>0	>0
g_{il}	0	>0	0	0
g_{is}	0	>0	0	>0
g_{2i}	>0	0	>0	>0

Table 2: The production function and performance measure differences between the IOFs and the cooperatives

It is straightforward that $a_{C's} > 0$ and $a_{2C'} > 0$. The use of accounting data helps at least motivate the cooperative CEO to pay attention to the downstream enterprise, though it is likely to overly accentuate the short-run activities, ignoring the long-run interests. By including accounting measures, the performance measure is better aligned with the production function, and the CEO has incentives to advance both the value of upstream member farms and the short-run goals of the cooperative firm.

Next we compare the total surpluses of the two IOFs to the total surplus of a cooperative. Denote the surplus of the upstream IOF, the downstream IOF and the cooperative as S_U, S_D and S_C. It can be shown that $S_U = f_2^2 / 2$, $S_D = (f_s g_s + f_l g_l)^2 / 2(g_s^2 + g_l^2)$ and $S_C = (f_s g_s + f_2 g_2)^2 / 2(g_s^2 + g_2^2)$. Notice that S_D increases with g_l when $g_l < f_l g_s / f_s$, reaches its maximum at $g_l = f_l g_s / f_s$, and decreases with g_l when $g_l > f_l g_s / f_s$. Notice also that $g_l = f_l g_s / f_s$ can be rewritten as $g_l / g_s = f_l / f_s$. It entails perfect alignment. S_D is therefore maximized when there is perfect alignment. When $g_l = 0$, $S_U + S_D \geq S_C$. When $0 < g_l < f_l g_s / f_s$, S_D, and consequently

S_U+S_D, increases with g_l, which implies that $S_U+S_D>S_C$ holds in this interval. Define θ_D as the angle between the *f* and *g* vectors when only the downstream activities are taken into account. Figure 3 depicts the parameters of the performance measure and the production function regarding the downstream activities.

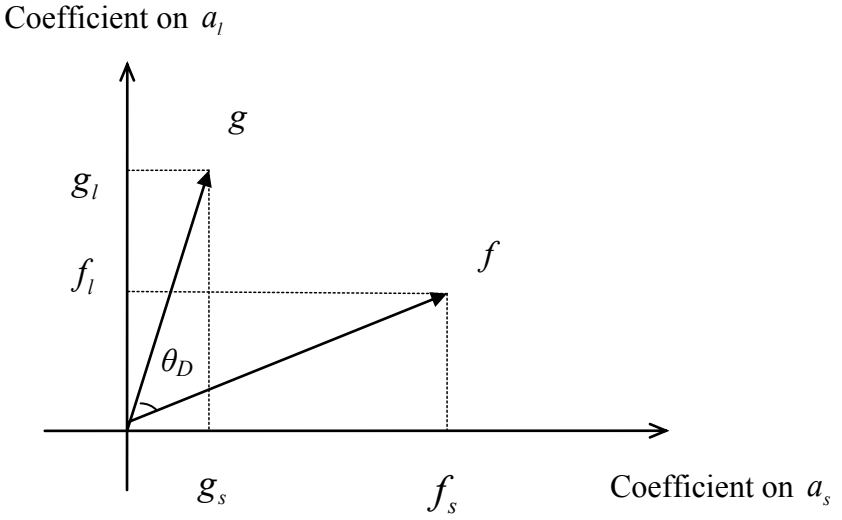

Figure 3: Alignment in the downstream IOF

Given that S_D decreases with g_l when $g_l > f_l g_s / f_s$, we want to know the conditions when the cooperative is the unique efficient governance structure. An example of $S_U+S_D>S_C$ is $f_2 = f_l = g_2 = g_s = 1, f_s = 2$ and $g_l > (4+\sqrt{21})/5$. It indicates that there has to be at least a lower bound on g_l in order for the cooperative to be efficient. This ensures that θ_D in figure 3 is above a certain level. In other words, the cooperative is more likely to be efficient when a high weight is attached in the performance measure to the stock price, as compared to the weight to the accounting data. However, this is not a sufficient condition. The production function parameters have also to be taken into account. Notice that the attractiveness of the cooperative also increases when the value of the downstream activities not reflected in the stock price increases in importance, i.e. f_s increases. An increase in f_s is equivalent to a decrease in f_l. This increases θ_D even

further and may make the cooperative the unique efficient governance structure. Proposition 4 makes this claim precise. It states that the cooperative is the unique efficient governance structure when the weight regarding the activity determining the public listing is sufficiently large and the marginal product related to this activity is sufficiently low.

Proposition 4: If $f_l^2 < \frac{f_s^2 g_s^2 + 2 f_s g_s f_2 g_2 - f_2^2 g_s^2}{g_s^2 + g_2^2}$*, then the cooperative is the unique efficient governance structure when* g_l *is sufficiently large.*

A large value of g_l provides strong incentives to develop activities increasing the value of the public listing, but this is reduced to a normal level of activity due to the scale effect in the efficient incentive intensity. However, this scale effect reduces also the incentive intensity regarding the other downstream activity by the IOF drastically. This imbalance may reduce S_U+S_D to such an extent that it drops below S_C. This result indicates that, not having a public listing provides the cooperative with a commitment to dedicate sufficient attention to valuable downstream activities that are not captured in the stock price as a performance measure. Proposition 4 specifies the circumstances when the misalignment in the downstream IOF is sufficiently large to make the cooperative the unique efficient governance structure. The angle θ_D is sufficiently large when f is sufficiently flat, i.e. f_l is below a certain level and g is sufficiently steep, i.e. g_l is above a certain level.

2.5.2 Subjective performance assessment

Objective performance measures have been highlighted to evaluate the CEO's contribution to the firm. However, they are typically not sufficient to create ideal incentives (Gibbons 1998). The stock price, for example, involves too much noise and external influences that are beyond the CEO's control. The uncertainty of agriculture in particular 'hampers tying a bonus to easily measured performance indicators that a CEO can control and that are of value of the cooperative' (Trechter et al. 1997). Moreover, paying the management for the current earnings sometimes goes at the expense of long-term profits. Activities that do not create immediate short-term profits though redound to long-term development, like R&D, might be underinvested.

In multi-task settings, it is often helpful to use multiple instruments to provide a balanced package of incentives. For instance, many firms mitigate the effects of distortionary objective performance measures by augmenting objective measures with subjective performance assessments even where the objective aspects of an individual's contribution to firm value are easily measured. Subjective measures refer to a judgment by the supervisor of the subordinates' performance, including a judgment of the actions taken to achieve that performance. Subjective evaluations can take different forms, such as (1) flexible weighting of objective performance measures ex-post (at the end of the evaluation period); (2) the use of subjective (qualitative) measures; (3) discretion in using additional performance criteria (Ittner 2003). They are more useful when decisions affect results further in the future (Lambert & Larcker 1987). Subjectivity allows the supervisor to correct for dysfunctional behavior, such as myopia, induced by incomplete performance measures (Gibbons 1998). Empirical evidence shows that when subjective evaluation is used more extensively, CEO compensation is more positively related to future earnings (Hayes & Schaefer 2000). Furthermore, the use of subjectivity in evaluations has been found to increase with firm growth opportunities and product life cycle length (Bushman, Indjejikian & Smith 1996).

Cooperatives may use subjective performance assessments to reconcile the short-term orientation and motivate managers to undertake actions with longer-term focus and consequences. That is, the performance of the CEO should be subjectively assessed by the board of directors who are well placed to observe the subtleties of the CEO's behavior and opportunities. The geographic proximity of patrons to their firm may also create stronger social ties between management and owners. The fact that the patrons are in a privileged position to observe and monitor managerial operations and the stable long-run relationships between owners and the board, suggests greater reliance on subjective performance evaluation in cooperatives (Hueth & Marcoul 2008). As discussed earlier, the board of directors in cooperatives is significantly more independent than its IOF counterpart is, and is better motivated to monitor the CEO. They interact with management both in the boardroom, and as patrons, they potentially have more information about the production environment in which the CEO operates. In addition, the patrons' vested interests in the performance of the cooperative and its CEO may reduce agency problems. Because the patrons

are also the owners, virtually every transaction in the cooperative involves a principal who can oversee the agent's actions. Therefore, the patrons' feedback and general level of satisfaction can also be part of the subjective assessment (Trechter et al. 1997). As a result, 'the incentive and compensation system encourages good long-run performance and is not driven by favorable or unfavorable short-run fluctuations' (Trechter et al. 1997).

We provide no formal modeling regarding subjective performance assessment in this section because it is similar to modeling the impact of incorporating accounting data. The only difference is that the labels regarding short and long run have to be reversed. However, the impact on alignment is the same. Incorporating subjective performance assessments will improve alignment, and therefore the managerial incentives.

2.6 Conclusions and further research

Why should we expect differences in the performance of cooperatives and publicly listed firms? We propose that the answer does not reside in the character or abilities of the management but in the constraints and the opportunities of the governance structure with which that management is faced. A model is presented highlighting the principal-agent tension between members and the cooperative CEO. Results are generated regarding the sensitivity of the optimal incentive intensity to the membership composition and to the composition of performance measure. The alignment between the performance measure and the production function is emphasized. While regulators and shareholders of an IOF may find it beneficial to encourage the use of equity-based compensation (Bebchuk & Fried 2003), a pay package that is very sensitive to any single performance measure will bring about misalignment and inefficiency in cooperatives. The lack of public listing in cooperatives may actually result in the cooperative being the unique efficient governance structure.

As far as we know, this article is the first to model the absence of a public listing as an advantage for cooperatives. However, much more is to be done. First, various behavioral implications may be formulated in terms of growth, innovation, and diversification. Holmström (1999) predicts higher growth for IOFs due to growth being the single most important determinant of stock price. The IOF CEO has therefore strong incentives to pursue growth, whereas a stock price is lacking in cooperatives. Thirkell (1989, p14)

claims that cooperatives are generally not innovative or progressive. Given the discussion in previous sections, the emphasis of a cooperative on upstream member benefits entails that the process innovation in members' close interests is not necessarily ineffective or inactive as compared with that in an IOF. Furthermore, the fact that members have expertise and will bring new ideas about their products will strengthen the cooperative's search for product related differentiation. Diversification choices of an IOF aim to maximize the net returns of the investors, while the diversification choices of a cooperative are guided by bringing to value the portfolio of members. Caves and Petersen (1986) argue that cooperative organizations are ill-suited to entrepreneurial tasks that involve activities far removed from the direct interests and experience of the cooperative members. In other words, its possibilities for diversification are limited. A cooperative focuses more on searching markets for sale instead of searching for market opportunities. We expect therefore that cooperatives are less diversified than IOFs.

Second, Trechter et al. (1997) is right that the CEO is important for the success of a cooperative. However, enterprises have a variety of means to address coordination and motivation problems, of which CEO performance measure is one. Other instruments have therefore to be considered in combination with it. For example, further research may incorporate the internal control mechanism in cooperatives. The board of directors is usually elected by and from the membership, and is commonly representing member interests. They have more access to information inside the organization and have more at stake in the cooperative than their counterparts in IOFs have, and are thus expected to be a more active monitor and participant.

Chapter 3
Chain Interdependencies and Efficient Governance Structure: Cooperatives versus Publicly Listed Firms

These figures suggest that cooperatives tend to operate in the low value-added, first-stage food manufacturing industries.

Cook 1995, p1154

3.1 Introduction

Some researchers doubt the efficiency of cooperatives and argue that cooperatives suffer from a host of problems unique to this specific form of governance. Stewart (1993) even asserts that a business cannot be successfully run if its customers or suppliers are deeply involved in running it because there is too much conflict of interest. Yet, cooperatives and IOFs coexist in many sectors of most modern economies and compete for market share, especially in the agricultural sector where cooperatives have played an active role for a very long time in many countries (Hansmann 1996).

A cooperative is an enterprise collectively owned by many independent farmers as input suppliers in a production chain. The members own collectively a joint resource where they either further process or market their produce. They delegate certain rights to the cooperative enterprise. Subsequently, the cooperative enterprise concludes contracts with members, specifying for example delivery requirements. The vertical ties between the members and the processor therefore consist of a transaction element and an ownership element. An IOF processor is a firm owned by outside investors and it has merely a transactional relationship with its input suppliers.

An important agent in bringing an enterprise to value is the CEO (Chief Executive Officer). This is reflected in the massive amount of research focusing on what guides CEO behavior (see for example Babchuk & Fried 2003). An important part of the research attention is executive compensation because it can help in rectifying the agency problem between the CEO and the owner(s). The relationship between the principal and the agent differs between a cooperative and an IOF. The situation in cooperatives is most likely more complex than a standard principal-agent relationship in an IOF. First, the tasks of a cooperative CEO consist of more

dimensions due to the 'cooperative's goal of jointly maximizing member and cooperative returns' (Peterson & Anderson 1996, p376). Members are users in addition to owners of the firm. They have at least two sets of concerns: owner concerns and user concerns. Owner concerns revolve around the security and overall profitability of their investments in the cooperative. User concerns include issues of the pricing and quality of product and services, which influence the profitability of their individual farm enterprise (Staatz 1987). These two concerns are reflected in the members' expectation regarding the management.

Second, the incentive contract of a CEO is based on a performance measurement system, creating incentives that align the goal of the agent with that of the organization. However, there are no simple indicators of cooperative managerial performance or automatic incentive systems (such as stock options) to close the gap in interests. Giving a CEO equity in the business, a common way to tie the CEO's wealth to firm performance and thus to alleviate the interests conflict in IOFs, is not feasible in cooperatives. The reason is that a cooperative CEO is not eligible to hold equity in the business and receives only limited benefits from such ownership given the fact that most cooperative stock does not appreciate in value (Trechter *et al*. 1997). Given these additional complexities in cooperatives, designing a contract ensuring the mutual compatibility of a cooperative's goals and the CEO's incentives has to be even more difficult.

These observations inspire the following questions: What is the impact of the special features of the governance structures cooperative and IOF on the behavior of the CEO? When is a cooperative (with its member ownership and its lack of public listing) uniquely efficient? These questions will be addressed by incorporating the above distinctions between cooperatives and IOFs in a multi-task principal-agent model. We specify an upstream and a downstream activity, their interdependency, and a performance measure for the CEO capturing the difference in public listing between the two governance structures. This allows us to determine the circumstances when a cooperative is the unique efficient governance structure.[9]

[9] This article is not the first to identify these circumstances. We like to mention Bontems & Fulton (2009), Hendrikse (1998), Hendrikse & Veerman (2001a, 2001b), and Sexton (1986).

We position our article in six ways. First, most studies regarding contract choice in agrarian economics using the principal-agent model are geared to the relationship between a landowner and a farmer (Hayami & Otsuka 1993). We address the relationship between farmers and the CEO of a cooperative. Second, Fulton and Hueth (2009) indicate that cooperative conversions, failures, and restructurings are often due to poor management, next to lack of capital, property rights problems and portfolio problems. They observe regarding cases 'that were identified as having poor management were also identified as having significant agency problems'. This article addresses on the one hand these agency problems by analyzing the impact of the performance measurement scheme on managerial performance, and on the other hand identifies the sectors in which cooperatives are most likely to be successful. A third way to position the article is that a variety of corporate forms has to be considered when studying the nature of the firm (Hansmann 1996). A cooperative is from this perspective an informative counterfactual for the much studied publicly-listed corporation. To be more specific, a cooperative has various special features which distinguish it from other governance structures. One of the objectives of research regarding cooperatives is to show that these features may actually be desirable, despite the widespread belief that they are not. In this article we demonstrate that the absence of a public listing, often believed as a disadvantage of cooperatives, can make a cooperative uniquely efficient. Finally, issues regarding the governance of enterprises are often distinguished into income and decision rights (Hansmann 1996). Income rights address the question 'How are benefits and costs allocated?' i.e. they specify the rights to receive the benefits, and obligations to pay the costs, that are associated with the use of an asset. Decision rights in the form of authority and responsibility address the question 'Who has authority or control?' i.e. they concern all rights and rules regarding the deployment and use of assets. This article is about income rights, whereas Hendrikse & Veerman (2001a, 2001b) are about decision rights. It entails implicitly that the ownership role is subordinate to the user/patron role in this article.

The next section presents the model. Section 3.3 identifies the efficient governance structure. The strategic choice of performance measure is addressed in section 3.4. Conclusions and research directions are formulated in the final section.

3.2 Model

A multi-task principal-agent model (Gibbons 1998) is developed to capture governance structure differences between cooperatives and IOFs. The model consists of a two-stage non-cooperative game. In the first stage, the principal (i.e. the owner) chooses the strength of incentives while the agent (i.e., the CEO)'s optimal choice of activities is determined in the second stage of the game. Assume that the CEO in governance structure i (c for a cooperative and f for an IOF) can take two actions. First, denote a_{1i} as the CEO's action to advance the value of the downstream firm. For example, a CEO's tasks include setting long-term goals, establishing policies and standards, determining long-term financing needs and sources, and setting strategies (Blanchard et al. 1996). According to Merchant (1990), CEOs allocates their time over eight categories of activities: 1) new product development, 2) improvement of existing products/services, 3) adjusting/improving production processes, 4) employee development, 5) capacity expansion, 6) improvement of information systems, 7) execution of current production processes, and 8) advertising and sales promotion.

Second, denote a_{2i} as the action adding value to the upstream suppliers. In addition to the activities mentioned above, a cooperative CEO needs to take actions that create value for the upstream members because of the user-owner feature of cooperatives. Three extra categories are specified. The first category is improvement of member involvement and member loyalty. Compared with his IOF counterpart, the cooperative CEO is more interdependent and interactive when coping with the user-owners. As a leader of a community-based organization, he needs to be particularly effective in fostering group cohesiveness, a key component in improving member loyalty. The second category is vertical information exchange. A cooperative CEO once informed us that he spent at least half of his time communicating with member patrons. Members have different preferences as to price, cost allocation, and equity retirement polices, which affect both the cooperative and the member enterprises. They have more formal and informal channels to communicate their desires to the CEO than do patrons of an IOF and thus are able to exercise cheaper "voice" (Staatz 1987). Meanwhile, a cooperative CEO must actively acquire useful information in discovering the optimal choice (Cook 1994). The third category is member coordination and improvement of member relations. A cooperative CEO takes a more integrated view of the members' fixed costs when attempting

to optimize the vaguely defined objective function of the firm. The more heterogeneous the membership, the more will be the difficulty for the CEO to form consensus and viable internal coalitions. The CEOs, particularly those of large, diversified cooperatives, need to spend considerable time and effort in negotiating and meeting the expectation of members. They are required to reduce the increasingly heterogeneous interests to more homogeneous interests to capture the benefits of coordination (Cook 1994).

The CEO's total contribution to firm value is denoted by y_i. Denote the marginal product of action a_{ji} by f_{ji}. The production function is $y_i = f_{1i}a_{1i} + f_{2i}a_{2i} + \varepsilon$, where ε is a stochastic variable with expected value of zero, representing the noise in the production process that is beyond the agent's control. Given the difficulty in measuring the exact overall effect of the CEO's actions on firm value, no compensation contract based on y_i can be enforced in court. Therefore, an alternative performance measure p_i becomes necessary. Suppose the technology of performance measurement takes the form $p_i = \mathrm{g}_{1i}\mathrm{a}_{1i} + \mathrm{g}_{2i}\mathrm{a}_{2i} + \phi$, where g_{ji} denotes the performance measurement parameter, i.e., the weight attached to a_{ji}, and ϕ denotes the noise in performance measurement with expected value of zero. Suppose the compensation contract in governance structure *i* specifies the wage w_i paid to the CEO as a linear function of p_i, i.e. $w_i = s_i + b_i p_i$, where s_i stands for the salary and b_i for the bonus rate. The principal's payoff is the difference between the CEO's total contribution to firm value and the wage paid: $\pi_i = y_i - w_i$. The CEO's payoff is the difference between the wage received and the cost of the actions taken: $U_i = w_i - c_i(a_{1i}, a_{2i})$. Assume that the cost function takes the form $c_i(a_{1i}, a_{2i}) = \frac{{a_{1i}}^2}{2} + ka_{1i}a_{2i} + \frac{a_{2i}^2}{2}$, where -1<k<1 (Dixit 2002). The parameter k captures interdependencies between the upstream and downstream activities in the production chain. There are no interdependencies when k=0. When 0<k<1, the two tasks are substitutes, i.e., more effort in a_{1i} increases the marginal cost of effort in a_{2i}, therefore enhancing the marginal incentive payment for greater output of a_{1i}, drawing effort away from a_{2i}. Examples of substitutable tasks are the time

spent in communicating with the input suppliers and the time spent on the business strategies of the firm. When the workload of the CEO is fixed, the more he works with the suppliers, the less time is left to spend on the strategies. When -1<k<0, the two tasks are complements, implying that the interaction between the two tasks strengthens incentives for both. An example of complementary tasks is the CEO's coordination role between the suppliers and the enterprise. Well known is the matching problem regarding sugar beets between the delivery of each farmer's harvest and the capacity of the processing plant. A farmer likes to deliver his harvest immediately to the processor, while the processor likes to spread the deliveries in order to reduce the idleness of the plant. More knowledge of one side facilitates coordination with the other side.

Differences between a cooperative and an IOF are formulated in terms of restrictions on the parameters in the production function and the performance measure. First, the CEO's contribution to firm value depends on the organizational form. In cooperatives, it is equivalent to the change in total member value. Members want to bring both upstream farms and the downstream cooperative to value, i.e., $f_{1c} > 0, f_{2c} > 0$. Investors in a downstream IOF care only about the value of the firm and consequently the CEO's action that increases firm value, i.e., $f_{1f} > 0, f_{2f} = 0$. Second, the performance measures of IOFs and cooperatives differ. It is not unusual in IOFs that the CEO's bonus is paid in the form of firm shares, i.e., $g_{1f} > 0$. Additionally, the CEO of an IOF at the downstream stage of production will of course not be rewarded based on a performance measure taking upstream activities into account, i.e. $g_{2f} = 0$. Cooperatives lack a public listing. They are therefore not able to pay the CEO with shares reflecting the value of the downstream enterprise. We capture this observation by $g_{1c} = 0$.[10] However, member interests are usually present in the incentive scheme for the CEO of a cooperative, e.g. by benchmarking the transfer price and production volume. This is reflected in our assumption that $g_{2c} > 0$. Notice that these assumptions regarding the parameters in the performance measure scheme of the cooperative reflects that members are

10 We are not stating that a cooperative has no information at all about the downstream activities, but our model will focus on the impact of lacking certain information.

prioritized rather than the downstream activities, which is of course popular with members, especially those who are close to retirement.

To summarize, members' plurality of interests is represented by $f_{2c} > 0$, while the absence of patron-members, and therefore serving their interests, in an IOF is represented by $g_{2f} = 0$. The absence of public listing of a cooperative is embodied by $g_{1c} = 0$, while the use of stock price in an IOF's performance measure is captured by $g_{1f} > 0$. The distinct features of both governance structures are displayed in table 1.

i	f	c
f_{1i}	>0	>0
f_{2i}	0	>0
g_{1i}	>0	0
g_{2i}	0	>0

Table 1: Marginal product and performance measure parameters of different governance structures

3.3 Efficient governance structure

We use backward induction to solve the game. We start therefore in the second stage of the game in order to determine $a^*_{ji(k)}$, i.e. the equilibrium level of task *j* in governance structure *i* when the interdependencies between tasks in the cost function is *k*. Subsequently we determine in stage one the equilibrium bonus rate $b^*_{i(k)}$.

The CEO's optimal action is determined by maximizing his expected utility, i.e., $\max_{a_{1i}, a_{2i}, a_{3i}} E(U_i)$, where $E(U_i) = E[w_i - c_i(a_{1i}, a_{2i})] = s_i + b_i(g_{1i}a_{1i} + g_{2i}a_{2i}) - c_i(a_{1i}, a_{2i})$. Setting the first derivative of the expected utility function with respect to a_{ji} equal to zero results in the first order condition $b_i g_{ji} = \partial c_i / \partial a_{ji}$, $j = 1, 2$. This characterizes the CEO's optimal actions $a^*_{ji}(b_i)$.

The payoff-maximizing reply in the second stage of the game is anticipated in the first stage when the principal chooses $b^*_{i(k)}$. $b^*_{i(k)}$ is determined by maximizing the expected total surplus, that is, $\max_{b_{i(k)}} E(\pi_i + U_i)$, where

$$E(\pi_i + U_i) = E[y_i - c_i(a_{1i}, a_{2i})] = f_{1i}a^*_{1i} + f_{2i}a^*_{2i} - c_i(a^*_{1i}, a^*_{2i}).$$

The efficient bonus rates for a firm and a cooperative are $b^*_{f(k)} = f_{1f} / g_{1f}$ and $b^*_{c(k)} = (f_{2c} - kf_{1c}) / g_{2c}$. Plugging these results in the expressions for the CEO's equilibrium actions results in $a^*_{1c(k)} = -k(f_{2c} - kf_{1c}) / (1-k^2)$, $a^*_{2c(k)} = (f_{2c} - kf_{1c}) / (1-k^2)$. Notice that the CEO in a cooperative will not choose $a^*_{1c} = 0$, despite that the performance measurement scheme of the cooperative prioritizes the members rather than the downstream activities, i.e. $g_{1c} = 0$ and $g_{2c} > 0$. It will differ from 0 because doing so is attractive in order to benefit from the chain interdependencies. Similarly, the equilibrium results for a downstream IOF CEO are $a^*_{1f(k)} = f_{1f} / (1-k^2)$, $a^*_{2f(k)} = -kf_{1f} / (1-k^2)$. The equilibrium results for an upstream IOF, with $f_{1f} = 0, f_{2f} > 0, g_{1f} = 0, g_{2f} > 0$ are $b^*_{uf} = f_2 / g_2$, $a^*_{1uf} = -kf_2 / (1-k^2)$, and $a^*_{2uf} = f_2 / (1-k^2)$.

3.3.1 No interdependency, i.e. k=0

If k=0, then the efficient bonus rates of an IOF and a cooperative are therefore $b^*_f = f_{1f} / g_{1f}$, $b^*_c = f_{2c} / g_{2c}$. Plugging these results in the expressions for the CEO's equilibrium actions results in $a^*_{1f}(b_f) = f_{1f}$, $a^*_{2f} = 0$ and $a^*_{1c} = 0$, $a^*_{2c}(b_c) = f_{2c}$.

A cooperative and an IOF differ because *f* and *g* are not aligned in a cooperative, whereas they are in an IOF. The misalignment is due to the production function depending on two actions while the performance measure in a cooperative is determined by only one of them. The appearance of a_{1c} in the production function does not have any impact on the efficient bonus rate and subsequently on the CEO's equilibrium actions because it is not acknowledged in the performance measure. When an

action increases the member value without simultaneously increasing the performance measure, the CEO has no incentives to undertake it.

In equilibrium, an IOF CEO has incentives to undertake only a_{1f}, because the investors care only about a_{1f} and make the CEO's pay dependent only on a_{1f}. Members of cooperatives, however, appreciate the CEO's actions on both dimensions but only compensate for a_{2c}. Thus, only an incentive to increase a_{2c} is created and no incentive for a_{1c} exists even though it would increase firm value. The misalignment between member value and the cooperative CEO's interest results in the CEO's failure to add value to the downstream enterprise, while the perfect interest alignment between the investors and the IOF CEO creates an incentive for the CEO to advance the firm value.

To facilitate the comparison of the governance structures cooperative and IOF in terms of efficiency, we assume that the marginal product and the performance measurement parameter of each activity remain the same across different governance structures. For example, f_1 and g_1 for a_1 for a cooperative, an upstream and a downstream IOF. Therefore the above results become $b_f^* = f_1 / g_1$, $b_c^* = f_2 / g_2$, $a_{1f}^* = f_1$, $a_{2f}^* = 0$, $a_{1c}^* = 0$, $a_{2c}^* = f_2$. Similarly, the equilibrium results for an upstream IOF are $b_{uf}^* = f_2 / g_2$, $a_{1uf}^* = 0$, and $a_{2uf}^* = f_2$.

A fair comparison of the efficiency of the two governance structures entails comparing the value created by a cooperative with the joint value created by a downstream and an upstream IOF. Straightforward calculations show that the total surplus of a cooperative and two IOFs are $f_2^2 / 2$ and $(f_1^2 + f_2^2) / 2$ respectively. The total surplus created by a cooperative is always less than the surplus created by the two IOFs when $f_1 > 0$, i.e. the cooperative is inefficient. The behavior of the cooperative CEO is exactly the same as the behavior of the CEO of the upstream IOF. Value would be created in the cooperative by developing downstream activities because $f_{1c} > 0$, but the cooperative CEO will not choose these activities because the performance measure does not put any weight on them. The difference

in value creation between the two governance structures is therefore equal to the value created at the downstream IOF. This result is summarized in proposition 1.

Proposition 1: A cooperative is inefficient when k=0.

Another way to explain this result is that the cooperative is supposed to serve member interests and to generate maximum value in processing. However, the organizational structures required for the upstream and downstream tasks differ. The cooperative is designed for the former task, and therefore does not always perform the latter task well. The governance structure IOF consists of two separate entities, i.e. a downstream and an upstream IOF. It is tailored to each task separately. Section 3.2 will show that this result hinges on the assumption that the upstream and downstream activities are independent.

3.3.2 Substitutable / complementary tasks, i.e. 0<k<1 / -1<k<0

The main result with either substitute or complementary tasks is that a_{2f} and a_{1c} are not zero anymore in equilibrium. Their actual levels will depend on the nature and the strength of the interaction effects. The marginal cost of a_{1f} decreases with the level of a_{2f} in the complementary case and increases in the substitute case. If a_{2f} can make a_{1f} less costly, the CEO will optimally choose to take some actions a_{2f}, which will further increase $a^*_{1f(k)}$ as compared with $a^*_{1f(0)}$. The stronger is the complementary effect, the more actions will be taken on a_{2f}. If a_{2f} makes a_{1f} more costly, he will take a negative action on a_{2f} since it will decrease the marginal cost of action a_{1f}. As a result of the decreased marginal cost, $a^*_{1f(k)}$ increases. The CEO's action advancing the downstream value increases, i.e., $a^*_{1f(k)} > a^*_{1f(0)}$, regardless the nature of the interaction between tasks.

When k=0, a cooperative CEO will in equilibrium take no action to increase the downstream enterprise's value. However, if two actions are complementary, he will optimally choose to take action on a_{1c}, which in turn increases the equilibrium level of $a_{2c(k)}$ as compared with $a^*_{2c(0)}$. A

stronger complementary effect results in higher levels of $a^*_{1c(k)}$ and $a^*_{2c(k)}$. A high bonus rate leads to a high level of $a^*_{2c(k)}$, which will result in a higher $a^*_{1c(k)}$ due to the complementary effect. Therefore, a principal valuing both actions has incentives to increase the bonus rate in order to increase both actions. The stronger is the complementary effect, the larger is the efficient bonus rate. When the two tasks are substitutes, a high bonus rate drives the CEO to exert as much effort as possible to a_{2c} while taking no action or even negative action on a_{1c}. Therefore, the principal will cut down the bonus rate. The stronger is the substituting effect, the smaller is the efficient bonus rate.

Interactions between the downstream and upstream activities may make the cooperative the unique efficient governance structure. These interactions in the cost function elicit new activities by the CEOs, i.e., the cooperative CEO will choose a positive level of the downstream activities, downstream activities are chosen also by the CEO at the upstream IOF, and upstream activities are put forward by the CEO at the downstream IOF. It turns out that the equilibrium level of upstream activities generated by the cooperative is identical to the level of upstream activities by the two IOFs together, while the level of downstream activities generated by the cooperative is lower than the level of downstream activities by the two IOFs together. Total output in a cooperative is therefore lower than in the IOFs. However, the decrease in total costs in a cooperative is even larger when the complementarities are sufficiently strong. The reason is that the decrease in the downstream activities by the cooperative CEO is limited due to $f_{1c} > 0$. This makes the cooperative the unique efficient governance structure, despite that the downstream activities are not recognized in the CEO' compensation scheme. The cooperative internalizes externalities to a certain extent by putting positive weight on serving member interests and generating maximum value in processing. Not having a public listing provides the cooperative with a commitment not to choose the level of the downstream activities too high. This result is formulated in proposition 2. (The cooperative is never efficient when the downstream and upstream activities are substitutes or independent.)

Proposition 2: A cooperative is uniquely efficient if and only if $f_1 < \frac{-2k}{1-k^2} f_2$.

This result provides at least two indications where cooperatives are to be expected. First, cooperatives are expected in sectors where the marginal productivity at the downstream stage is below a certain level, which depends on the strength of the complementarities and the marginal productivity at the upstream stage of production. This is in line with the opening citation of this article. Second, the incidence of cooperatives varies between countries and over time. Hansmann (1999, p387) observes that 'more generally and more strikingly, the overall share of economic activity accounted for by cooperatives is larger in advanced economies than it is in less-developed economies. And, more striking still, the market share of cooperatives in economic activity has grown throughout the 20th century.' One development in the advanced economies is the rise of ICT, and its applications in the management of supply chains. Improving the coordination in supply chains entails an increase in the importance of chain complementarities, i.e. a decrease in the level of the chain interdependencies parameter k in our model. The above inequality indicates that cooperatives are the efficient organizational form in more sectors of the economy when the strength of chain complementarities increases.

3.4 Strategic choice of performance measure

This section argues that there may be a strategic rationale involved in the choice of the performance measure parameters. Strategic as well as efficiency considerations may determine the weights in the performance measure to establish alignment with the production function parameters. An early contribution is Vickers (1985). Notice that to study strategic performance measurement choice, there need to be (potential) competition between enterprises, i.e., there have to be at least two enterprises.

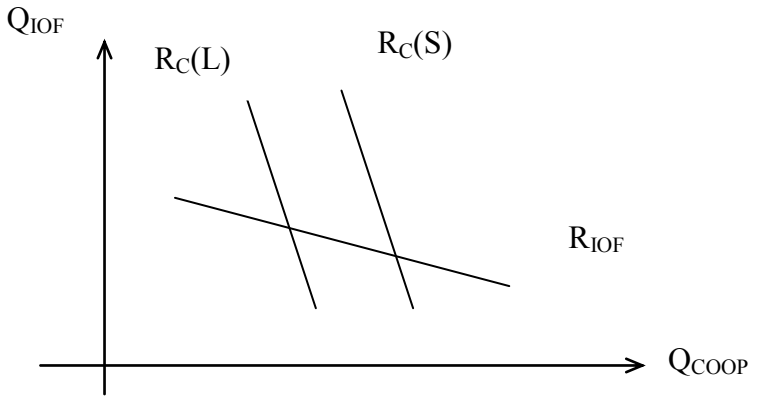

Figure 1: Performance measure choice and reaction functions

According to Fudenberg & Tirole (1984), three variables have to be specified in order to determine the payoff maximizing choice of performance measure in a strategic setting: the nature of the investment, the nature of the competitive process, and the entry condition. First, define the investment as the extent of member focus in the performance measure. If the extent of member focus is large, i.e., g_2 is much higher than g_1, then the profits of the rival firm will increase. The reason is that the CEO will dedicate a larger part of his time to activities related to the interests of members when the extent of member focus changes from small (S) to large (L), which goes at the expense of activities geared towards developing the cooperative enterprise. It entails that the investment is soft, because it establishes a positive relationship between investment in the weight of member focus in the performance measure and profits of the rival firm. Second, assume that the nature of the competitive process is characterized by strategic substitutes, i.e. reaction functions are downward sloping (figure 1). Third, two cases regarding the possibilities of market entry have to be distinguished (Fudenberg & Tirole, 1984): entry is inevitable or it is not. If entry is not inevitable, then a monopoly market structure arises endogenously by the choices of the two enterprises. Otherwise it is always a duopoly.

The profit maximizing investment profile of the cooperative is to be aggressive in order to elicit a passive response by the rival, i.e. underinvestment in the weight put on member focus in the performance measure. Notice that in a setting with strategic substitutes no distinction has

to be made regarding the entry condition. The payoff maximizing investment choice is the same in both cases regarding the entry condition because the market is characterized by a soft investment and strategic substitutes. This result is summarized in proposition 3.

Proposition 3: A cooperative puts a low weight on member focus in its performance measure in order to elicit passive behavior from a rival enterprise.

3.5 Conclusions and further research

This article has developed a multi-task principal-agent model in order to address the effects of interdependencies between upstream and downstream activities and strategic performance measure choice. It is established that the interdependency between upstream and downstream activities is a possible source to make the cooperative the unique efficient governance structure. A necessary requirement for the efficiency of the cooperative is that this interdependency is a chain complementarity, and that it has to be above a certain level. This level is increasing in the ratio of the downstream and upstream marginal product, i.e. the chain complementarities have to be stronger when the downstream marginal product increases relative to the upstream marginal product. It entails that cooperatives are efficient only in sectors where the downstream marginal product is below a certain level, given the level of the upstream marginal product and the strength of the chain complementarities.

It is encouraging that the results are established in a highly stylized model. It provides a start for developing additional arguments for the widespread occurrence of cooperatives. One obvious possibility for further research is to relax the assumption that cooperatives have no information available regarding downstream activities to incorporate in the performance measure scheme of the CEO, e.g. accounting data or subjective performance measures. Relaxing this assumption may identify additional circumstances when the cooperative is an efficient governance structure.

Second, Trechter *et al.* (1997) is right that the CEO is important for the success of a cooperative. However, enterprises have a variety of means to address coordination and motivation problems, of which CEO compensation is one. Other instruments have therefore to be considered in combination with CEO compensation. For example, further research may

incorporate additional internal control mechanism in cooperatives. The board of directors is usually elected by and from the membership, and is commonly representing member interests. It has more access to information inside the organization and has more at stake in the cooperative than their counterparts in IOFs have, and are thus expected to be a more active monitor and participant.

Third, the principal-agent model embodies various assumptions which are questioned by practitioners. For example, the model posits that the principal is in a very powerful position because he determines the details of the contract, while the agent decides subsequently regarding acceptance of the contract and the level of activities. It seems that the model allocates too much power to the principal, i.e. the members. In reality the CEO has often substantial power due to his superior information regarding final product markets and the details of similar compensation packages for his position (Hendrikse 2007b). He is therefore in a position to propose his own compensation package, while the board representing the members only can decide to accept or reject the compensation proposal. So, there seems to be a skewed power relationship between the board and the CEO in favor of the CEO. A related observation is that many researchers today think that there are problems associated with the vaguely defined property rights in cooperatives. Future research has to determine how our results are influenced by the degree of CEO power.

Fourth, our results can be related to growth and innovation of cooperatives versus IOFs. The nonmarketability of cooperative equity implies different attitudes towards growth between cooperatives and IOFs. Growth is the single most important determinant of stock price (Holmström 1999). The growth of an IOF results in appreciation of equity, which can be realized by investors through selling their shares in the secondary market. An IOF CEO has thus incentives to accelerate the firm growth when his own pay and tenure are strongly tied to the stock price (Lerman & Parliament 1991). The nonmarketability of cooperative equity, on the other hand, provides no incentives for the cooperative CEO to pursue firm growth. This is in line with our results predicting that the cooperative CEO spends less effort to advance downstream value, leading to slower growth in cooperative enterprises than in IOFs.

There are also differences to be expected regarding upstream versus downstream innovation. Upstream innovation mainly concerns the process innovation related to the existing products while the downstream innovation concerns development of new products. Cooperatives, according to many, are at a disadvantage in the innovation race with IOFs. For instance, Thirkell (1989) claims that cooperatives are generally not innovative or progressive. Given the discussion in previous sections, the emphasis of a cooperative on upstream member benefits entails that the process innovation in members' close interests is not necessarily ineffective or inactive as compared with that in an IOF. A cooperative normally only processes (or markets) the products from its members, and this makes product-orientation a characteristic of the cooperative business form. Furthermore, the fact that members have expertise and will bring new ideas about their products will strengthen the cooperative's search for product related differentiation. Based on our results we expect that the cooperatives focus more on upstream innovation with regard to the existing products than on the development of new products downstream. Empirical research has to shed light on these claims.

Chapter 4
Coordination and Governance: The case of Cooperatives versus IOFs

'Perhaps the most important role of contracts is to coordinate the actions of independent decision makers.'

Bogetoft & Olesen 2002, p189

4.1 Introduction

Specialization is attractive according to the law of comparative advantages, but it also generates motivation and coordination problems due to the required exchange between specialized parties. The parties must be motivated to carry out their parts of the exchange, and the decisions and actions of the parties have to be coordinated to realize the gains of cooperation. A governance structure has to address these problems of conflicting as well as joint interests. Motivation problems can be addressed by designing incentives and assigning authority to reduce conflicts of interests and to provide the proper investment incentives, while coordination is required even if the parties involved have joint interests in order to focus on one course of action. The scientific literature has focused on analyzing the former, like in the agency literature (Fama & Jensen 1983) and the property rights literature (Grossman & Hart 1986). Coordination problems in a setting of joint interests have received limited attention during the last decades, but this is changing rapidly (for example, Alonso, Dessein & Matouschek 2008; Dessein & Santos 2006).

As the opening citation indicates, in many production and supply chains, coordination is the primary concern, ensuring that production is optimized throughout the entire production chain and value is created through joint actions. For example, the harvesting of fruits and vegetables must be coordinated to avoid capacity problems like congestion as well as idleness at the factory. Coordination problems arise when there are (positive) externalities between different organizational units (Lazear & Gibbs 2008). An example is double marginalization in a chain (Spengler 1950). Vertical coordination entails aligning interdependent activities of various actors in a production chain. It requires complex information exchange, not only on supply and demand, but also on the quality requirements of retail customers and final consumers. The introduction of new products and improvement of

logistic efficiency also require a coordinated effort of all actors in the value chain (Bijman, Chaddad & Cook 2004).

The literature on agricultural cooperatives pays noticeable attention to the coordination problem over time. Coordination aims to harmonize the economic activities of different economic units. It is intended to 'achieve necessary adjustments of functioning of the participants without any encroachments upon their individuality or their independence' (Emelianoff 1948). It is therefore widely applied in both cooperatives and IOFs. Shaffer (1987) argues that the patron-owned characteristics of a cooperative provide the potential for advantages in coordination for cooperatives over IOFs since the coordination between the parties internalizes the vertical externality in a cooperative. However, he does not specify these advantages. Bogetoft & Olesen (2002) summarize ten rules of thumb in agricultural contract design and group them into three categories corresponding to the overall objectives of coordination, motivation, and minimization of transaction costs. Three rules relating to coordination are "coordinate production", "balance the pros and cons of decentralization" and "minimize the costs of risk and uncertainty". However, a relationship between governance structure and coordination is not outlined. Bijman, Chaddad & Cook (2004) build on Thompson (1967)'s theory that associates three types of coordination mechanisms (by standardization, by plan, or by mutual adjustment) to three types of interdependencies (pooled, sequential, or reciprocal), and apply it to various governance structures in the context of cooperatives. Cooperatives are characterized by all three types of interdependencies while IOFs in the production chains are only sequential interdependent. They establish that, if interdependencies shift from pooled to sequential to reciprocal, transactions will be governed in a more hierarchical way in order to economize on coordination costs. The reason is that more information has to be exchanged and more activities of various participants have to be aligned along the shift.

The current article contributes to this literature by relating coordination mechanisms and governance structures. We examine the use of coordination mechanism in the vertical relationship between input supplier and the processor of a certain good, and link it to the choice of governance structure, either a cooperative or an IOF. Two ingredients drive our results: internalizing externalities and uncertainty. First, a cooperative is an enterprise collectively owned by many independent farmers as input

suppliers or buyers. The members own collectively a joint resource where they either further process or market their produce. They delegate certain rights to the cooperative enterprise. Subsequently, the cooperative enterprise concludes contracts with members, specifying for example delivery requirements. The vertical ties between the members and the processor therefore consist of a transaction element and an ownership element. An IOF processor is owned by outside investors and it has merely a transactional relationship with its input suppliers. This governance structure difference has an impact on the coordination problem. A cooperative takes into account the vertical externalities between member farms and the cooperative processor, whereas an IOF does not.[11]

Second, agricultural markets are subject to a wide range of risks and uncertainties. Information asymmetry is precisely what we would expect to see in this market. There are production risks pertaining the farm operations. Farmers' ability to plant and yield, and the costs of production are difficult to predict, "due among other things, to varying weather conditions" (Nilsson 2001, p332). Price volatility is another important source of risk. Agricultural commodity prices are subject to sharp fluctuations over relatively short periods of time and between geographical dispersed markets, depending on both local and global supply and demand conditions. Moreover, the market is also characterized by information asymmetry between different parties involved. The producers have, for instance, more information regarding the production stage while the processors might be more knowledgeable about the market prices. We incorporate this latter uncertainty in the model and examine the implications for organizational structure choices.

Our study can also be seen as an extension of institutional market failure analysis. Williamson (1975) makes it clear that trust and goodwill among businessmen are essential, "A better understanding of market failure might

[11] Notice that the consolidation of ownership in cooperatives does not imply that the dominant coordination mechanism should be an authority relation. Conversely, an authority relation, in the sense of quantity instruction, can be used independently from the centralization of ownership and/or residual income rights, such as the relational contracts among separate firms (Grandori 1997).

also come from studying how good estimates and revelations must be to allow approximate planning rather than studying how to elicit the truth" (Flaherty 1981, p524).

We analyze in this article the choice of coordination mechanism in the vertical relationship between producers and a processor governed by either a cooperative or an IOF. Circumstances are delineated when each governance structure is efficient. The next section provides a characterization of the coordination problem. Section 4.3 sets up the model, followed by the equilibrium results in section 4.4. Section 4.5 formulates an extension. Section 4.6 concludes.

4.2 Coordination as a game of multiple equilibria

Classic definitions of management include often explicitly the coordination problem in characterizing the field. For example, Drucker (1946) states that 'Management science is the science of the coordination of activities and processes, decision making in organizations, and optimal use of scarce resources (human and financial capital, materials, equipment) in order to reach favorable outcomes (products and services, employment, profit) for the organization'. Organization theory (for example Thompson 1967, Galbraith 1977) deals also with the coordination issues between activities carried out by different actors, either within the boundaries of one organization or among collaborators in a partnership. This article addresses issues regarding coordination from an economic perspective.

A coordination problem can be conceptualized as a game with multiple equilibria (Milgrom & Roberts 1992). To illustrate, consider a situation with two growers and a processor. Suppose that each grower produces a harvest of size one and has to decide to deliver the harvest to the processor either today or tomorrow. During each of these two days the processor can handle a harvest of size one. Coordination entails that one grower delivers today and the other grower tomorrow. There are two equilibria: grower 1 delivers today and grower 2 delivers tomorrow, and vice versa. Lack of coordination entails parties may be focusing on different equilibria, resulting in a coordination problem. For example, if grower 1 focuses on the equilibrium where grower 2 is delivering tomorrow, and grower 2 is focusing on the equilibrium where grower 1 is delivering tomorrow, then there is congestion at the processor today and idleness tomorrow.

Lazear & Gibbs (2008) distinguish two general types of coordination problems. One is called the synchronization problem which does not require parties involved to communicate to each other in order to coordinate. Examples are the synchronization of harvesting and processing of perishable products, the consistent overall product image, and uniform services provided by a firm at all of its retail locations. The other type is an integration problem. When there is specific knowledge rather than general knowledge in an organization that must be used to create firm value, and it is costly to communicate the knowledge to someone else, the integration problem arises. Should the decision making be centralized or decentralized is an example of such problem (Alonso, Dessein & Matouschek 2008). Vertical or horizontal communication is needed to solve an integration problem. We look at the second type of coordination problems in the current article, more specifically, who and how to determine the efficient amount of production?

The solution to a coordination problem entails that the game with multiple equilibria is transformed into a game with one equilibrium. This can be done by changing the (number of) players, the choice possibilities, the payoffs, the information structure, or the rules of the game. One way of solving the synchronization problem and achieving consistency across employees and organizational units is to standardize practices and implement standard operating procedures. It entails that the number of choice possibilities for each player is reduced to one. There is of course a unique equilibrium in a game where each player has only one choice possibility. Milgrom & Roberts (1992) identify two solutions for an integration problem, namely, centralization and decentralization. Each solution has its advantages and disadvantages. "Either the dispersed information must be transmitted to a central computer or planner who is expected to solve the resource allocation problem or else a more decentralized system must be developed that involves less information transmission and, correspondingly, leaves at least some of the calculations and decisions about economic activity to those with whom the relevant information resides. The trick with the first option is to make timely decisions while keeping the costs of communication and computation from absorbing all the available resources low. The challenge of decentralization is to ensure that the separately made decisions yield a coherent, coordinated result"(p26).

Different organizational structures achieve coordination in an integration problem in different ways and with differing results. Weitzman (1974) makes this explicit by comparing the efficacy of instructions (centralization) versus price signals (decentralization) as coordination modes. For a quantity control to work, one party specifies a quota, target, or command to produce a certain level of output, then the other party must obey without consideration of how costs will be met and how rewards will be distributed (Flaherty 1981). With price instruments, the rules specify explicitly or implicitly that profits are maximized at the given prices, taking into account the cost and revenue. A prominent example of this type of coordination is the US dairy marketing orders that establish minimum prices to be paid by the processors for milk purchased from producers. When there is no informational constraint, having the centre name prices while producers respond with quantities, or having the centre assign quantities while the producers reveal marginal costs does not make a difference. A more realistic issue of central control is to focus on the essential difference between quantities and prices as planning instruments, since quantity and price instruments transmit central control in quite different ways when uncertainty is involved. Whether it is better to directly administer production under scrutiny via quantity, or to fix transfer prices and rely on self-interested profit maximization to achieve the same ends in decentralized fashion is contingent on the shape of the marginal cost and marginal revenue curves. Notice that the first solution establishes coordination by reducing the choice possibilities of local parties to one, while the second solution entails changing the payoffs. Mintzberg (1980) define organizational structure as the sum total of the ways in which it divides its labor into distinct tasks and then achieves coordination among them. He distinguishes five coordination mechanisms: mutual adjustment, direct supervision, and the standardization of work processes, outputs, skills. We focus on the two mechanisms suggested by Weitzman (1974) and add into the analysis the features of two governance structures. In Weitzman (1974)'s framework, both mechanisms operate on the assumption that upstream units are obedient to downstream units. The coordination problem of concern is how to direct upstream actions with minimal loss when the downstream director has imperfect information about upstream costs. In the current article, the choice of coordination mechanisms is made by the party who owns and control the processing stage, i.e. farmer in a cooperative and processor in an IOF.

4.3 Model

This section presents a non-cooperative game theoretic model regarding the relationship between governance structure and coordination. The decision making parties, the information structure, the choices, the sequence of decisions, and the payoffs will be specified. There are two parties: an upstream farmer and a downstream processor. The farmer is representative of all farmers together.

The information structure specifies the uncertainty regarding MR and MC. Ex ante the information regarding the optimal decision is hardly exactly available even to the persons involved. However, one party may have more information at its disposal than the other party due to its position in the production process. We assume that the incompleteness of information resides with the farmer in a cooperative (processor in an IOF), i.e. the cooperative farmer (IOF processor) is unsure about the precise specification of the MR (MC) function. Particularly, an IOF processor may lack certain information regarding the marginal costs of its upstream supplier while a cooperative processor may incorrectly estimate the benefits of processing (Fleherty 1981).[12]

There are four choices to be made. First, in order to determine the impact of governance structure on the incentive to produce, two governance structures are distinguished: a cooperative and an IOF. The identity of the party making the choice of coordination mechanism in the second stage of the game depends on the choice of governance structure. The farmer chooses the coordination device in a cooperative, while the processor determines this choice in an IOF. Second, in order to establish coordination between the upstream farmer and the processor, either the price or the quantity instrument may be adopted. That is, the cooperative can either specify an amount to be delivered or a price to its member farmer, while the IOF can either have a contract with the farmer fixing the quantity to supply or guaranteeing a price. Third, the farmer (processor) in a cooperative (an IOF) has to decide how much to produce (process) based on his information regarding MC (MR) and the guess of MR (MC). Finally, the actual level of

[12] Posing the problem this way implicitly entails assuming that the cost of communication between the parties is high enough to warrant consideration of these coordination mechanisms.

MR and MC has to be determined. The artificial player Nature chooses the level of the marginal costs to be either Low (MC_L) or High (MC_H), each with probability .5, and the level of the marginal revenues to be either Bottom (MR_B) or Top (MR_T), each with probability .5.

The game consists of four stages. The choice of governance structure (cooperative or IOF) is made in the first stage. A coordination mechanism (price or quantity coordination) is then chosen by the farmer (the processor) in a cooperative (an IOF) in the second stage of the game. Subsequently the cooperative member make a guess regarding the MR of the processor, or the IOF processor makes a guess on the MC of the upstream farmer. In the fourth stage Nature determines the real MR and MC.

The payoff differences between a cooperative and an IOF are due to the two governance structures having different objective functions. A cooperative takes into account not only the downstream surplus but also the upstream surplus while an IOF processor is merely concerned with the downstream surplus. That is, a cooperative processor internalizes how its decisions affect the farmers, whereas an IOF processor does not. In order to delineate the implications of this distinction for the choice of coordination mechanism and the efficiency of a governance structure, we will specify the payoffs of the upstream farmer and the downstream processor.

Consider first a situation of a cooperative where the actual marginal revenue is MR_B and the farmer has a belief either MR_B or MR_T (figure 1). Notice that by definition a cooperative acquires the entire surplus generated in the transaction whereas the processor earns nothing. It entails that the payoff of the processor is always zero in a cooperative regardless of the choice of coordination mechanism and the belief of a farmer regarding the MR. If the farmer possesses an exact account of the MR, the upstream payoff is A+B regardless the choice of coordination mechanism. The price instrument will specify P_E, and an output level Q_E will be chosen. The quantity instrument will specify Q_E.

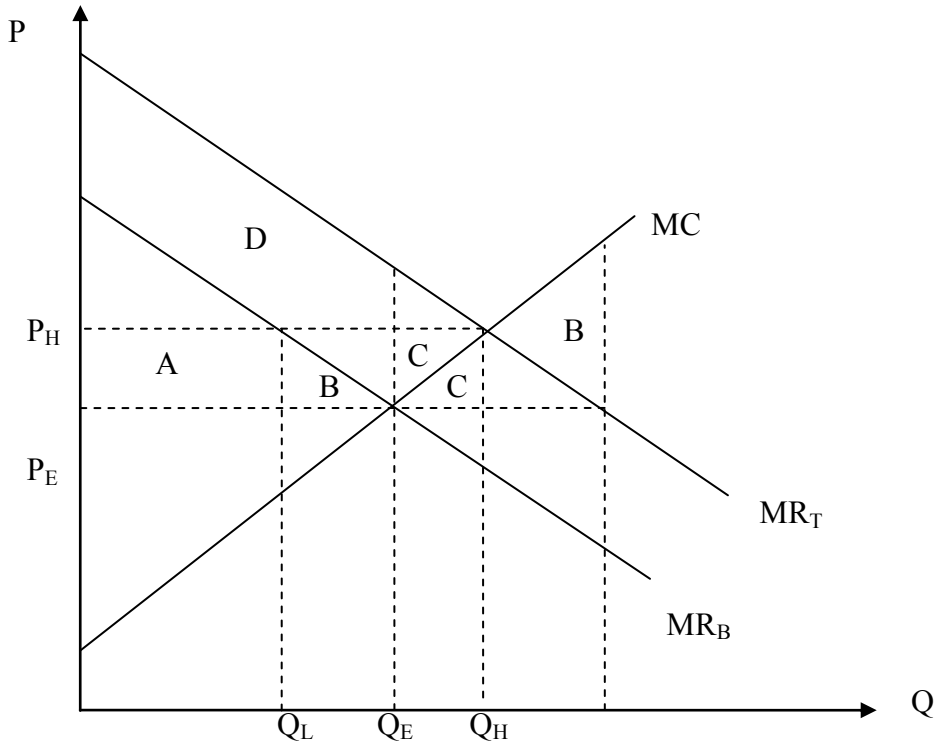

Figure 1: A cooperative

If the farmer overestimates the MR, then the size of the surplus depends on the choice of coordination mechanism. The price instrument determines a transfer price P_H. The processor faces therefore a MC equal to P_H and the intersection of P_H and MR_B determines that the processor procures an amount Q_L. The surplus is therefore A when the price mechanism is adopted. Similarly, the quantity mechanism determines a quantity Q_H and the surplus is A+B-C. The payoffs when the actual MR is MR_T and the farmer has a belief either MR_B or MR_T can be calculated in the same manner. [13]

[13] We limit the presentation of the extensive form in figure 1 to reflect the uncertainty regarding MR when a cooperative prevails. The two levels of MC would only result in presenting figure 1 twice. One figure would have MC_L and the surfaces A_L, B_L, C_L and D_L, while the other figure would have MC_H and the surfaces A_H, B_H, C_H and D_H. This is the reason why MC, rather than MC_L and MC_H, is presented in figure 1.

Figure 2 depicts the extensive form when the governance structure cooperative is chosen in the first stage. The farmer chooses first the coordination mechanism and then his belief regarding MR. Subsequently, Nature determines the true level of MR. Finally, the first number presents the payoff of the farmer, while the number below is the payoff of the processor. The payoff of the processor is always 0 in a cooperative because the farmer receives the entire surplus. The surplus received by the farmer in the various circumstances is retrieved from figure 1.

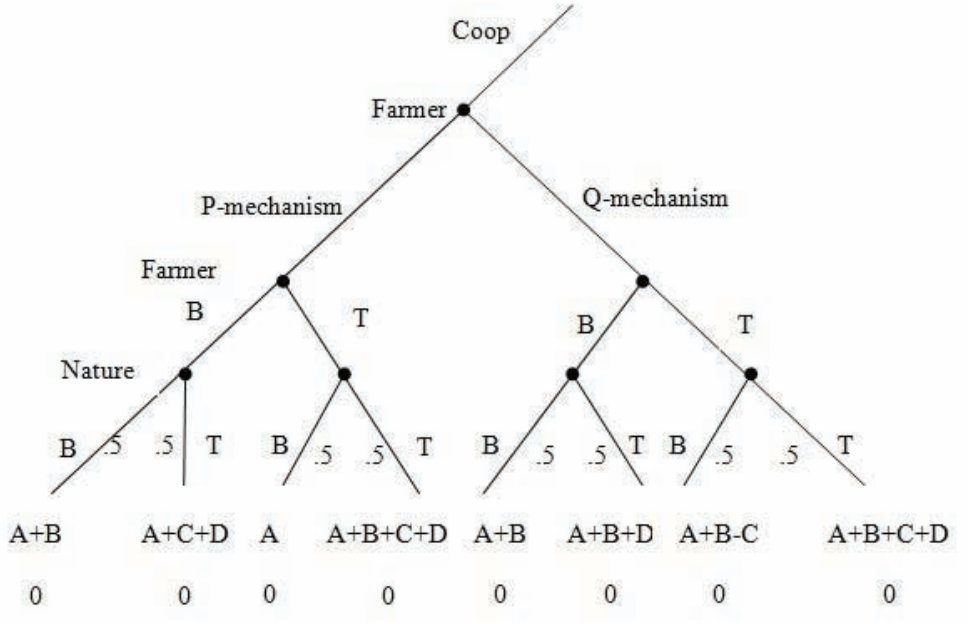

Figure 2: The extensive form of the game when the cooperative prevails

Consider next a situation of an IOF where the actual MC is MC_H and the IOF processor's belief is either MC_L or MC_H. If the belief is consistent with the real MC, then the payoffs of the farmer and the processor are C+D+E and A+B (figure 3), respectively, regardless the choice of coordination mechanism. The price mechanism would determine the transfer price P_E, while the quantity mechanism would determine the efficient quantity Q_E. If the processor underestimates the MC, then the payoff of the farmer and the processor depend on the choice of coordination mechanism. If the price instrument is chosen, then the MR received by the farmer is equal to P_L, i.e. the transfer price is determined by the intersection of the MR facing the

processor and MC_L. An output level Q_L will be chosen. Thus the payoff of the farmer is E, while the payoff of the processor is A+C. Similarly, if the quantity instrument is chosen, then the intersection of the MR and MC_L determines that an output Q_H has to be delivered. The farmer earns E-D-2F-G, while the processor receives a payoff A+B+C+2D+F. The payoffs of both parties can be calculated in the same way when the actual marginal cost is MC_L and the IOF processor's belief is either MC_L or MC_H.

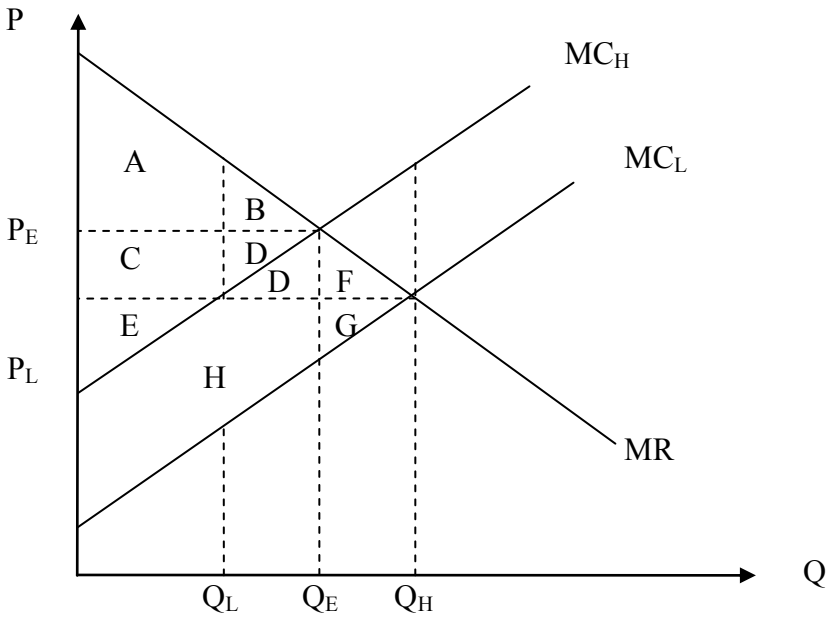

Figure 3: An IOF

Figure 4 depicts the extensive form when the governance structure IOF is chosen in the first stage. The processor chooses first the coordination mechanism and then his belief regarding MC. Subsequently, Nature reveals the true level of MC. Finally, the first number presents the payoff of the farmer, while the number below is the payoff of the processor. The payoffs in the various circumstances are retrieved from figure 3.

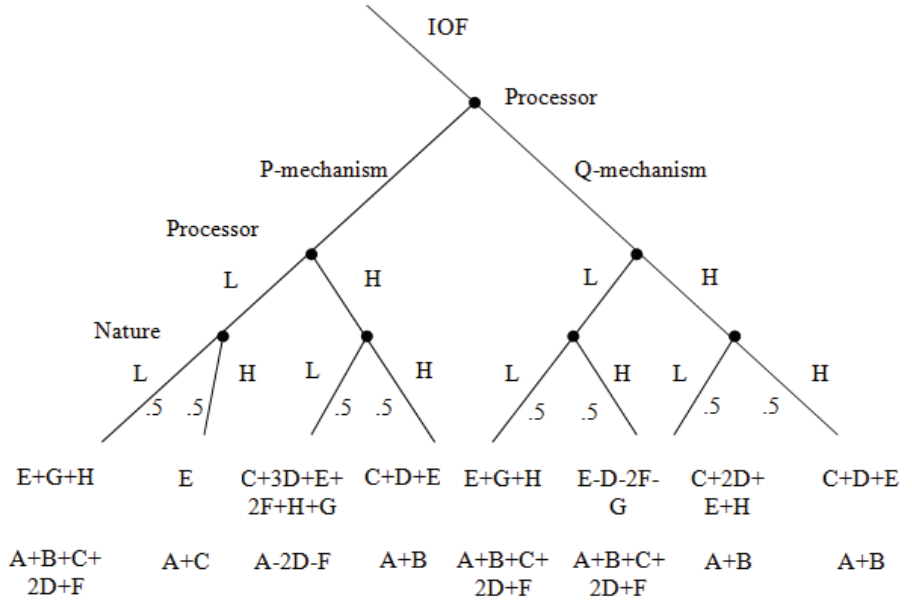

Figure 4: The extensive form of the game when the IOF prevails

4.4 Equilibrium

A cooperative takes into account not only the downstream surplus but also the upstream surplus, while an IOF processor is merely concerned with the downstream surplus. That is, a cooperative internalizes externalities, whereas an IOF does not. This entails that different coordination mechanisms may be employed in the two governance structures. This claim will be made specific by determining the subgame perfect equilibrium of the model with the method of backward induction. The choice of coordination mechanism in the second stage of the game is therefore addressed first, given the choice of governance structure. Subsequently, the choice of governance structure is addressed, anticipating the equilibrium choice of coordination mechanism in the next stage of the game.

The choice of coordination mechanism in a cooperative is entirely guided by the size of the total surplus. We have therefore

Proposition 1: The choice of coordination mechanism in a cooperative is efficient.

This proposition is consistent with the findings of Flaherty (1981) that if the relation between upstream unit and downstream unit is expected to endure for a long time and if it is expected to require much renegotiation at each point in time because a lot of uncertainties are involved, then financial integration may generate more joint profits.

For a cooperative, the expected payoffs of making a guess of B or T are identical, given the choice of coordination mechanism. The expected payoff associated with a guess is (2A+B+C+D)/2 when the price mechanism is chosen, while it is (2A+2B+D)/2 when the quantity mechanism is adopted. Both coordination mechanisms generate the same surplus when the guess turns out to be right, but the surplus differs when the guess is wrong. The surplus B is the deadweight loss when the price mechanism is used and the surplus C when the quantity mechanism is used. We have therefore that the total surplus generated by a cooperative with the price instrument is higher (lower) than the total surplus generated by a cooperative with the quantity instrument when C>B (C<B). It can be shown (Weitzman 1974; Milgrom & Roberts 1992) that C>B (C<B) corresponds with the slope of the MR being more (less) steep than the slope of the MC. Denote the slope of the MR as S^{MR} and the slope of the MC as S^{MC}. This result is summarized in proposition 2.

Proposition 2: A cooperative will choose the price (quantity) mechanism when $S^{MR} > S^{MC}$ *(*$S^{MR} < S^{MC}$*).*

The above result indicates that a market mechanism like the price can be efficiently used in addition to hierarchy within a single firm, i.e. even though property rights over assets are not assigned to difference actors. There are situations in which either price or quantity control must be used to minimize losses in net joint profits.

It is obvious that the choice of coordination mechanism in an IOF is not always efficient because it is based only on the payoff of the processor rather than total surplus. For example, payoff G (figure 4) is never taken into account by the processor. However, payoff G matters in the total surplus generated by the IOF when the price mechanism is in place, whereas it does not (on average) when the quantity mechanism is used. The extensive form in figure 4 reveals immediately that the quantity instrument performs better from the processor's point of view. The processor will

receive the same payoffs when the guess turns out to be right, but her payoff will be strictly lower with the price instrument when the guess turns out to be wrong because a larger share of the surplus goes to the upstream farmer. Quantity is thus the preferred planning instrument for an IOF.[14] This result is formulated in proposition 3.

Proposition 3: An IOF will choose the quantity mechanism.

Figure 5 visualizes the main insight of propositions 2 and 3. The choice of coordination mechanism by each governance structure is presented in terms of the slope of the MR (S^{MR}) and the slope of the MC (S^{MC}), where j^i represents the choice of coordination mechanism j (Q or P) by governance structure i (C for cooperative or F for IOF).

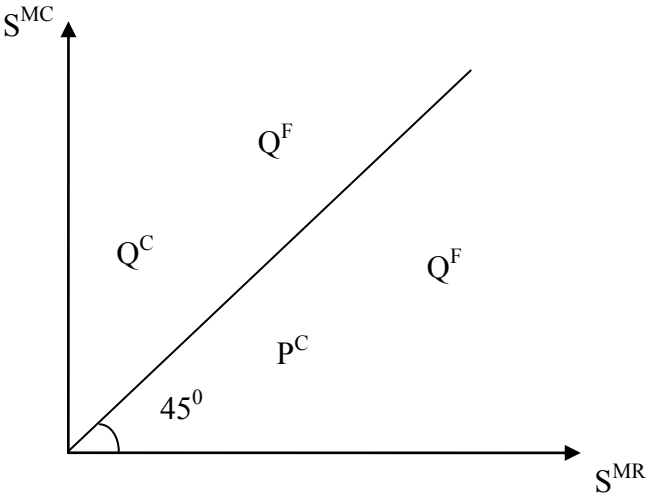

Figure 5: Choice of coordination mechanism

[14] The quantity mechanism is chosen by the processor because when the estimates are wrong, the total surplus does not change with the coordination mechanisms but a larger share of the total surplus goes to her. If the upstream party cares only about upstream surplus and is the decision maker, then the price mechanism will be chosen.

An IOF chooses a coordination mechanism based on the downstream surplus it acquires. Therefore the choice is not necessarily optimal in terms of total surplus. Yet an efficient coordination mechanism can be chosen if both the downstream surplus and the total surplus generated with a certain mechanism are higher than those with the other mechanism. We know already from proposition 3 that the downstream surplus associated with quantity control is higher than that associated with price control. So we investigate next if and when the total surplus associated with quantity control exceeds that associated with price control. The total surplus of an upstream farmer and an IOF processor can be represented by the area of 2A+B+2C+2D+2E+F+G+H when the price control is applied and by the area of 2A+2B+2C+3D+2E+H when the quantity control is used. It can be shown that the quantity control is more attractive than the price control when $S^{MR} > S^{MC}$. This result is stated in proposition 4.

Proposition 4: The choice of coordination mechanism in an IOF is efficient when $S^{MR} > S^{MC}$.

Having determined the efficient coordination mechanism choice for each governance structure, we will identify next the efficient governance structure. It will depend on the choice of coordination mechanism and the importance of the lack of information regarding MR or MC. This argument is presented for the case where $S^{MR} < S^{MC}$ and the MC_H and MR_B are the true MC and MR curves (figure 6). Denote the vertical distance between the actual and estimated MC as ΔC and the vertical distance between the actual and estimated MR as ΔR. Notice that (line segment DE implies that) ΔC is taken to be equal to ΔR in figure 6.

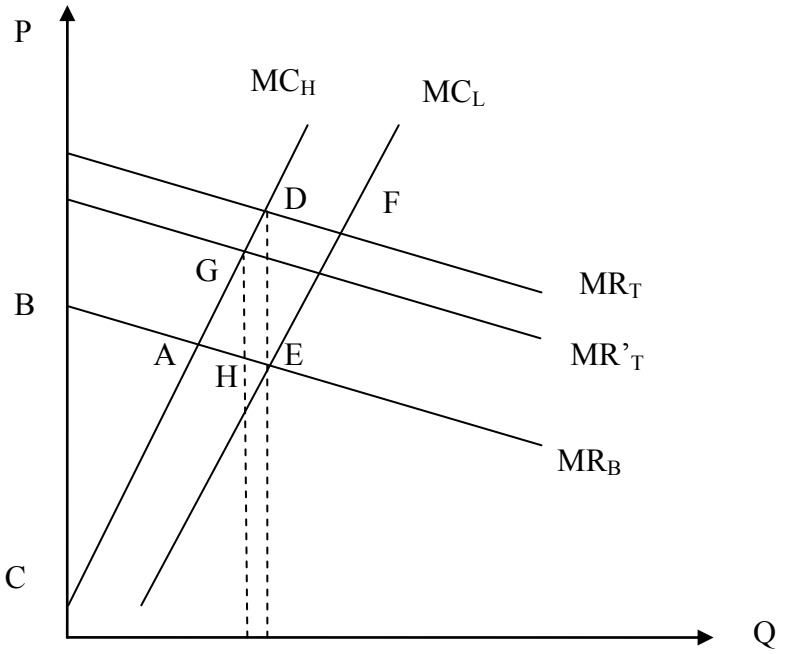

Figure 6: An illustration of total surplus generated in two governance structures

According to proposition 2, a cooperative will choose the quantity mechanism when $S^{MR} < S^{MC}$, and the total surplus can be represented by the area of ABC-ADE. According to proposition 3, an IOF will always choose the quantity control and the total surplus can also be represented by the area of ABC-ADE. That is, a cooperative and an IOF are equally efficient when $\Delta C = \Delta R$.

Suppose that the cooperative's information about the MR becomes more accurate, i.e. $\Delta R < \Delta C$. It is represented in figure 6 by a downward shift of the estimate MR curve to MR'_T. The total surplus increases to ABC-AGH, making a cooperative uniquely efficient. Likewise, an IOF will become uniquely efficient if its information about the MC becomes more accurate, i.e. $\Delta R > \Delta C$. It can be shown in a similar manner that when $S^{MR} > S^{MC}$, a cooperative is uniquely efficient if $\Delta R < (S^{MR} / S^{MC}) * \Delta C$ and an IOF is

uniquely efficient if $\Delta R > (S^{MR} / S^{MC}) * \Delta C$[15]. This result is summarized in proposition 5.

Proposition 5: When $S^{MR} < S^{MC}$, a cooperative (an IOF) is uniquely efficient if $\Delta R < \Delta C$ ($\Delta R > \Delta C$); when $S^{MR} > S^{MC}$, a cooperative is uniquely efficient if $\Delta R < (S^{MR} / S^{MC}) * \Delta C$ and an IOF is uniquely efficient if $\Delta R > (S^{MR} / S^{MC}) * \Delta C$.

We have shown earlier that the choice of coordination mechanism in a cooperative is efficient (proposition 1), whereas it is not always in an IOF. However, a loss of surplus is always associated with each coordination mechanism. This is inevitable due to the lack of information. The cooperative lacks information regarding MR, whereas the IOF lacks information regarding the MC. An IOF may therefore be an efficient governance structure when its estimate of MC is more accurate compared to a cooperative's estimate of MR, despite its choice of coordination mechanism being inefficient. The efficient governance structure choice is visualized in figures 7.[16]

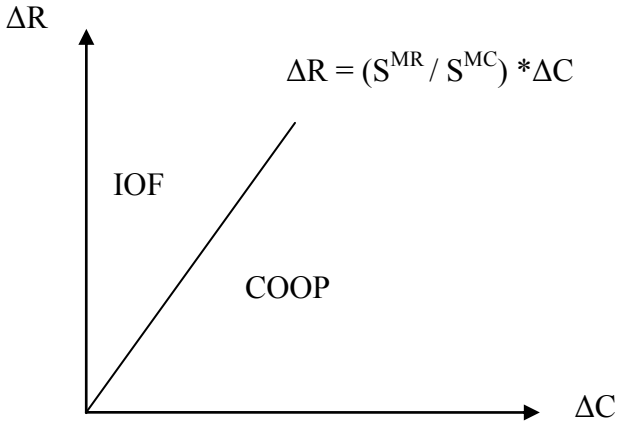

Figure 7: Efficient governance structure

[15] The ratio of the two slopes shows up only when $S^{MR} > S^{MC}$ due to the fact that a cooperative and an IOF use different coordination mechanism while they both use quantity control when $S^{MR} < S^{MC}$.

[16] This is in line with the argument of Alchian (1950) that efficient behaviors survive, while inefficient behavior does not. To be more specific, the governance structure generating the highest total surplus is adopted in the first stage of the game, like in Grossman and Hart (1986) and Hart and Moore (1990).

Notice that there will always be coordination based on the quantity mechanism when the swings in MR are relatively large compared to the swings in MC. In the special case where the farmers in a cooperative have perfect information regarding the marginal revenue as well as marginal, i.e. $\Delta R=0$, the choice of coordination mechanism is irrelevant because both mechanism will lead to the same optimal result.

4.5 Upstream focus by the cooperative

It is difficult to refrain from noticing that although cooperative members have both upstream and downstream interests, they seem to be more concerned with the value added to their individual farm enterprises. "The income that a stockholder derives from an IOF depends on the firm's 'bottom line', but the income of a cooperative's stockholder often depends more on the prices of the individual goods and services purchased from the cooperative than on the organization's overall profitability" (Staatz 1987). There are various possible explanations for the dominance of user value in the perception of members. On the one hand, the limitation on dividend payments and the members' inability to capture capital gains in a cooperative may account for member's preference to direct benefits in the form of transfer prices (Staatz 1987). On the other hand, the frequency of transactions may play a role. Cooperative members are users on an almost daily basis, while owner-investors are only several times a year (tax day, equity redemption day, dividend day). This frequent-use interface relative to the investor interface reinforces a constant message that price and quality of the cooperative's services and goods affect the members' bottom line, which is more important (in the short run and for the individual member) than the bottom line of the cooperative (Cook 1994). For these purposes, each farmer may free ride on the common cooperative enterprise and take merely the individual producer surplus into account.

The analysis of a cooperative with upstream focus proceeds in a similar way as the analysis in the previous section. Figure 8 presents several additional areas compared to figure 1 because upstream and downstream surplus have to be distinguished in order to account for the upstream focus by the cooperative.

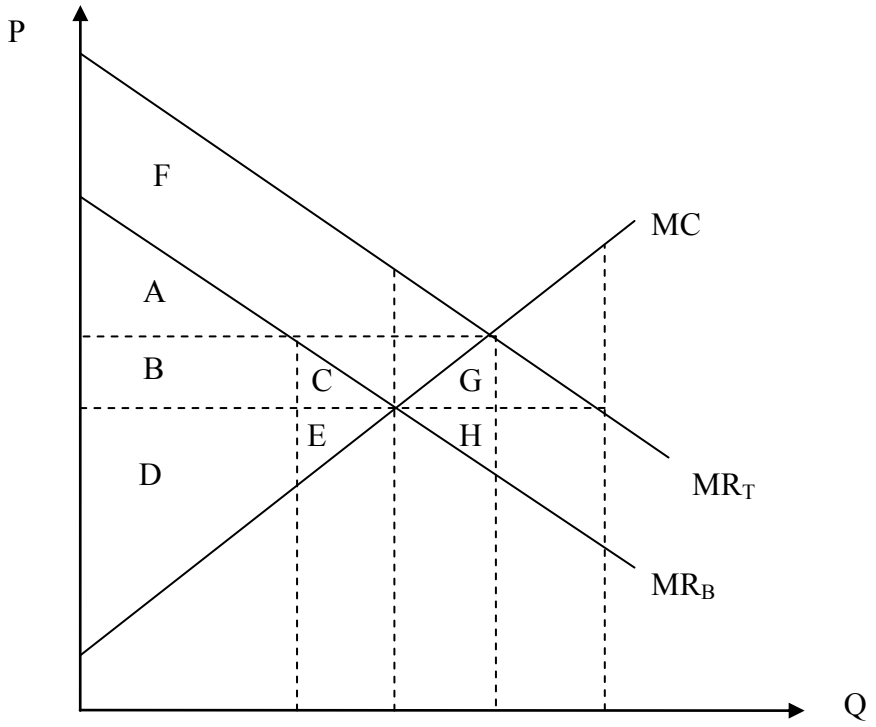

Figure 8: A cooperative with upstream focus

The extensive form of the game when the cooperative with an upstream focus prevails (figure 9) is different from figure 2 in terms of the payoffs of the upstream and downstream parties. Figure 8 defines the areas that correspond to the payoffs in figure 9.

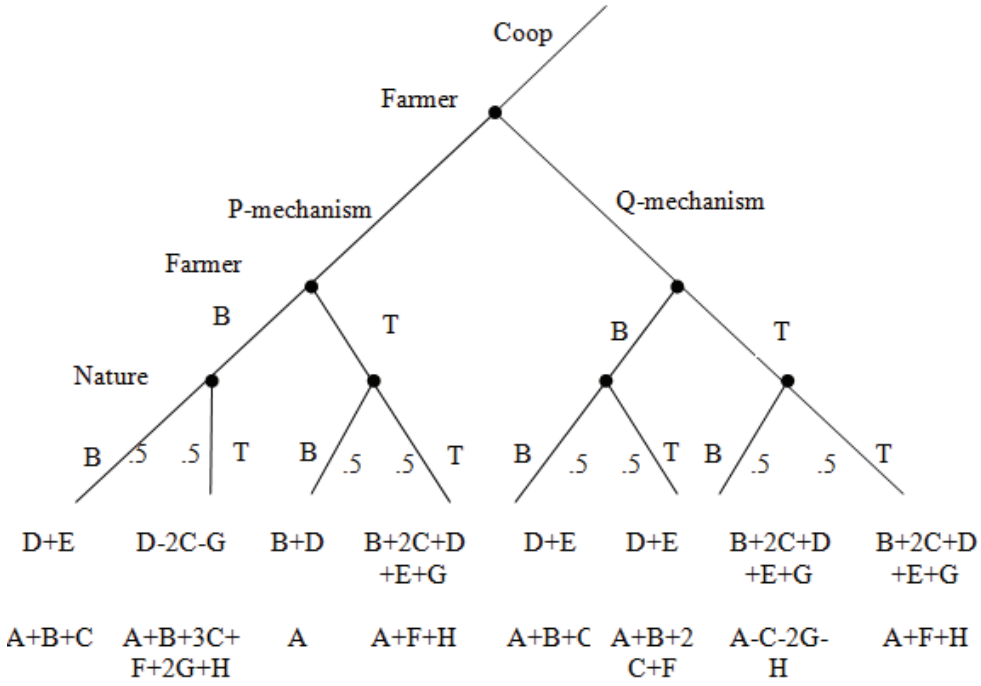

Figure 9: Extensive form when the cooperative with upstream focus prevails

The extensive form in figure 9 reveals immediately that the upstream focused farmer prefers always the quantity instrument to the price instrument. The processor will receive the same payoffs when the guess turns out to be right, but her payoff will be strictly lower with the price instrument when the guess turns out to be wrong because a larger share of the surplus goes to the downstream processor. The cooperative will therefore adopt the same coordination mechanism as an IOF. This result is formulated in proposition 6.

Proposition 6: A cooperative with upstream focus will choose the quantity mechanism.

Another observation is that the payoffs associated with Top are larger than those associated with Bottom when the quantity instrument is used, which means that the production plan of the farmer will always be based on MR_T. If the estimate is correct, the cooperative will end up with an optimal

quantity of delivery. If the estimate is wrong, the quantity of delivery will be higher than the optimal one. That is, the delivery level of a cooperative with upstream focus will not be lower than the optimal level.

Proposition 7: A cooperative with upstream focus is likely to overproduce.

The result in the above proposition accords well with observations reported from most agricultural markets that cooperatives do have large volume of production and large market shares in the collection and primary processing of the raw produce (Nilsson 2001).

A cooperative with upstream focus chooses a coordination mechanism based only on the upstream surplus. Therefore the choice is not always optimal in terms of total efficiency. Yet an efficient coordination mechanism can be chosen if both the upstream surplus and the total surplus generated with a certain coordination mechanism are higher than those with the alternative coordination mechanism. Proposition 6 indicates that the downstream surplus associated with quantity control is higher than that associated with price control. So we investigate next if and when the total surplus associated with quantity control exceeds that associate with price control. The total surplus of the cooperative can be represented by the area of 2A+2B+2C+2D+E+F+G+H when the price control is employed and by the area of 2A+2B+3C+2D+2E+F when the quantity control is used. It can be shown that the former is smaller than the latter when $S^{MC} > S^{MR}$, i.e., quantity control is efficient when the MC curve is steeper than the MR curve.

Proposition 8: The choice of coordination mechanism in a cooperative with upstream focus is efficient when $S^{MC} > S^{MR}$.

Proposition 6 indicates that a cooperative with upstream focus will choose the same coordination mechanism as an IOF. It can be easily shown with figure 6 that when the estimates on MR and MC are inaccurate to the same extent, the total surplus generated by a cooperative with upstream focus equals that generated by an IOF. Therefore the efficient governance structure is the one with more accurate estimate.

Proposition 9: A cooperative with upstream focus (an IOF) is uniquely efficient if $\Delta R < \Delta C$ ($\Delta R > \Delta C$).

The efficient organizational structure choice, depending on the relative accuracy of the estimates of MC and MR, is visualized in figures 10.

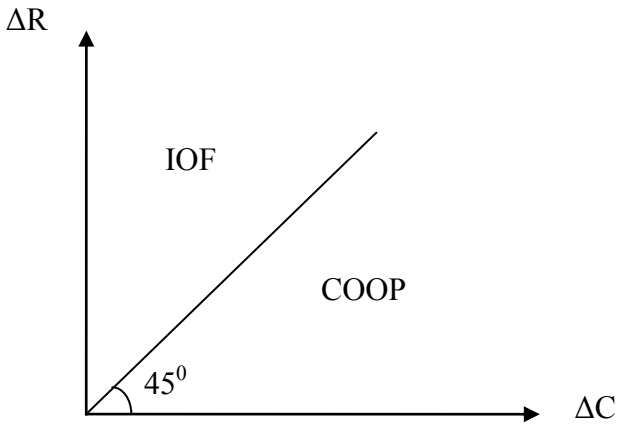

Figure 10: Efficient governance structure

4.6 Conclusions

The coordination mechanism choice in a cooperative and an IOF and the efficiency of the two governance structures is analyzed. Due to the "owner as user" characteristic, a cooperative internalizes the vertical externalities between upstream producers and the downstream processor, maximizing their joint profits, and will adopt therefore the efficient coordination mechanism. This contrasts with IOFs, where the coordination mode linking the upstream and downstream units is not always efficient. The slope of the MC and MR determines whether the price or quantity control is adopted. Each governance structure can be uniquely efficient, which depends on the importance of lacking information upstream or downstream.

It is undoubtedly worthwhile to test the propositions. Even though a general prediction on governance structure or coordination mechanism requires examining all the activities performed by the constituent units and all the relevant conditions, we expect that a good prediction may be made by studying only the most important attributes. However, we leave careful testing for later, we proceed to list some extensions to the theory required to make it more useful and closer to the real practices.

There are various possibilities for future research regarding the relationship between coordination and governance structure. We indicate two possibilities. First, a simplifying assumption of our model is that there are physical communication constraints between the producers and the processors, which limits information transmission between the party that is best informed and the party with a natural disadvantage. An obvious way to enrich the model is to incorporate the informational flow. The cooperative members may be more willing to provide higher quality, more frequent, and more truthful information to the cooperative than they would to an IOF (Cook, 1994), rendering better vertical information transmission in a cooperative than in an IOF. This suggests an additional advantage of coordination by cooperatives. One can go even further to examine the conditions under which the costly communication is worthwhile.

Second, a cooperative is characterized by a processor (or wholesaler, or retailer) being owned by an upstream party (vertical relationship), where the upstream party consists of an association of many independent growers (horizontal relationship). This article has addressed coordination issues regarding the vertical relationship. Hart and Holmstrom (2010) address issues regarding governance and coordination between units that have a lateral relationship. Future efforts might be fruitfully devoted to investigating how the vertical alignment interacts with the horizontal coordination between the members.

Chapter 5
Cognition and Governance Structure

The firm is a focusing device.

Nooteboom (2006)

5.1 Introduction

Nowadays, the modern business world witnesses an increasing awareness of people's, and therefore firms', inability to handle complex situations effectively and costlessly. To survive and become successful, managers must ensure that effective knowledge is being created and assembled in a meaningful manner. Information regarding their own operation and the environment in which they are running their business has to be forthcoming and well interpreted. One critical role of decision makers of a firm is to 'make inferences about the environment in which they operate, an activity dependent on their ability to analyze the situation' (Rubinstein 1998, p4). They need to evaluate changing market conditions, contemplate competitive strategies, decide on new products, production technologies, new markets, and so forth.

Decision making in organizations is the result of both the limited cognitive capacity of humans and the structural influences of governance structures on an individual's attention (Simon 1947). First, since firms are run by managers, one cannot ignore the human factor and the unavoidable boundedness of the ability and rationality of human beings (Simon 1955). In analyzing the behavior of firms, the standard economic literature relies on the assumption of perfect rationality of agents, which assumes that there is no limit to the ability of people to calculate, to remember, to foresee, to distinguish, or to plan (Fershtman & Kalai 1993). Decision making requires judgment and knowledge of the specifics of complex situations. However, the amount of attention, knowledge and computational capacity that any central decision maker has is limited. Second, Hammond (1994, p101) raises the question of "Why structure matters?" A governance structure is a distinct constellation of income rights and control rights, and it channels and structures information. Hammond's answer is addressing the latter part by stating that "a firm's structure can be expected to shape, constrain, and otherwise influence the development and content of the firm's strategy" (p99). As Nooteboom (2006) puts it, the firm is a focusing device. Governance structures differ in the way they process information, i.e. a

governance structure is not neutral in the processing of information (Hammond & Thomas 1989). Errors are typically systematic (Conlisk 1996), i.e. each governance structure creates its own biases in decision making. One of the roles of a governance structure is to limit the harmful consequences of bounded cognition at the individual level.

Decision-making requires information and information has to be acquired, processed and categorized to form a meaningful partition (Fulton & Gibbings 2006). We use information partition to capture the way people sort information. An unboundedly rational agent is able to partition different types of signals into distinct categories, while an agent with limited cognitive ability can distinguish only part of the information and the remaining part therefore has to be grouped into one category. The different foci of firms and agents entail different knowledge sets. The primary purpose of this article is to examine how governance structures differ in their organization of the cognition of boundedly rational agents, and identify the efficient governance structure. We aim to answer the following questions in this article: 1) How do different governance structures differ in their allocation of attention? 2) What determines the efficient governance structure? These questions are addressed in a proposal selection project implementation setting. Agents confronted with all kinds of business ideas and opportunities are not rational enough to identify and correctly implement all of them. Their limited cognitive ability and the governance structure of the firm shape their knowledge, which in turn determine their expected benefit and loss. The agents make decisions on proposal selection based these expected benefit and loss.

The article is organized as follows. The next section reviews previous research on bounded cognition and governance structures. The governance structures are distinguished from a bounded cognition perspective in section 3. Section 4 identifies the bias of each governance structure and the efficient governance structure. Section 5 concludes.

5.2 Literature

Since Coase (1937), the concept of transaction costs has been used to explain the nature and limits of the firm. Transaction cost theory, in general, maintains that firms are established to avoid some of the transaction costs in the market. A company grows when the external transaction costs are high relative to the internal transaction costs. If the external transaction

costs are lower than the internal transaction costs the company will be downsized by for instance outsourcing. The ideas of Coase (1937) have been developed by many scholars, notably Williamson (1985), Grossman & Hart (1986) and Hart (2008). The central theme is that the rules by which institutions are governed affect the investment level in transaction specific assets and alternative ownership structures. The concern is how ex post opportunism, due to incomplete contracts, affects the investment level, and how reallocation of the ownership of the assets alleviates suboptimal investment. Williamson (1986, p110) traces transaction costs to agents' limited cognitive abilities: 'Economizing on transaction costs essentially reduces to economizing on bounded rationality…'.

Transaction costs economics has stressed the role of governance structure in alleviating the ex ante as well as ex post problems. The problems associated with asset specificity are driving the analysis. However, many problems are so complex that only a limited number of choices can be anticipated ex ante. As a consequence, complexity rather than asset specificity may guide the choice of governance structure (Hendrikse 2003). This raises the cognitive issues of decision making. Examples are the price system economizing on attention (Hayek 1945), the competence-difficulty gap (Heiner 1983), organizational design to protect against the mistakes of fallible decision maker (Sah & Stiglitz 1986, Sobel 1992), the coordination of activities within the firm (Milgrom & Roberts 1988), making inferences about the market environment (Rubinstein 1998), outsourcing (Tadelis 2002), the impact of the manager's attention (Gifford 2004), information partitions (Cremer et al. 2007), the spinning off of business lines to concentrate on the core business and to strengthen the abilities to compete (Fershtman & Kalai 1993), and so on.

Bounded rationality results in a theory of firm boundaries (Cremer et al. 2007). Nooteboom (2006) introduces the notion of a firm as a focusing device and explains the scope and boundaries of the firm. The need to achieve a focus in a firm however entails "a risk of myopia: relevant threats and opportunities to the firm are not perceived" (p158) and a bias specific to this type of firm. Limited attention is at the core of the analysis of hierarchies in Bolton & Dewatripont (1995) and Aghion & Tirole (1995). It captures the fact that 'deliberation about an economic decision is a costly activity' (Conlisk 1996, p669). The delegation of decision making authority within an integrated organization is studied. Both models assume that the

opportunity cost of attention is exogenous and the size of the firm is fixed. Gifford (2004) presents a cognitive explanation of the decision by a firm to make an input within the firm rather than to out-source the production to another firm. A tradeoff between adopting new behaviors and adapting current behaviors is specified. Ortoleva (2008) defines the notion of thinking aversion, much in line with the definitions of risk or ambiguity aversion. It is the sum of the cost to find the optimal choice in a set and the cost to find out which is the optimal choice. "…the concept of 'cost of thinking' is connected to the broad notion of bounded rationality, understood as the presence of some form of constraints to the ability of the agent to process information: the cost of thinking could be seen as a way to represent such computational constraints" (p4). Decision making is thus characterized by a tradeoff. On the one hand, the agent prefers larger sets due to having more options to choose from. On the other hand, smaller sets since avoid the disutility associated with having to think about what to choose.

Read et al (1999) introduce the concept of "choice bracketing", a term that designates the grouping of individual choices into sets. They distinguish narrow bracketing "with an eye to the local consequences of one or a few choices" and broad bracketing "with an eye to the global consequences of many choices" (p172). Cognitive limitations in perception, attention, memory, and analytical processing, are argued to be "one important determinant of bracketing" (p187). Fryer & Jackson (2008) provide a link between categorization and social decision making. They build a model of how experiences are sorted into categories and how categorization affects decision making. They show that types of experiences and objects that are less frequent in the population tend to be more coarsely categorized and lumped together. As a result, decision makers make less accurate predictions when encountering such objects.

Sah & Stiglitz (1986) make an important contribution relating people's judgmental errors with the efficiency of various organizational forms. They distinguish different organizational forms with regard to how the agents are organized together and how the decision making authority is distributed in a system. The current article examines also the influence of the omission errors and commission errors on the relative performance of governance structures. We differ from Sah & Stiglitz (1986) by making the omission errors and the commission errors of an agent dependent on the governance

structure because the model characterizes each governance structure with a distinct information partition. Instead of having either a good or bad project, the agents in our model face a variety of possible states regarding each task or project. They accept or reject proposals based on the expected benefit due to correctly identifying the state and the expected loss due to misidentifying the state. We believe that our proposal selection process captures better the structuring of information by a governance structure. There are rarely clearly right or wrong projects, but most of the initiatives have both potential benefits and potential loss. The matter is how governance structure shapes the ability of the agents to identify various ideas and possibilities.

There are several ways to position our article in the literature. First, the behavioral assumptions opportunism and bounded rationality are often used in the analysis of governance structure. Most contributions start with opportunism, like transaction costs economics, while this article highlights the assumption of bounded cognition. It is in line with the behavioral approach following Simon (1955). People are not perfectly rational. When confronted with a situation they have available to them only a limited set of strategies or actions, and will only consider a small number of them. The reason for this could be many, but is likely due in part to a lack of awareness about the actions' availability. We attempt to merge standard modeling ingredients like optimization and efficiency with bounded rational ingredients like partition and cognition. Second, there are various ways of modeling a firm, like a production function (Debreu, 1959), a contract (Jensen and Meckling, 1976), or a set of assets (Grossman & Hart 1986, Hart 2008). This article views the firm as a partition. We characterize various governance structures in terms of information partitions and analyze the bias of governance structures in a bounded rationality framework. Third, a recent development in the theory of the firm is the cognitive theory of the firm (Nooteboom 2006). It claims that different people possess different information to the extent that they have developed in different social and physical surroundings and have not interacted with each other. As a result, they see the world differently. The firm provides both a cognitive framework for interpreting data and intellectual habits or routines for transforming information into useful knowledge. Firms may also differ in their abilities to assemble and classify information and consequently to create knowledge, because of the manner in which they are structured (Fulton & Gibbings 2006). The governance structure encasing

the firm "focuses its attention, creates its unique view of the environment, limits its search and investigation" (Burton & Kuhn 1979, p4). On the basis of different experiences, with different technologies and different markets, different contexts in which they have developed, and different organizational histories, different firms perceive, interpret, understand and categorize phenomena differently, creating different information in the supply chain. Our model evaluates how governance structures vary in the focus they provide.

5.3 Governance structures from a bounded cognition perspective

We distinguish various governance structures in terms of partitions (section 5.3.1) and probabilities (section 5.3.2).

5.3.1 Partitions

Start with two agents, an upstream dairy farmer (F) and a downstream milk processor (P). Farmers' production portfolio typically consists of more than just one product. We capture this by assuming that the upstream farmer has two production activities. (S)he produces potato in addition to milk which subsequently is handled by the processor. The processor has also two activities, milk processing and development of other dairy products like cheese, yogurt or ice cream. Both agents are confronted with a stream of heterogeneous opportunities associated with these four distinct activities. Examples of these business ideas and opportunities are product and process innovation, R&D, divestiture, marketing promotion, actions to cope with the competitors' threats, the inter-functional coordination, and collaboration with other peers, and the like. The complex and time-consuming task of dealing with these ideas involves both decision on accepting or rejecting a proposal and then implementing the adopted project in a productive way. There is, in effect, uncertainty about the environment and the opportunity itself, which entails that the agents' perception of the environment is inevitably partial and fragmentary and his knowledge about how to implement a project is consequently incomplete. For simplicity, denote a project associated with the upstream milk production as U_1, that associated with the potato production as U_2, that associated with the downstream milk processing as D_1, and finally those associated with the development of other dairy products as D_2. The project set to be identified is therefore $\{U_1, U_2, D_1, D_2\}$.

The ability to correctly identify and implement a project is clearly one of the key ingredients of successful management. If the agents are unbounded rational, they would have an adequate understanding of the situation and be aware whether the state of the environment requires U_1, U_2, D_1 or D_2 and carry out the project accordingly. The reality is often different and complicated. It is difficult to anticipate or consider all alternatives and all information. A decision maker may deal with complexity by storing past experiences in a finite set of categories. This finiteness of the set of categories reflects the central idea of bounded cognition that the number of categories used by the decision maker is small relative to the complexity of the environment (Heiner 1983). It follows that the decision maker's ability to have one category for each kind of problem is inhibited. So (s)he is forced to group heterogeneous events in the same category. In agricultural production, there are considerable uncertainties due to, among other things, varying weather conditions and uncertain market developments. The quantity of the produce is often not completely known to the processor. Only the farmer knows exactly whether the potato yield this year is higher, lower, or the same as last year. And the prices of the produce are often difficult to assess by the farmer. A farmer is usually not in a good position to tell the trends of price fluctuation. In other words, there is information asymmetry of various kinds (Nilsson 2001, p332). Alternatively, grouping heterogeneous events into one category can be interpreted as limited understanding. Each agent with a limited number of cognitive units may have detailed knowledge of some specific situations, which makes it easy to identify some states but not others. For example, a farmer is usually apt to be singularly minded with respect to some particular commodities and a geographical area (Clodius 1957). It is likely that the farmer knows when an action relating to the production stage is necessary as he is knowledgeable about his own business U_1 and U_2, but it may be costly for him to distinguish D_1 and D_2, which are sorted more coarsely into one category. The partition reflecting such a farmer is denoted as $\{(U_1),(U_2),(D_1,D_2)\}$.[17]

[17] To keep it simple, we assume that each type of project can be assigned to just one subset, although we realize that in the real world there might be projects associated with a combination of various activities and this assumption is with some loss of generality.

A governance structure systematically affects what information is made available to the agents (Hammond 1994). Here we distinguish four governance structures, namely, Market (M), Cooperative (C), Forward Integration (FI), and Backward Integration (BI). The influence of governance structure on the agents' partition of information is so pervasive that both agents have a distinct partition in different governance structure. The precise partitions can be specified in a few ways, but the crucial aspect is the direction of the differences between governance structures. By Market we mean that two agents are independent. We assume that they both can distinguish the problems associated with their own activities. A Cooperative is set up when a group of farmers collectively own the processor. To simplify we treat the group of farmers as one agent. With the farmer's acquisition of the downstream control, the processor becomes an employee of the farmer, which reduces the processor's attention on the downstream activities. (S)he will thus concentrate only on D_1 given the farmer's particular interest in milk processing. The farmer as the owner of the cooperative has to gain knowledge on the downstream stage of production and therefore make partitions with regard to both the upstream and downstream activities. By Forward Integration we mean that the farmer's activities are expanded to include control of the processing of his/her products. In other words, the dairy processor is owned by the farmer. What distinguish FI from C is that the owner of the chain does not necessarily focus more attention on one of the products, like milk for the dairy cooperative. The two upstream activities are thus equally important, and so are the two downstream activities. The processor in FI is an employee of the farmer, and is less attentive regarding the downstream activities than (s)he would be in the Market, i.e. D_1 and D_2 are grouped in one subset. Backward Integration is similar with FI. The difference is that the processor acquires the ownership of the farm. The partition of each agent in the four governance structures is shown in table 1.

	M	C	FI	BI
Farmer	$\{(U_1),(U_2),(D_1,D_2)$	$\{(U_1),(U_2),(D_1),(D_2$	$\{(U_1),(U_2),(D_1),(D_2$	$\{(U_1,U_2),(D_1,D_2)\}$
Processor	$\{(D_1),(D_2),(U_1,U_2)$	$\{(D_1),(D_2,U_1,U_2)\}$	$\{(D_1,D_2),(U_1,U_2)\}$	$\{(D_1),(D_2),(U_1),(U_2)$

Table 1: The partition of each agent in each governance structure

5.3.2 Probabilities

Partitions are associated with the probabilities that the agents in various governance structures correctly or incorrectly identify a state. Assume the probabilities associated with the four states are $p(U_1)=p(U_2)=\frac{1}{2}p$, $p(D_1)=p(D_2)=\frac{1}{2}(1-p)$ with $0<p<1$.

Before implementing any project, an agent has to decide which of the following four projects $\{U_1,U_2,D_1,D_2\}$ is needed. Each agent can correctly select some of the states without uncertainty due to the fact that they are perfect knowledgeable about these states. For examples, the farmer in the Market can identify U_1 and U_2 whereas the processor indentifies D_1 and D_2. With regard to other states, the agents may assign a certain probability of selecting each one of them, depending on the probability that each state actually occurs. Figure 1 represents in the extensive form the bounded cognition of the processor in Cooperative. Nature presents itself to the processor in two information sets. The first information set consists of one node. It reflects that the processor observes the choice D_1 by Nature. The solution of the problem, or the implementation of the project, will be tailored entirely to state D_1. The second information set consists of three nodes. It reflects that either U_1, U_2 or D_2 has to be in place, but that the actual state is not known to the processor with certainty. (S)he has to choose U_1, U_2 or D_2 without knowing what the actual state is. Bounded cognition entails that $p(U_1|D_2)=p(U_1|U_1)=p(U_1|U_2)$, $p(U_2|D_2)=p(U_2|U_1)=p(U_2|U_2)$ and $p(D_2|D_2)=p(D_2|U_1)=p(D_2|U_2)$.

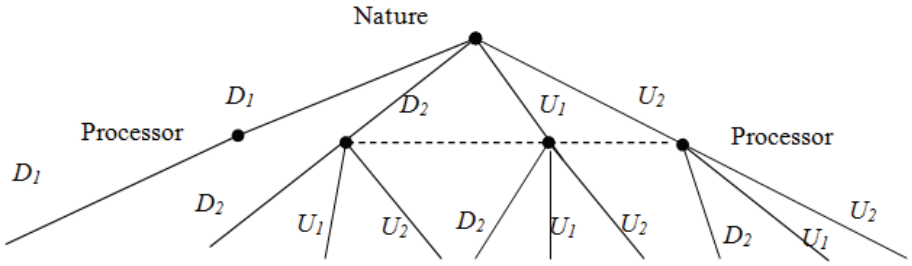

Figure 1: Bounded cognition of the processor in Cooperative

To generalize, we define $\Gamma(k)$ as the probability matrix of agent k in governance structure Γ, where $\Gamma_{ij}(k)$ is the probability that state j is selected by agent k in governance structure Γ when the actual state is i. Table 2

shows C(F). The farmer in the Cooperative is able to identify all the states, i.e. $C_{U_1U_1}(F) = C_{U_2U_2}(F) = C_{D_1D_1}(F) = C_{D_2D_2}(F) = 1$. The diagonal cells are filled with the probabilities that the right states are chosen while the off-diagonal elements reflect choosing the wrong state.

Selected state / Actual state	U_1	U_2	D_1	D_2
U_1	1	0	0	0
U_2	0	1	0	0
D_1	0	0	1	0
D_2	0	0	0	1

Table 2: State probabilities of the farmer in the Cooperative

Similarly, table 3 presents C(P). The processor is able to identify perfectly the state D_1, i.e. $C_{D_1D_1}(P) = 1$. The processor knows about the other states only that it is not D_1. The probability that state D_2, U_1, or U_2 is selected reflects the frequency specified by the probability distribution regarding the actual state.

Selected state / Actual state	U_1	U_2	D_1	D_2
U_1	$\frac{p(U_1)}{1-p(D_1)}$	$\frac{p(U_2)}{1-p(D_1)}$	0	$\frac{p(D_2)}{1-p(D_1)}$
U_2	$\frac{p(U_1)}{1-p(D_1)}$	$\frac{p(U_2)}{1-p(D_1)}$	0	$\frac{p(D_2)}{1-p(D_1)}$
D_1	0	0	1	0
D_2	$\frac{p(U_1)}{1-p(D_1)}$	$\frac{p(U_2)}{1-p(D_1)}$	0	$\frac{p(D_2)}{1-p(D_1)}$

Table 3: State probabilities of the processor in the Cooperative

5.4 Bias

The payoffs of the agents in the four governance structures are determined in 5.4.1. The efficient governance structure is identified in 5.4.2. The

distinction between type I and type II errors is made in 5.4.3 and we compare again the performance of various governance structures.

5.4.1 Payoffs

Define B_{ji} as the benefit when state j is selected while the actual state is i. The loss associated with selecting the wrong state is captured by assuming that $B_{ji} < B_{ii}$ when j≠i. So the expected benefit of agent k in governance structure Γ is $E_k(\Gamma) = \sum_{i=1}^{4} p(i)B_{ik}(\Gamma)$, where $B_{ik}(\Gamma) = \sum_{j=1}^{4} \Gamma_{ij}(k)B_{ji}$. $B_{ik}(\Gamma)$ represents the expected benefit for player k when state i prevails in governance structure Γ. The expected benefit of governance structure Γ is then $E(\Gamma) = \sum_{k=1}^{2} E_k(\Gamma)$. Table 4 presents the composition of the expected benefit of all governance structures. It is assumed for simplicity that B_{ii}=s and B_{ji}=-t when j≠i, and s>0, t>0. That is, there is a benefit due to selecting the right state and a loss due to selecting the wrong state.

	M	C	FI	BI
Farmer	$(\frac{1}{2}+\frac{1}{2}p)s-(\frac{1}{2}-\frac{1}{2}p)t$	s	s	$\frac{1}{2}s-\frac{1}{2}t$
Processor	$(1-\frac{1}{2}p)s-\frac{1}{2}pt$	$\frac{p^2-p+1}{p+1}s-\frac{2p-p^2}{p+1}t$	$\frac{1}{2}s-\frac{1}{2}t$	S
Total	$\frac{3}{2}s-\frac{1}{2}t$	$\frac{p^2+2}{p+1}s-\frac{2p-p^2}{p+1}t$	$\frac{3}{2}s-\frac{1}{2}t$	$\frac{3}{2}s-\frac{1}{2}t$

Table 4: The payoffs of the agents in the four governance structures

The expected benefits of Market, Forward integration and Backward integration are always equal, i.e. $E(M) = E(FI) = E(BI) = \frac{3}{2}s-\frac{1}{2}t$. The reason is that their partitions are the same when the upstream and downstream parties' partitions are put together, i.e. U_1, U_2 are grouped in one subset, D_1, D_2 are grouped in one subset, and four subsets each with a state. The expected benefits of Cooperative is $E(C) = \frac{p^2+2}{p+1}s-\frac{2p-p^2}{p+1}t$.

5.4.2 Efficient governance structure

Straightforward calculations allow one to ascertain how the efficiency of governance structures is influenced by the probabilities of the states. Consider the case B_{ii}=s and B_{ji}=-t when j≠i, and s>0, t>0. The four governance structures are equally efficient if $p=\frac{1}{2}$, i.e. $p(U_1)=p(U_2)=p(D_1)=p(D_2)=\frac{1}{4}$. That is, governance structure does not matter when all states occur with the same probability because the number of cognitive units is the same across the four governance structures. The agents can make four partitions in every governance structure. The difference is how they partition, namely, which states are distinguished and which are not. When all the states are equally likely to happen, the only thing that matters is the number of partitions and payoffs. All governance structures generate the same benefits because have the same number of cognitive units, the same benefit of selecting the right state and the same loss of selecting the wrong state. Proposition 1 summarizes the result of comparison.

Proposition 1: Cooperative is uniquely efficient when $0<p<\frac{1}{2}$, B_{ii}=s and B_{ji}=-t when j≠i.

A small p means the states D_1, D_2 are much more likely to happen as compared to U_1, U_2. Because Cooperative is the only governance structure with the farmer as well as the processor paying particular attention to D_1, the comparative advantage of Cooperative increases with $p(D_1)$. The other three governance structures are efficient when $\frac{1}{2}<p<1$, i.e. U_1, U_2 are much more likely to happen as compared to D_1, D_2.

Next we examine the case where the benefit due to identifying an upstream state differs from that due to selecting the downstream state correctly, i.e. $B_{U_1U_1}=B_{U_2U_2}\equiv s_U$, $B_{D_1D_1}=B_{D_2D_2}\equiv s_D$, and B_{ji}=-t when j≠i, and s_U >0, s_D>0, t>0. We obtain $E(M)=E(FI)=E(BI)=\frac{3}{2}ps_U+\frac{3}{2}(1-p)s_D-\frac{1}{2}t$ and

$E(C) = \frac{2p^2 + p}{p+1} s_U + \frac{2 - p - p^2}{p+1} s_D - \frac{2p - p^2}{p+1} t$. To compare the total payoffs of different governance structure, we look at $E(M) - E(C) = \frac{(1-p)p}{2(p+1)} s_U + \frac{-(1-p)^2}{2(p+1)} s_D - \frac{(1-p)(2p-1)}{2(p+1)} t$. Proposition 2 summarizes the implications of this expression.

Proposition 2: Cooperative always generates less upstream payoffs and more downstream payoffs as compared to the other three governance structures. When $0 < p < \frac{1}{2}$ ($\frac{1}{2} < p < 1$), Cooperative incurs less (more) loss than the other three governance structures.

This result can also be explained by the partitions of these governance structures. Cooperative has an advantage in distinguishing one of the downstream states and a disadvantage in distinguishing the upstream states. The expected loss is lower (higher) when the downstream state is more (less) likely to prevail.

5.4.3 Type I and type II errors and efficient governance structure

One interpretation of the above results regarding the efficient governance structure is that they entail a comparison of the various governance structures in terms of type II errors. The expected benefit of each governance structure is determined, given that a project is adopted by both agents anyway. This results in a benefit when the right state is selected, but it turns into a loss when the wrong state is selected, i.e. a type II error.

Next we consider also the type I errors made by a governance structure. This is done by distinguishing two decisions made by each agent: proposal selection and project implementation. In the first stage, the agent has to decide whether (s)he will accept or reject a proposal, based on his/her expected payoff. If the proposal is rejected, the agent takes no further action and the expected payoff of the agent is 0. If the proposal is accepted, then the project implementation proceeds as specified above and results sometimes in a type II error. Sometimes the right decision is taken by not choosing a proposal, i.e. the project is not implemented in the wrong state. However, not adopting a proposal may also entail that the wrong decision is taken. It prevents that a benefit occurs when the right state is selected. This is a type I error. In the second stage, the agent has to identify the state or

category of the proposal. Each agent in the governance structures has to make independent decisions in these two stages whether (s)he will adopt a proposal and how (s)he will implement the project. The expected payoff of a certain governance structure is the sum of the expected payoff of the two agents if they both adopt the proposals. If only one of the two agents adopt a proposal, then his/her expected payoff constitutes the expected payoff of the governance structure. If neither agent adopts a proposal, the governance structure generates zero payoff.

Take Cooperative as an example. The farmer will accept all proposals in that his perfect partitions of the states guarantee an expected benefit of *s* and a loss of zero. The processor will only accept a proposal when the expected benefit exceeds the expected loss, i.e. $E_P(C) = \sum_{i=1}^{4} p(i) \sum_{j=1}^{4} \Gamma_{ij}(P) B_{ji} = \frac{p^2 - p + 1}{p+1} s - \frac{2p - p^2}{p+1} t > 0$, which is equivalent to $t < \frac{p^2 - p + 1}{2p - p^2} s$. Similarly it can shown that the farmer in Market accepts a proposal when $t < \frac{1+p}{1-p} s$, whereas the processor in Market accepts when $t < \frac{2-p}{p} s$. The farmer in Forward integration and the processor in Backward integration will always accept whereas the processor in Forward integration and the farmer in Backward integration accept only if t<s.

Overall, the larger is the loss due to selecting wrong state, the less likely each agent is to accept a proposal and undertake the project. The farmer in Cooperative and Forward integration and the processor in Backward integration have accurate partitions of the states and will always accept the proposals. Other agents will only accept a proposal when the expected payoffs as specified in table 4 are positive, which means each of them has a threshold in terms of the minimum expected benefit or maximum expected loss. We consider in the following analysis the threshold to be the maximum expected loss at which an agent would accept a proposal. That is, an agent will reject a proposal when the expected loss is higher than the threshold loss. Denote the threshold value of t for agent k in governance structure Γ as T_k^{Γ} . For example, T_P^C is determined by

$E_P(C) = \frac{p^2 - p + 1}{p+1} s - \frac{2p - p^2}{p+1} T_P^C = 0$, i.e. $T_P^C = \frac{p^2 - p + 1}{2p - p^2} s$. A closer inspection of the threshold of the agents leads to proposition 3.

Proposition 3: When $0 < p < 2 - \sqrt{3}$, $T_P^{FI} = T_F^{BI} < T_F^M < T_P^C < T_P^M$. When $2 - \sqrt{3} < p < \frac{1}{2}$, $T_P^{FI} = T_F^{BI} < T_P^C < T_F^M < T_P^M$. When $\frac{1}{2} < p < 1$, $T_P^C < T_P^{FI} = T_F^{BI} < T_P^M < T_F^M$.

The farmer in Cooperative and Forward integration and the processor in Backward integration have the highest thresholds because they do not make any omission or commission errors and therefore accept all proposals and successfully implement them. Players with low thresholds are those who are prone to make type II errors and therefore are stricter in proposal screening. Proposition 3 implies that the processor in Cooperative is more conservative than other agents in proposal selection when the probability associated with the upstream stage is high. (S)he will only accept a proposal when the expected benefit (or the expected loss) is high (low) enough as compared with other agents. This conservatism is reflected in Cooperatives' innovation strategies. Cooperative members may insist on a high expected return in order to undertake a project. For example, they often have a decision rule that only projects with an expected return in excess of 20 percent be undertaken. It is widely recognized that a cooperative enterprise usually does not assimilate all the opportunities for profit that come its way, but instead sticks to the original products and rarely expand to products that have little connection with its life blood (Helmberger 1966). Our result confirms the descriptions in LeVay (1983) that cooperative management is constrained and conservative, and cooperatives perform poorly in terms of growth. It also offer an explanation to Helmberger's claim that 'there may be markets that are essentially closed to the cooperative firm but open to others' (1966, p143). Cooperative enterprises pursue fewer initiatives and are more inert to change than other enterprises. The inertia to adjust to the changing market and technology constitutes a serious threat to the development of cooperatives.

Next we compare again the performance of the four governance structures taking account of the proposal selection stage prior to the project

implementation discussed in previous section. When $\frac{1}{2} < p < 1$, if $t < T_P^C$, all agents accept all proposals and expected benefits of all governance structures are the same as what we had when only the stage of project implementation is involved, i.e. $E(M) = E(FI) = E(BI) = \frac{3}{2}s - \frac{1}{2}t$, $E(C) = \frac{p^2+2}{p+1}s - \frac{2p-p^2}{p+1}t$. It immediately follows that $E(C) < E(M) = E(FI) = E(BI)$ given that $\frac{1}{2} < p < 1$. The processor in Cooperative makes more type II errors than other agents by grouping U_2, D_1 and D_2 while distinguishing only U_1, which is less likely to happen than D_1 and D_2. If $T_P^C < t < T_P^{FI} = T_F^{BI}$, the processor in Cooperative will choose not to proceed with any proposal. We find $E(C) = s < \frac{3}{2}s - \frac{1}{2}t = E(M) = E(FI) = E(BI)$. This is because the processor in Cooperative makes too many type I errors by being inert. If $T_P^{FI} = T_F^{BI} < t < T_P^M$, the processor in Forward integration and the farmer in Backward integration will also choose to reject all proposals. So $E(M) = \frac{3}{2}s - \frac{1}{2}t < s = E(C) = E(FI) = E(BI)$. This is due to the fact that the agents in Market makes too many type II errors and the potential loss of type II errors is increased compared with the previous cases. If $T_P^M < t < T_F^M$, the processor in Market will no longer accept a proposal. It follows therefore $E(M) = \frac{1+p}{2}s - \frac{1-p}{2}t < s = E(C) = E(FI) = E(BI)$. The farmer in Market is subject to type II errors and the potential loss of type II errors is even larger compared to the previous case. If $T_F^M < t$, only the farmer in Cooperative and Forward integration and the processor in Backward integration accept proposals. We obtain therefore $E(M) = 0 < s = E(C) = E(FI) = E(BI)$. The agents in Market do not generate any benefit or loss by rejecting all the proposals while the other governance structures generate only a benefit and therefore perform better. Proposition 4 summarizes these findings.

Proposition 4: When $0 < p < \frac{1}{2}$, Cooperative is the efficient governance structure. When $\frac{1}{2} < p < 1$, $E(C) < E(M) = E(FI) = E(BI)$ if t<s, $E(M) < E(C) = E(FI) = E(BI)$ if t>s.

Figure 2 depicts this result. Proposition 1 claims that a Cooperative is only efficient when $0 < p < \frac{1}{2}$, if only type II errors are considered in the calculation of benefits. Proposition 4 implies that Cooperative can also be efficient when $\frac{1}{2} < p < 1$ if type I errors are taken into account. This result has an intuitive explanation. According to proposition 3, when $\frac{1}{2} < p < 1$, the processor in Cooperative is very conservative in proposal selection. t>s entails that the potential loss is larger than the potential benefit. The relative advantage of Cooperative in rejecting proposals that are not profitable becomes increasingly important. Consequently, Cooperative is more likely to be efficient in that it now has an option to reject the proposal and avoid type II errors.

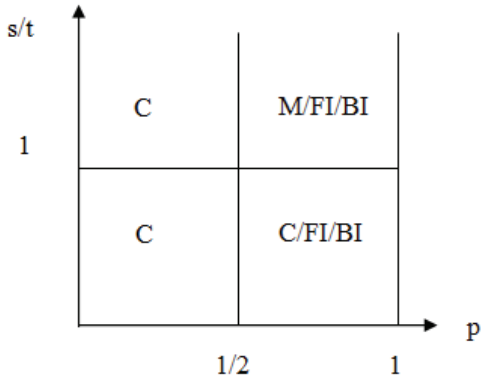

Figure 2: The efficient governance structure

5.5 Conclusions and further research

There is a growing awareness that the bounded cognition of people has implications for firms and their governance structures. Despite the fact that human behavior falls short of the rational ideal in important ways, these behaviors can be incorporated into policy design in a way that can improve the efficiency of decision making (Thaler & Sunstein 2008). Our model

addresses governance structure from a bounded cognition perspective. There are two main contributions. First, governance structures differ in their allocation of attention. This is captured by each agent in each governance structure grouping states in a unique way. This has an impact on when and how frequent the wrong state regarding the implementation of a project is selected. It captures on the one hand the way governance structure channels attention and cognition, and on the other hand distinct ownership features of each governance structure. Second, the efficient governance structure is determined by the bias of each player in terms of type I and type II errors. The influence of the bias on the relative performance of the governance structures depends on the probability of the various states and the size of the potential benefit and loss. Cooperative is efficient when the downstream state is more likely to occur because of its specific focus. Cooperative processor is more conservative than other agents, which renders it an advantage when the potential loss due to selecting the wrong state is large. This may have implications for a cooperative enterprise's diversification (the "make-or-buy" decision) and innovation strategies.

There are various possibilities for further research. First, the model specifies one farmer and one processor. However, an important aspect of cooperatives is that the society of members owns the infrastructure of the downstream processor. This raises many issues of collective decision making, and it becomes more difficult when there is also member heterogeneity. A first start to model these issues is to distinguish at least two farmers, where each farmer is characterized by a distinct partition. Having two farmers allows for many additional governance structures, like an association, homogeneous cooperatives, and heterogeneous cooperatives, where each governance structure is expected to channel and shape information in a unique way. Second, the above model is silent about the role of a CEO in a cooperative. One of the roles of a CEO from an information partition perspective is that (s)he serves as a linking pin (Likert 1961), i.e. an interface connecting the upstream and down stage of production in order to realize complementarities. In the language of our model, the unique partition of the CEO serves as a cognitive bridge between the world (partition) of farmers and the world (partition) of the processor. This allows for determining the value of the CEO from a cognition perspective. Third, future research may endogenize the number of cognitive units in various governance structures. The current model

assumes that the number of cognitive units is fixed across governance structures in order to make a fair comparison. Endogenizing the number of cognitive units may start to address the efficient incompleteness of contracts (Grossman and Hart 1986).

Summary

A cooperative is a firm collectively owned by many independent input suppliers or buyers. This dissertation examines the nature of a cooperative and its efficiency compared with other governance structures from the perspectives of motivation, coordination and cognition. First, a multi-task principal-agent model is developed to address the motivation issues in cooperatives. It captures that a cooperative is not publicly listed and that it has to bring the enterprise to value as well as to serve member interests. We find that the lack of public listing in cooperatives may result in the cooperative being the unique efficient governance structure under either one of two conditions: 1) additional sources of information like accounting information and subjective performance evaluations are available; 2) the upstream marginal product multiplied with a function increasing in the strength of the chain complementarities is higher than the downstream marginal product. Second, the impact of governance structure on the choice of coordination mechanism in a chain is investigated. The governance structures cooperative and IOF are distinguished. A cooperative as a coordination device is always efficient due to its prevention of double mark-up. Last, the dissertation attempts to gain a better understanding of the governance structure choice in a bounded cognition framework. The influence of governance structures (market, cooperative, forward integration, and backward integration) on the information partitions of boundedly rational agents is specified. Our characterization of the governance structures captures on the one hand the way they channel attention and cognition, and on the other hand the distinct ownership distributions. We show that each governance structure can be efficient, depending on the probabilities of the various states and the size of the potential benefit and loss. A cooperative enterprise's conservativeness to change is explained.

To wrap up, the dissertation aims to deepen the current understanding of the cooperative as one governance structure out of many. It is compared with other governance structures from various perspectives. In doing so, I hope to ease the doubt of some researchers regarding the efficiency of the cooperative and to identify the conditions under which cooperatives are efficient.

References

Aghion, P and J. Tirole, Some Implication of Growth for Organizational Form and Ownership Structure, European Economic Review, 1995, 39, 440-455.

Akerlof, G.A., and R.E. Kranton, Economics and Identity, Quarterly Journal of Economics, 2000, 115(3), 715-753.

Alchian, A., Uncertainty, Evolution and Economic Theory, *Journal of Political Economy*, 1950, 58, 211-221.

Alonso, R., W. Dessein, and N. Matouschek, When does Coordination Require Centralization? American Economic Review, 2008, 98(1), 145-179.

Baker, G., The Use of Performance Measures in Incentive Contracting, American Economic Review, 2000, 90(2), 415-420.

Baker, G., R. Gibbons and K.J. Murphy, Strategic Alliances: Bridges between 'islands of conscious power', Journal of Japanese International Economies, 2008, 22, 146-163.

Ballou, J.P., An Examination of the Presence of Ownership Effects in Mixed Markets, Journal of Law, Economics, and Organizations, 2005, 21(1), 228-255.

Barton, D., What is a Cooperative? In D. Cobia (eds), Cooperatives in Agriculture, Prentice Hall, 1989, 1-20.

Bebchuk, L.A., and J.M. Fried, Executive Compensation as an Agency Problem, Journal of Economic Perspectives, 2003, 17(3), 71-92.

Bijman, J., F.R. Chaddad, and M.L. Cook, How strengthening vertical coordination may lead to restructuring of macrohierarchies, In H.J.Bremmers, S.W.F. Omta, J.H. Trienekens and E.F.M.Wubben (eds), Dynamics in Chains and Networks. Proceedings of the sixth International Conference on Chain and Network Management in Agribusiness and the Food Industry (Ede, 27-28 May 2004), Wageningen: Wageningen Academic Publishers, 252-261.

Blanchard, K., C. Schewe, R. Nelson, and A. Hiam, Exploring the World of Business, New York, Worth Publishers, 1996.

Bogetoft, P. and H.B. Olesen, Ten Rules of Thumb in Contract Design: Lessons from Danish Agriculture, European Review of Agricultural Economics, 2002, 29(2), 185-204.

Bolton, P. and M. Dewatripont, The Time and Budget Constraints of the Firm, European Economic Review, 1995, 39, 691-699.

Bontems, P. and M.E. Fulton, Organizational Structure, Redistribution and the Endogeneity of Costs: Cooperatives, Investor-Owned Firms and

the costs of Procurement, Journal of Economic Behavior & Organization, 2009, 72, 322-343.
Bonus, H., The Cooperative Association as a Business Enterprise: A Study of the Economics of Transactions, Journal of Institutional and Theoretical Economics, 1986, 142(2), 310-339.
Burton, R.H. and A.J. Kuhn, Strategy Follows Structure: the Missing Link of their Intertwined Relation, Working paper No. 260, Fuqua School of Business, Duke University, May 1979.
Bushee, B.J., The Influence of Institutional Investors on Myopic R&D Investment Behavior, Accounting Review, 1998, 73, 305-333.
Bushman, R.M., R.J. Indjejikian, and A. Smith, CEO Compensation: The Role of Individual Performance Evaluation, Journal of Accounting and Economics, 1996, 21, 161-193.
Caves, R.E., and B.C. Petersen, Cooperatives' Shares in Farm Industries: Organizational and Policy Factors, Agribusiness, 1986, 2 (1), 1-19.
Dessein, W., and T. Santos, Adaptive Organizations, Journal of Political Economy, 2006, 114 (5), 956-995.
Clodius, R., The Role of Cooperatives in Bargaining, Journal of Farm Economics, 1957, 39(2), 1271-1284.
Coase, R.H., The Nature of the Firm, Economica, 1937, 4, 386-405.
Conlisk, J., Why Bounded Rationality? Journal of Economic Literature, 1966, 34, 669-700.
Cook, M.L., The Role of Management Behaviour in Agricultural Cooperatives, Journal of Agricultural Cooperatives, 1994, 9, 42-58.
Cook, M.L., The Future of U.S. Agricultural Cooperatives: A Neo-Institutional Approach, American Journal of Agricultural Economics, 1995, 77, 1153-1159.
Cremer, J., L. Garicano, and A. Pratt, Language and the Theory of the Firm, Quarterly Journal of Economics, 2007, 122, 373-407.
Debreu, G., The Theory of Value, Wiley, 1959.
Dixit, A., Power of Incentives in Public versus Private Organization, American Economic Review (Papers and Proceedings), 1997, 87(2), 378-382.
Dixit, A., Incentives and Organizations in the Public Sector: An Interpretative Review, Journal of Human Resources, 2002, 37(4), 696-727.
Drucker, P.F., Concept of the Corporation, Transaction Publishers, 1946.
Drucker, P.F., Management: Tasks, Responsibilities, Practices. Heinemann, London, 1974.

Dunn, J.R., Basic Cooperative Principles and their Relationship to Selected Practices, Journal of Agricultural Cooperation, 1988, 3, 83-93.
Emelianoff, O., Economic Theory of Cooperation: Economic Structure of Cooperative Organizations. Washington, D.C.: Ivan V. Emelianoff, 1948.
Fama, E. and M. Jensen, Separation of Ownership and Control, Journal of Law & Economics, 1983, 26, 301-325.
Fershtman, C., and E. Kalai, Complexity Considerations and Market Behavior. RAND Jounal of Economics, 1993, 24, 224-235.
Flaherty, M.T., Prices Versus Quantities and Vertical Financial Integration, Bell Journal of Economics, 1981, 12(2), 507-525.
Fryer, R. and M.O. Jackson, A Categorical Model of Cognition and Biased Decision Making, The B.E. Journal of Theoretical Economics, 2008, 8(1), article 6.
Fudenberg, D. and J. Tirole, The Fat-Cat Effect, the Puppy-Dog Ploy, and the Lean and Hungry Look, American Economic Review, 1984, 74(2), 361-366.
Fulton, M. and J. Gibbings, Cognitive Processes and Cooperative Business Strategy, Centre for the Study of Co-operatives, University of Saskatchewan (Saskatoon, Sask), 2006.
Fulton, M.E. and B. Hueth, Cooperative Conversions, Failures and Restructurings: An Overview, Journal of Cooperatives, 2009, 23: i-xi.
Gaibraith, J.R., Organization Design, Reading, MA, Addison-Wesley, 1977.
Gibbons, R., Incentives in Organizations, Journal of Economic Perspectives, 1998, 12, 115-132.
Gibbons, R., Incentives between Firms (and Within), Management Science, 2005, 51(1), 2-17.
Gifford, S., To Make or Buy: An Allocation of Attention, Contributions to Theoretical Economics, 2004, 4 (1), Article 2.
Grossman, S.J. and O.D. Hart, The Costs and Benefits of Ownership: A Theoretical of Vertical and Lateral Integration, Journal of Political Economy, 1986, 94, 691-719.
Hammond, T., Structure, Strategy, and the Agenda of the Firm, In R. Rumelt, D. Schendel, and D. Teece (eds) Fundamental Issues in Strategy: A Research Agenda, Harvard Business School Press, 1994.
Hammond, T.H. and P.A. Thomas, The Impossibility of a Neutral Hierarchy, Journal of Law, Economics, and Organization 1989, 5(1): 155-184.

Hansmann, H., The Organization of Insurance Companies: Mutual versus Stock, Journal of Law, Economics, and Organizations, 1985, 1(1), 125-153.
Hansmann, H., Ownership of the Firm, Journal of Law, Economics, and Organizations, 1988, 4(2), 267-304.
Hansmann, H., The Ownership of Enterprise. The Belknap Press of Harvard University Press, Cambridge, MA/London, 1996.
Hansmann, H., Cooperative Firms in Theory and Practice, Finnish Journal of Business Economics, 1999, 4, 387-403.
Hart, O., Economica Coase Lecture Reference Points and the Theory of the Firm, Economica, 2008, 75, 404-411.
Hart, O. and B. Holmström, A Theory of Firm Scope, Quarterly Journal of Economics, 2010, 125(2), 483-513.
Hart, O.D. and J. Moore, Property Rights and the Nature of the Firm, Journal of Political Economy, 1990, 98, 1119-1158.
Hart, O.D. and J. Moore, The Governance of Exchanges: Members' Cooperatives versus Outside Ownership, Oxford Review of Economic Policy, 1996, 12(4), 53-69.
Hayami, Y. and K. Otsuka, The Economics of Contract Choice, Clarendon Press, Oxford, 1993.
Hayek, F., The Use of Knowledge in Society, American Economic Review, 1945, 35, 519-530.
Hayes, R.M. and S. Schaefer, Implicit Contracts and the Explanatory Power of Top Executive Compensation for Future Performance, Rand Journal of Economics, 2000, 31, 273-293.
Heiner, R.A., The Origin of Predictable Behavior, American Economic Review, 1983, 73(4), 560-595.
Helmberger, P., Future Roles for Agricultural Cooperatives, Journal of Farm Economics, 1966, 48(5), 1427-1435.
Helmberger, P. and S. Hoos, Cooperative Enterprise and Organization Theory, Journal of Farm Economics, 1962, 44, 275-290.
Hendrikse G.W.J., Screening, Competition and the Choice of Marketing Cooperative as an Organizational Form, Journal of Agricultural Economics, 1996, 49(2), 202-217.
Hendrikse, G.W.J., Governance of Chains and Networks: A Research Agenda, Journal of Chain and Network Sciences, 2003, 3(1), 1-6.
Hendrikse, G.W.J., On the Co-existence of Spot and Contract Markets: the Delivery Requirement as Contract Externality, European Review of Agricultural Economics, 2007a, 34(2): 257-282.

Hendrikse, G.W.J., Two Vignettes regarding Boards in Cooperatives versus Corporations: Irrelevance and Incentives, In K. Karantininis and J. Nilsson (eds), Vertical Markets and Cooperative Hierarchies, Springer, 2007b, 137-150.

Hendrikse G.W.J. and W.J.J. Bijman, On the Emergence of New Growers' Associations: Self-Selection versus Countervailing Power, European Review of Agricultural Economics, 2002, 29(2), 255-269.

Hendrikse, G.W.J. and T. Jiang, An Incomplete Contracting Model of Governance Structure Variety in Franchising, Working paper, Rotterdam School of Management, Erasmus University, ERS-2007-049-ORG, 2007.

Hendrikse G.W.J. and C.P. Veerman, Marketing Cooperatives as a System of Attributes, in G. van Dijk en J. Nilsson (editors), Strategies and Structures in the Agro-Food Industries, Van Gorcum, 1997, 111-130.

Hendrikse, G.W.J. and C.P. Veerman, Marketing Co-operatives: An Incomplete Contracting Perspective, Journal of Agricultural Economics, 2001a, 52(1), 53-64.

Hendrikse G.W.J. and C.P. Veerman, Marketing Cooperatives and Financial Structure: a Transaction Costs Analysis, Agricultural Economics, 2001b, 26(3), 205-216.

Hind, A.M., The Changing Values of the Cooperatives and its Business Focus, American Journal of Agricultural Economics, 1997, 79, 1077-1082.

Holmström, B., Future of Cooperatives: A Corporate Perspective, Finnish Journal of Business Economics, 1999, 4, 404-417.

Hueth, B., and P. Marcoul, Incentive Pay for CEOs in Cooperative Firms. Available at SSRN: http://ssrn.com/abstract=1303050, 2008.

Ittner, C.D., D.F. Larcker, and M. Meyer, Subjectivity and the Weighting of Performance Measures: Evidence from a Balanced Scorecard, The Accounting Review, 2003, 78, 725-728.

Jensen, M. and W. Meckling, Theory of the Firm: Managerial Behavior, Agency Costs and Capital Structure, Journal of Financial Economics, 1976, 3, 305-360.

Kwoka, J.E., Governance Alternatives and Pricing in the U.S. Electric Power Industry, Journal of Law, Economics, and Organizations, 2002, 18(1), 278-294.

Lambert, R.A., and D.F. Larcker, An Analysis of the Use of Accounting and Market Measures of Performance in Executive Compensation Contracts, Journal of Accounting Research, 1987, 25, 85-125.

Lang, M.G., The Role of Management Behavior in Agricultural Cooperatives: Discussion, Journal of Agricultural Cooperatives, 1994, 9, 61-66.
Lerman, Z., and C. Parliament, Financing of Growth in Agricultural Cooperatives, No 13410, Staff Papers from University of Minnesota, Department of Applied Economics, 1991.
LeVay, C., Agricultural Co-operative Theory: A Review, Journal of Agricultural Economics, 1983, 34(1), 1-44.
Lazear, E. P. and M. Gibbs, Personnel Economics in Practice, 2008.
LeVay, C., Agricultural Cooperative Theory: A Review, Journal of Agricultural Economics, 1983, 34(1), 1-44.
Libby, R., R. Bloomfield, and M.W. Nelson, Experimental Research in Financial Accounting, Accouting, Organizations and Society, 2002, 2, 775-810.
Likert, R., New Patterns of Management, McGraw-Hill, New York, 1961.
Makadok, R. and R. Coff, Both Market and Hierarchy: An Incentive-System Theory of Hybrid Governance Forms, Academy of Management Review, 2009, 34(2), 297-319.
McAfee, R.P., Competitive Solutions. Princeton University Press, 2002.
Ménard, C., Cooperatives: Hierarchies or Hybrids? In: K. Karantininis and J. Nilsson (eds.), Vertical Markets and Cooperative Hierarchies, Springer, 2002, 1-17.
Merchant, K.A., The Effects of Financial Controls on Data Manipulation and Management Myopia, Accouting, Organizations and Society, 1990, 15, 297-313.
Milgrom, P. and J. Roberts, Economic Theories of the Firm: Past, Present and Future, Canadian Journal of Economics, 1988, 21, 444-458.
Milgrom, P.A. and J. Roberts, The Economics of Modern Manufacturing: Technology, Strategy, and Organization, American Economic Review, 1990, 80(3), 511-528.
Milgrom, P., and J. Roberts, Economics, Organization and Management, Englewood Cliffs, NJ, Prentice Hall, 1992.
Mintzberg, H., Structure in 5's: A Synthesis of the Research on Organizational Design, Management Science, 1980, 26(3), 322-341.
Nilsson, J., Organizational principles for co-operative firms, Scandinavian Journal of Management, 2001, 17, 329-356.
Nooteboom, B., Element of a Cognitive Theory of the Firm, Advances in Austrian Economics, 2006, 9, 145-175.

Ortoleva, P., The Price of Flexibility: Towards a Theory of Thinking Aversion, Mimeo, New York University, 2004.
Oustapassidis, K., A. Vlachvei and K, Karantininis, Growth of Investor Owned and Cooperative Firms in Greek Dairy Industry, Annals of Public and Cooperative Economics, 1998, 69 (3), 399-417.
Peterson, H.C. and B.L. Anderson, Cooperative Strategy: Theory and Practice, Agribusiness, 1996, 12(4), 371-383.
Phillips, R., Economic Nature of the Cooperative Association, Journal of Farm Economics, 1953, 35, 74-87.
Read, D., G., Loewenstein & M., Rabin, Choice Bracketing, Journal of Risk and Uncertainty, 1999, 19, 171-197.
Robotka, F., A Theory of Cooperation, Journal of Farm Economics, 1946, 29(1), 94-114.
Rubinstein, A., On Price Recognition and Computational Complexity in a Monopolistic Model, Journal of Political Economy, 1993, 101, 473-484.
Rubinstein, A., Modeling Bounded Rationality, MIT Press, 1998.
Sah, R.K. and J.E. Stiglitz, The Architecture of Economic Systems: Hierarchies and Polyarchies, American Economic Review, 1986, 76(4), 716-727.
Savage, J.K., Comment on Economic Nature of the Cooperative Association, Journal of Farm Economics, 1954, 36, 529-534.
Sexton, R.A., The Formation of Cooperatives: A Game-Theoretic Approach with Implications for Cooperative Finance, Decision Making, and Stability, American Journal of Agricultural Economics, 1986, 68, 423-433.
Shaffer, J. D., Thinking about Farmers' Cooperatives, Contracts, and Economic Coordination, In J. Royer (eds) Cooperative Theory: New Approaches, 61-86, ACS Report 18, USDA, 1987.
Simon, H.A., Administrative Behavior: A Study of Decision-making Processes in Administrative Organizations, Macmillan, Chicago, 1947.
Simon, H. A., A Behavioral Model of Rational Choice, Quarterly Journal of Economics, 1955, 69(1), 99-118.
Sobel, J., How to Count to One Thousand, Economic Journal, 1992, 102(410), 1-8.
Spengler, J.J., Vertical Integration and Antitrust Policy, Journal of Political Economy, 1950, 58, 347-352.
Staatz, J.M., The Structural Characteristics of Farmer Cooperatives and their Behavioral Consequences, In J. Royer (eds). Cooperative Theory:

New Approach, 33-60, USDA-ACS Service Report no. 18, Washington, D. C, 1987.
Stewart, A.L.T., Have Traditional Cooperative Structures Outlived their Usefulness? Farm Management, 1993, 8(6), 287-296.
Tadelis, S., Complexity, Flexibility, and the Make-or-Buy Decision, American Economic Review, 2002, 92(2), 433-437.
Thaler, R.H. and C.R. Sunstein, Nudge: Improving Decisions about Health, Wealth, and Happiness, New Haven and London, Yale University Press, 2008.
Thirkell, J.D., Attracting and Motivating Managers in U.K. Agricultural Cooperatives. In Yearbook of Cooperative Enterprise, Oxford, Plunkett Foundation, 1989.
Thompson, J.D. Organizations in Action, New York, McGraw-Hill, 1967.
Trechter, D.D., R.P., King, D.W., Cobia and J.G., Hartell, Case Studies of Executive Compensation in Agricultural Cooperatives, Review of Agricultural Economics, 1997, 19 (2), 492-503.
Trifon, R., The Economics of Cooperative Ventures: Further Comments, Journal of Farm Economics, 1961, 43, 215-235.
United States Department of Agriculture, Agricultural Cooperatives in the 21st Century, 2002.
United States Government Printing Office, Report on the Inquiry on Cooperative Enterprise in Europe, Washington, 1937.
Vickers, J., Delegation and the Theory of the Firm, Economic Journal, 1985, 95 (Supplement), 138-147.
Vitaliano, P., Cooperative Enterprise: An Alternative Conceptual Basis for Analyzing a Complex Institution, American Journal of Agricultural Economics, 1983, 65, 1078-1083.
Weitzman, M.L., Prices vs. Quantities, Review of Economic Studies, 1974, 41, 477-491.
Williamson, O.E., Markets and Hierarchies, Free Press, New York, 1975.
Williamson, O.E., The Economic Institutions of Capitalism, Free Press, New York, 1975.
Williamson, O.E., Economic Organization: Firms, Markets, and Policy Control, Brighton, Wheatsheaf, 1986.
Williamson, O.E., Comparative Economic Organization: The Analysis of Discrete Structural Alternatives, Administrative Science Quarterly, 1991, 36 (2), 269-296.
Williamson, O.E., Transaction Cost Economics and Agriculture: An Excursion. In: Van Huylenbroeck, G., W. Verbeke, and L. Lauwers

(eds), Role of Institutions in Rural Policies and Agricultural Markets, Elsevier, 2004, 19-39.
Yamey, B.S., The Price Policy of Co-operative Societies, Economica, 1950, 17(65), 23-42.
Ziv, A., Performance Measures and Optimal Organization, Journal of Law, Economics, and Organizations, 1993, 9(1), 30-50.

About the author

Li Feng was born on August 06, 1983, in Jiangxi, China. She studied international economics and trade in Wuhan University and received bachelor degree in economics in 2004. She obtained master degree in economics and business in 2006 at the Erasmus School of Economics, after which she joined the Department of Organization and Personnel Management of Rotterdam School of Management, Erasmus University, as a PhD candidate.

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MOTIVATION, COORDINATION AND COGNITION IN COOPERATIVES

A cooperative is a firm collectively owned by many independent input suppliers or buyers. This dissertation examines the nature of a cooperative and its efficiency compared with other governance structures from the perspectives of motivation, coordination and cognition. We find that the lack of public listing in cooperatives may result in the cooperative being the unique efficient governance structure under either one of two conditions: 1) additional sources of information like accounting information and subjective performance evaluations are available; 2) the upstream marginal product multiplied with a function increasing in the strength of the chain complementarities is higher than the downstream marginal product. A cooperative as a coordination device is always efficient due to its prevention of double mark-up. The influence of governance structures (market, cooperative, forward integration, and backward integration) on the information partitions of boundedly rational agents is also investigated. We show that each governance structure can be efficient, depending on the probabilities of the various states and the size of the potential benefit and loss. A cooperative enterprise's conservativeness to change is explained.

In sum, the main objective of the dissertation is to deepen the current understanding of the cooperative as one governance structure out of many. It is compared with other governance structures from various perspectives. In doing so, I hope to ease the doubt of some researchers regarding the efficiency of the cooperative and to identify the conditions under which cooperatives are efficient.

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Rotterdam School of Management (RSM)
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P.O. Box 1738, 3000 DR Rotterdam
The Netherlands

Tel. +31 10 408 11 82
Fax +31 10 408 96 40
E-mail info@erim.eur.nl
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