Pooling, Access, and Countervailing Power in Channel Governance

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Fruit and vegetable marketing organization the Greenery has experienced various governance structure changes, like horizontal merger, forward integration, and the emergence of grower associations. A multilateral incomplete contracting model is presented to account for these changes by analysing the interactions between pooling, access, and countervailing power. This model does not only explain the changes at the Greenery, but it contributes also to the design of efficient channel governance.

Key words: channel governance; cooperatives; pooling; foreclosure; market power; incomplete contracts

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1. Introduction
The Greenery BV is one of the leading companies in Europe in the fruit and vegetable sector. Its main activity is to provide a complete range of fruits and vegetables to supermarket chains in Europe, North America, and the Far East throughout the year. Other major target groups are wholesale businesses, catering companies, and industrial processing companies. The company has some 2,500 employees, and its shares are owned by 1,500 producers. They are members of the horticultural cooperative the Greenery UA and they market all their products via the Greenery.

The Greenery has gone through various governance structure changes. It started as a merger between nine regional fruit and vegetable auction cooperatives in December 1996. They combined all their assets and activities into Voedingstuinbouw Nederland (VTN). VTN is the 100% shareholder of the Greenery. The Greenery integrated forward by acquiring two fresh produce wholesalers in 1998, the Dutch Van Dijk Delft group and the Fresh Produce Division of Perkins Food, a UK-based wholesaler (Bijman 2002, p. 101). Various large growers left the Greenery to start product-specific bargaining associations during the next few years. Finally, various bargaining associations merged again with the Greenery after the introduction of member benefit programs.

These governance structure changes are not unique to the Greenery. The trend toward differentiation and innovation in marketing channels puts pressure on the relationship between the parties in the channel. One source of this development is the growing diversity in customer demands, increasing the importance of investments of the parties most close to the final consumers. This seems to favor governance structures allocating ownership to parties close to consumers. One of the responses has been that wholesalers start to contract directly with producers (Bijman 2002). Technological developments are another source of heterogeneity. Different classes of producers emerge based on meeting certain product and transaction requirements, like quality, transaction volume, and delivery time (Nilsson 1998). This favors governance structures allocating ownership to parties closer to primary producers. Examples are forward integration into wholesaling and producers establishing new organisations to bargain with wholesalers or retailers.

This paper addresses the governance structure implications of these developments for producers as well as wholesalers. Some of these developments can be understood from the perspective of the complete contracting models in marketing (Anderson and Coughlan 2002, Coughlan and Wernerfelt 1989). They are informative regarding the details of specific contracts, but a different framework is more suited to address the nuances of the above governance structure changes in terms of ownership/decision rights. This contributes not only to the understanding of these changes, but also to the design of efficient channel governance. An incomplete contracting model will be developed to explain the governance structure changes at the Greenery (Grossman and Hart 1986, Hart and Moore 1990). The model will be tailored to the governance alternatives adopted by the Greenery in the course of time. The effect of the interactions between pooling, countervailing power, and access on the efficiency of various governance structures is addressed by answering the following
question: Which governance structures result in efficient investments?

This paper is organized as follows. Section 2 positions the model in the literature. Section 3 presents the model. Section 4 formulates the outcomes of the model. The governance structure changes at the Greenery are addressed from the perspective of the model in §5. Section 6 concludes.

2. Literature

A standard way of characterizing a governance structure is to distinguish income and decision rights (Hansmann 1996). Decision rights in the form of authority concern all rights and rules regarding the deployment and use of assets. Income rights specify the rights to receive the benefits and the obligations to pay the costs associated with the use of an asset, thereby creating the incentive system faced by decision makers. These two aspects of a governance structure will be illustrated with the governance structure of the Greenery. It is a producer cooperative.

The core of a producer cooperative is member control over the infrastructure or assets at the downstream stage of production. Decision rights are therefore owned by an upstream party (vertical relationship), where the upstream party consists of an association of many independent growers (horizontal relationship). The Commission of the European Communities (2001, p. 12) formulates, regarding the income rights of these cooperatives, that they have “an orientation to provide benefits to members and satisfy their needs, democratic goal setting and decision-making methods, special rules for dealing with capital and profit, and general interest objectives (in some cases).”

A prominent example of the “special rules for dealing with capital and profit” is that most cooperatives and associations use a “pooling arrangement in which members share equitably on a per-unit basis in the revenue stream that has been created” (Cook and Iliopoulos 1999, p. 526).

Income and decision rights are analyzed in different branches of the field of contract theory (Bolton and Dewatripont 2005). The analysis of income rights/incentives is the realm of complete contracting theory in the form of agency relationships. The working hypothesis is that everything that is known can and will be incorporated in the design of optimal remuneration schemes/contracts without costs. However, contracts are in general incomplete because of the costs of writing contracts, the complexity of transactions, or the vagueness of language. Incomplete contracts are completed by the allocation of authority over assets to decide in circumstances not covered by the contract. Incomplete contracting theory addresses the allocation of decision power/authority in situations left open by formal (incentive) contracts.

The incompleteness of contracts causes problems when the parties involved in the exchange make specific, irreversible investments. Specificity of investments entails that the costs of the investment are paid always entirely by the investing party because of the noncontractibility of these costs. This will give rise to ex post opportunistic behavior regarding the remaining surplus. The investor recognizes his weak bargaining position once the investment has been made and may decide not to invest in the project generating the highest surplus. This is the (inefficient) hold-up problem (Klein et al. 1978). The value of an efficient governance structure is that it provides all parties with incentives to invest in such a way that the highest value is generated. It allocates sufficient bargaining power/strength (in terms of ownership over assets) to the investor that he is confident that the costs of investment can be recouped (Grossman and Hart 1986, Hart and Moore 1990). Trade-offs are involved in the determination of the efficient governance structure because allocating more ownership rights to one party means taking ownership rights away from another party.

The focus in this paper is on the allocation of decision rights in the form of ownership over assets, while taking income rights into account. The model investigates the interactions between one decision right (priority access) and two income rights (pooling, countervailing power) on the incentive to invest for each party and the efficiency of various governance structures in an incomplete contracting model. These decision and income rights will be elaborated upon now. First, the desire to obtain a more certain demand by securing access has always been an important driving force in structuring the governance of enterprises and markets. For example, Nourse (1922, p. 581) observes already about “a small fruit-producing section” that “the salvaging of their investment, or the continuance of their life work may be at stake on the part of growers. Hence it is argued (and demonstrated in practice) that the cooperative association of producers frequently achieves results where private outside entrepreneurship fails.” One of his arguments is that “the agricultural producer can advantageously avail himself of the same cooperative form to open and maintain a channel from his farm to the factory

1 This is also reflected in the definition of a cooperative of the U.S. Department of Agriculture (Dunn 1988, p. 85): “A cooperative is a user-owned and controlled business from which the benefits are derived and distributed equitable on the basis of use.”

2 Relevant examples regarding the case in this paper are the outlays geared toward the development of specific fruit and vegetables.

3 The perishability of fruits and vegetables is also vulnerable to opportunistic behavior.
or the wholesale or even the retail market” (Nourse 1922, p. 593). Nowadays members delegate the formal authority regarding many aspects of the cooperative enterprise to the chief executive officer, but this is accompanied by granting each member the right, and also the obligation, to deliver a specified quantity of the commodity each season, i.e., access. Nilsson (1998, p. 42) describes its relevance as follows: “The delivery obligation for members is the dominating practice everywhere; in some countries it is even an obligation by law.” Direct access at the retail stage can be established by forward integration. Forwardly integrated growers have the decision power to direct the activities at the processor stage of production, i.e., the wholesaler has to buy the output of the owners of the cooperative.

Second, pooling is an important aspect in many organizations. Nilsson (1998, p. 43) observes: “The principle of equal treatment within agricultural cooperatives is traditionally strong. This involves things as pricing, e.g., prices are not always differentiated based on quality and quantity, and member control, e.g., the general rule is that all members have equal voting rights.” The importance of pooling is that revenues and costs are allocated to a certain extent independent of quantity and/or quality. The increasing grower heterogeneity poses also a challenge for traditional grower organizations because various aspects of these governance structures are tailored toward homogeneous members. Pooling will be referred to as the equality principle in this paper. The equality principle will entail equal treatment regarding the distribution of revenues as well as the delivery of output. The equal sharing rule regarding the distribution of revenues means that each member receives the same remuneration for a unit of output that is delivered, regardless the quality of the product.\(^4\) The equal sharing rule regarding the delivery of output entails that customer demand is met by proportionally delivering from the output of each grower, regardless the quality.

Third, it matters for the price level in a market whether a monopolistic seller is facing a fragmented demand side or many small sellers (growers) facing a few large buyers (retailers). The latter situation is increasingly representative for many agricultural markets because of the massive consolidation of retailers (Reardon et al. 2004). It undermines the bargaining power of growers regarding the price of exchange. The balance of power between sellers and buyers can be restored by organizing countervailing power between many small parties (Galbraith 1952) and drives some of the current governance structure changes. Having two upstream parties and one downstream party reflects that the concentration at the retail level usually entails that a retailer handles the products of various producers. Organizing countervailing power of the growers prevents the wholesaler from being able to deal with the growers separately. This is attractive for the growers in establishing a price with the wholesaler.

The positioning of this paper in the literature is as follows. First, the characterization of a governance structure in terms of income and decision rights implies that the governance response to the trend toward differentiation and innovation in marketing channels can be twofold. First, enterprises may change their income rights by restructuring their bylaws. For example, producer cooperatives have changed their bylaws to address the free-rider problem, the horizon problem, the portfolio problem, the control problem, and the influence problem in an environment of increasing heterogeneity (Cook 1995). Second, a different allocation of decision rights may be needed to deal effectively and efficiently with the increasing heterogeneity between members. Examples are the emergence of grower associations and moving decision power closer to final product markets (Hendrikse and Veerman 2001). The model in the next section highlights the second response.

Second, the model addresses the scope of the enterprise (Coase 1937) and is related to the subsequent literature on transaction cost economics (Williamson 1985), incentive systems (Holmström and Milgrom 1994), and hybrid forms (Makadok and Coff 2009). This literature is mainly concerned with bilateral relationships. However, channel relationships are usually multilateral. For example, when a number of sellers have to rely on a single source of demand, surpluses may make the sellers worry about (the price of) access at the downstream stage. This raises issues regarding the governance of horizontal as well as vertical relationships, i.e., the scope of the enterprise. The observation by Joskow (1991, p. 81) that transaction cost analyses “frequently ignore the possibility that there may be market power motivations or market power consequences for these organizational arrangements as well” has therefore to be addressed. Another example is that governance structure choice often entails governance externalities, i.e., third parties may be affected by a switch in governance structure between two parties. This paper addresses governance structure choice in a multilateral setting.

Third, the industrial organization literature formulates explanations for industry structure, including horizontal and vertical integration. Technological economies and market imperfections are important

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\(^4\) This is not at odds with the fact that many cooperatives, for instance, pay for quality. It is sufficient for the argument of this paper that some aspects of quality are not completely accounted for in the distribution of revenues.
determinants in explaining industry structure in this literature (Perry 1989). The vast majority of the papers in this literature can be classified as income rights analyses, whereas this paper takes a decision rights perspective.

Finally, the literature on marketing channel management assigns a prominent role to governance issues. Anderson and Coughlan (2002) distinguish seven governance structure issues in the organization of marketing channels. Their first issue is “vertical integration or not (whether to own the channel)” (p. 224). This issue is at the core of this paper. The incomplete contracting model of this paper can be viewed as a game theoretic treatment of channel ownership.

3. Model
This section presents an incomplete contracting, property rights model along the lines of Grossman and Hart (1986) and Hart and Moore (1990). The model studied is the simplest in which the issues of pooling, access, and countervailing power can arise: two upstream parties offering produce of different quality in excess supply to one downstream party in a situation with certainty. Figure 1 depicts two types of growers and a wholesaler. A high-quality grower generates value $A$, and a low-quality grower generates value $B$ ($B < A$). The source of this heterogeneity may reside in differences between growers in innovativeness, size, growth potential, and regional backgrounds. The high- (low)-quality grower will be referred to as grower 1 (2).

Assume that grower 1 (2) is able to produce one unit with value $A$ ($B$). Define $x_i$ as the investment by grower $i$, where $i = 1, 2$. Each grower is assumed to take an all or nothing decision regarding investment, i.e., $x_i = 0$ when grower $i$ does not invest, and $x_i = 1$ when grower $i$ invests. The costs of the (specific) investment of grower 1 (2) are defined as $k_1$ ($k_2$). The wholesaler demands at most one unit in total, but can spread its demand across the two producers. It is assumed that the wholesaler is essential for the growers to bring their produce to value.

Five governance structures regarding the allocation of asset ownership over these three parties are distinguished in Figure 2. A cross in a box indicates that this party has power/authority to decide regarding its assets. Governance structure I represents market exchange, i.e., the growers and the wholesaler are independent. The association of all growers is represented by governance structure II. A producer cooperative is an association of many independent growers (horizontal relationship) who jointly own a downstream processor/retailer (vertical relationship). An association is the same as a producer cooperative, except for the vertical relationship. Figure 2 distinguishes three producer cooperatives (III, IV, and V), depending on the number and type of growers owning the downstream party. Notice that other governance structures can be distinguished, for example, a governance structure without authority for one or both growers. We do not consider these governance structures because of transparency and length considerations.

A cooperative is usually conceived of as an organization consisting of many independent producers/consumers jointly owning an enterprise at another stage of production. This seems to be at odds with Figure 2, where the authority in a cooperative seems to be allocated to either one or two growers. However, this is not problematic for the model. It can be shown that many identical producers/consumers will always prefer a governance structure in which they are united above a governance structure in which they are all independent, ceteris paribus. Countervailing power drives this result. Each box in Figure 1 can therefore be thought of as one grower or as an association of many identical growers.

The marketing literature on dual distribution channels is advancing this research program (Balasubramanian 1998, Chiang et al. 2003, Liu and Zhang 2006, Purohit 1997, Zettelmeyer 2000). The work of Bolton and Whinston (1995) is most related to this paper. They also consider the choice of governance structure in a setting with multilateral trading relationships. Their model consists of one seller and two buyers; with some probability, upstream capacity is insufficient to satisfy downstream demand. Its main focus is on supply assurance concerns when several downstream firms are competing for inputs in limited supply.

Table 1 distinguishes the governance structures by their decision rights in terms of ownership/authority over assets (Figure 2) and priority access. Priority access of a grower means that the wholesaler is not allowed to reject the produce of this grower. Once production costs are sunk, the active producer(s) negotiate with a monopoly wholesaler. Following Hart and Moore (1990), the outcome of negotiations between independent firms is assumed to be the Shapley value. It captures the implica-
This reflects the equality principle. It entails that the revenues of the growers have to be shared equally over the parties jointly owning the assets when they both produce. Grower 1 and grower 2 earn the same in governance structures II and V when they both invest because of the aspect of pooling of revenues of the equality principle.

Second, notice that the decision rights of governance structures I and II are identical in Table 1. However, governance structures I and II differ in terms of total revenue as well as the distribution of the revenues. The total revenue \((A)\) generated in governance structure I is larger than the total revenue \((A + B)/2\) generated in governance structure II. This is because of the aspect of pooling of deliveries of the equality principle in governance structure II. The difference in the payoff of growers 1 and 2 is also due to the lack of countervailing power and the presence of a bilateral monopoly to a certain extent (because of member heterogeneity) in governance structure I. Consider the lack of countervailing power in governance structure I. Supposing that there is no member heterogeneity, i.e., \(A = B\), each grower in governance structure I will receive one-sixth of the surplus, whereas the wholesaler will receive two-thirds. Each grower in governance structure II will receive one-fourth of the surplus, whereas the wholesaler will receive one-half. Governance structure I, i.e., the situation with the most intense competition between growers and therefore a lack of countervailing power, is most beneficial for the wholesaler. Consider next the bilateral monopoly feature of governance structure I. The difference between \(A\) and \(B\) represents the uniqueness of grower 1. This is beneficial for grower 1, but goes at the expense of grower 2 as well as the wholesaler. If the difference between the growers becomes very large, then the market is close to a bilateral monopoly. Grower 1 and the wholesaler

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**Table 1** Decision Rights in the Five Governance Structures

<table>
<thead>
<tr>
<th>Governance structure</th>
<th>Authority grower 1</th>
<th>Authority grower 2</th>
<th>Authority wholesaler</th>
<th>Priority access grower 1</th>
<th>Priority access grower 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>II</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>III</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>IV</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>V</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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**Table 2** Distribution of Revenues in Each Governance Structure When Both Growers Invest

<table>
<thead>
<tr>
<th>(x)</th>
<th>(G)</th>
<th>Shapley value grower 1</th>
<th>Shapley value grower 2</th>
<th>Shapley value wholesaler</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1,1)</td>
<td>I</td>
<td>((3A - 2B)/6)</td>
<td>(B/6)</td>
<td>((3A + B)/6)</td>
</tr>
<tr>
<td>(1,1)</td>
<td>II</td>
<td>((A + B)/8)</td>
<td>((A + B)/8)</td>
<td>((A + B)/4)</td>
</tr>
<tr>
<td>(1,1)</td>
<td>III</td>
<td>(A)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(1,1)</td>
<td>IV</td>
<td>0</td>
<td>(B)</td>
<td>0</td>
</tr>
<tr>
<td>(1,1)</td>
<td>V</td>
<td>((A + B)/4)</td>
<td>((A + B)/4)</td>
<td>0</td>
</tr>
</tbody>
</table>

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11 The equality principle is also present in governance structure I, but in a generic way. There is no averaging of payoffs of different types of growers, because there is no collective ownership of assets by different types of growers.
4. Efficient Governance Structures

The standard incomplete contracting model consists of a two-stage noncooperative game: a governance structure stage and an investment stage (Grossman and Hart, 1986; Hart and Moore, 1990). The relationship between the stages is that the choice of governance structure in the first stage determines the incentive to invest in nonverifiable actions of each party in the second stage. To be more specific, a party is willing to deteriorate its bargaining position by making costs of specific investments in the second stage when the governance structure in the first stage of the game allocates sufficient bargaining power to this party to recoup its costs of investment in the ex post bargaining process.

There is a straightforward general pattern in the subgame perfect equilibrium investment decisions.\(^{14}\) If \(k_1\) and \(k_2\) are sufficiently small, then both growers invest in several governance structures. Similarly, if both \(k_1\) and \(k_2\) are large, then both growers do not invest. If \(k_1\) is relatively small and \(k_2\) is large, then grower 1 invests and grower 2 does not invest. The reverse also holds.\(^{15}\)

An efficient governance structure entails that only one grower invests.\(^{16}\) The identity of this grower is determined by the investment generating the highest surplus, i.e., max\([0, A - k_1, B - k_2]\). Investment by grower 1 is efficient when \(k_2 > k_1 + B - A\) and \(k_1 < A\). Investment by grower 2 is efficient when \(k_1 > k_2 + A - B\) and \(k_2 < B\). It is efficient that nobody invests when \(k_1 > A\) and \(k_2 > B\). Efficiency of a governance structure depends on the values of \(A\) and \(B\), and the costs of specific investments. Many cases have to be distinguished, and the results are summarized in Figure 4.\(^{17}\) The notation I/II (I/V) in this figure means that either I or II (I or V) is efficient, which depends on the values of \(X\), \(Y\), and \(Z\).

Several observations regarding Figure 4 will now be formulated. There are three observations regarding inefficient governance structures. First, there are various governance structures resulting in underinvestment, i.e., no grower produces. If \(k_1\) is close to \(A\) and \(k_2\) is close to \(B\), then neither grower 1 nor grower 2 will invest in the governance structures I and II. The main source of the inefficiency is that the wholesaler has too much power. Second, there is overinvestment

\(^{12}\) Notice that this reasoning provides also the motivation for restricting our analysis to one grower 1 and one grower 2. Taking \(A = B\) and comparing governance structures I and II immediately reveals that identical growers increase their Shapley value by merging. More generally, suppose that there are \(n\) identical growers, one wholesaler, and the surplus to be divided is 1. The Shapley value is equal to \((1/n(n + 1), 1/(n(n + 1), \ldots, 1/(n(n + 1), n/(n + 1))\) when the growers are independent, whereas the Shapley value is \((1/n + 1/2n, \ldots, 1/n + 1/2n, 1/2)\) when the growers are integrated.

\(^{13}\) We assume regarding the second stage of the game that grower 1 decides before grower 2. If grower 2 invests first, then the market is sometimes preempted. However, the main results continue to hold when this sequence of investment decisions is adopted.

\(^{14}\) The supplemental appendix to this paper (available at http://hdl.handle.net/1765/22815) provides the calculation of the subgame perfect equilibrium investment choices and payoffs in the second stage of the game. It is available upon request from the author.

\(^{15}\) There are a few exceptions within this general pattern. For example, low-quality grower 2 will switch in governance structure I from not investing when \(k_2 < A/2\) and \(B/6 < k_2 < B/2\) to investing when \(k_2 > A/2\) and \(B/6 < k_2 < B/2\). The reason is that grower 1 invests when \(k_2 < A/2\), whereas grower 1 is not investing when \(k_2 > A/2\). The switch from a competitive situation for grower 2 when \(k_2 < A/2\) to a bilateral monopoly when \(k_2 > A/2\) increases the payoff to such an extent that investment becomes attractive. Second, grower 2 will switch in governance structure III from not investing when \(k_1 < A\) and \(k_2 < B/2\) to investing when \(k_1 > A\) and \(k_2 < B/2\). Grower 2 faces foreclosure because of priority access in governance structure III when grower 1 produces. However, if the costs of investment are above \(A\), then grower 1 will not invest. This provides the opportunity for grower 2 to produce. Grower 1 will receive half of the revenues because of its control over the wholesale channel. Finally, grower 2 will not invest in governance structure IV when \(k_1 < A/2\) and \(k_2 > B - A/2\). Grower 2 will not invest despite ownership of the wholesaler because receiving half of the revenues of grower 1 due to having authority over the assets of the wholesaler is more attractive than investment.

\(^{16}\) The classic motivation for the focus on efficient governance structures is that competitive processes are likely to winnow out the inefficient governance structures (Alchian 1950). A more recent motivation is provided by Wernerfelt (1994). He proposes an efficiency criterion for marketing design. It entails that “parties in vertical trading relationships allocate their efforts towards marketing and information exchange such that no other arrangement makes them all better off” (p. 462).

\(^{17}\) The supplemental appendix to this paper distinguishes these cases, and the values of \(X\), \(Y\), and \(Z\) are defined.
in the governance structures I, II, and V when $k_1$ and $k_2$ are small. Both growers invest because the incentive to invest is too strong. This is inefficient because the processor can handle only one product.\(^{18}\)

Third, there are governance structures in which exactly one grower is producing, but it is the wrong grower from an efficiency perspective. There are three sources of this inefficiency. Priority access of the inefficient grower deteriorates the incentive to invest of the efficient grower. This occurs in the governance structures III and IV for certain ranges of the parameter values. For example, only grower 1 invests in governance structure III because of access priority when $A/2 < k_1 < A$ and $k_2 < B/2$. The lack of countervailing power in governance structure I reduces the revenues of grower 2 to such an extent that investment is not profitable anymore when the costs of investment are above $B/6$. Pooling in governance structure II is attractive for grower 2 in terms of revenues, but it is not sufficient to cover the costs of investment when $k_2 > (A + B)/8$.

Four observations are formulated regarding efficient governance structures. First, an efficient governance structure provides sufficiently strong incentives for the efficient grower to invest and sufficiently weak incentives for the inefficient grower to not invest. Sufficiently weak incentives are provided to the inefficient grower by allocating priority access to the efficient grower, i.e., governance structure III or IV. This result holds for all costs of investment. To be more specific, the choice of efficient governance structure to the northwest of the 45° line entails that grower 1 invest and grower 2 does not. Governance structure III is always efficient because no power is allocated to grower 2. Similarly, governance structure IV is efficient to the southeast of the 45° line in Figure 4 because grower 2 invest and grower 1 does not. Grower 1 will not invest in governance structure IV regardless the costs of investment, because no power is allocated to grower 1. Governance structure III or IV is therefore always efficient.

Second, efficiency requires that only grower 2 invests when $k_1 > A$ and $B/2 < k_2 < B$. Grower 1 will not invest because the costs of investment are too high. Grower 2 needs strong incentives to invest because the costs of investment are high. Governance structures IV (priority access) and V (equality principle and control over the wholesaler) allocate sufficient power to grower 2 to induce investment. Similarly, if $A/2 < k_1 < A$ and $k_2 > (A + B)/4$, then governance structures III (priority access) and V (control over the wholesaler) will elicit investment by grower 1 only. Third, grower 1 will not invest when $k_1 > A$ and $k_2 < B/2$. All governance structures giving some power to grower 2 will result in the efficient outcome. Similarly, if $k_1 < A/2$ and $k_2 > (A + B)/4$, then grower 2 will not invest. All governance structures result in the efficient investment by grower 1.

Fourth, governance structure IV is efficient to the northwest of the 45° line when $k_2 > B - A/2$. Grower 2 will not invest despite having all the power because owning the wholesaler results in half of the revenues of grower 1 without making the costs $k_2$ of investment.

5. Governance Structure Changes at the Greenery

The Greenery is the outcome of a merger between nine regional fruit and vegetable auction cooperatives. The timing is informative regarding the driving force behind this governance structure change. The Netherlands did not have a competition authority to enforce antitrust laws before 1997. The Dutch parliament decided that it had to be erected. In 1997 preparations were made to start its activities in January 1998. In December 1996, the merger of the nine auctions was concluded to prevent the possibility that it might be rejected by the new competition authority as too powerful a player in the market. In terms of our model, the merger is a shift from governance structure I to governance structure II. The Greenery
establishes countervailing power for the fragmented growers in a market where the wholesale/retail stage of production has been consolidating. It entails a redistribution of payoffs from the processor to the growers. The growers receive half of the quasi surplus in governance structure II, whereas they receive less in governance structure I. If \( A \) is close to \( B \), then both growers benefit from a switch from governance structure I to governance structure II.

The trend of consumers asking for more variety and higher quality has induced some growers to innovate, therefore increasing member heterogeneity. This is reflected on the one hand in a higher level of \( A \) because of the willingness of consumers to pay more for higher quality, and on the other hand in a higher level of \( k_1 \) because of the increased efforts/costs of innovation. Increasing heterogeneity creates problems in a heterogeneous association. Pooling limits the payoff received by innovative growers for their innovative efforts. One way to increase the reward for all growers in a heterogeneous association is to increase their market power even more. This was done by forward integration. The Greenery established forward integration by acquiring two fresh produce wholesalers, the Dutch Van Dijk Delft group and the Fresh Produce Division of Perkins Food, a UK-based wholesaler (Bijman 2002, p. 101), to start direct trade with major food retailers. It constitutes a switch from governance structure II to governance structure V.

However, heterogeneous cooperatives have difficulties in keeping highly innovative growers. Some large growers left because of “cross-subsidization of small growers” (Bijman and Hendrikse 2003, p. 102). Innovative growers started product-specific bargaining associations. There were also some innovative growers leaving the cooperative to form bargaining associations and marketing cooperatives to advance their specific interests. They felt that marketing efforts could be improved to highlight their products. It is reflected in our model by a higher level of \( A \). The self-selection of innovative growers into grower associations represents the shift from governance structure V to governance structure IV.\(^{19}\) The disadvantage of governance structure IV for the innovative growers is that they do not control the infrastructure at the downstream stage anymore, and therefore have to pay a price for this loss of control. However, they are willing to pay this price because they escape the pooling aspect of the cooperative.

Nowadays, many cooperatives try to counter this process of adverse selection by spending considerable effort in developing member benefit programs. Different classes of members are distinguished based on meeting certain transaction requirements, like transaction volume, quality of produce, and delivery time. Differentiation occurs regarding cash payments as well as capital titles. Cooperatives with strong incentive structures are characterized by “individualized” rather than collective capital structures (Nilsson 1998). The introduction of member benefit programs increases the number and extent of quality attributes covered by specific clauses in incentive contracts. The effect is that accounting for the heterogeneity of members in payment schemes reduces the heterogeneity between the members in the quality attributes/dimensions that are left unspecified by formal contracts. The introduction of member benefit programs entails from an incomplete contracting perspective that a smaller difference between \( A \) and \( B \) has to be governed. In terms of governance structures, a member benefit program reduces the negative impact of the equality principle for the high-quality growers in governance structures II and V. Innovative growers do not leave the Greenery anymore, or even come back to the Greenery. Innovative growers coming back to the Greenery is an example of a switch from governance structure IV back to governance structure V.

Notice the contrast between a complete contracting principal–agent model and the above incomplete contracting analysis. The focus of a complete contracting analysis would be on monetary rewards for the provision of incentives, where the optimal contract satisfies incentive compatibility, participation, and renegotiation proofness constraints. The completeness aspect of the analysis is reflected in the compensation package being contingent on all observable contingencies. Incomplete contracting analyses start with the observation that not all future events can be described in a binding contract. Many decisions and transactions are left open to be determined later. This shifts the focus away from incentive issues on compensation contingent on outcomes to procedural and institutional design issues. The control variables become ownership titles, control rights, decision making rules, discretion, tasks, authority, and the like, to be allocated among contracting parties. This allows for addressing the costs and benefits of integration and the boundaries of the firm, and therefore the structure of marketing channels. Integration strengthens the investment incentives of the owner of the newly integrated firm, but the previous owner’s bargaining position is weakened.

6. Conclusions and Further Research
The trend toward differentiation and innovation has resulted in changes in the governance structure of marketing channels. Economic and organizational
factors determine the efficient governance structure (Hansen and Wernerfelt 1989), but these factors differ in attractiveness for the various players. The forces of pooling, access, and countervailing power have been highlighted regarding the Greenery. Growers like countervailing power and priority access, whereas the high-quality grower and the wholesaler like self-selection. All players like more authority, which sometimes creates a positive governance externality for the grower outside the hierarchical relationship. Increasing member heterogeneity induces forward integration and subsequently the emergence of dual distribution governance structures, whereas the introduction of member benefit programs reverses this development to a certain extent.

One of the results from the model is that one of the dual distribution governance structures is always efficient, but other governance structures may be efficient as well. The inefficiency of other governance structures is due to either underinvestment caused by the wholesaler having too much power, overinvestment caused by the distribution of power being too dispersed, or investment by the inefficient grower due to priority access, lack of countervailing power, or pooling.

Future research may be pursued in various directions. First, a simplifying assumption of the model is that the wholesaler does not invest. However, this assumption may not be very restrictive because the wholesaler is already essential in the model. Second, the focus has been on efficient governance structures. Efficiency is an important consideration in the emergence and survival of governance structures, but strategic considerations also play a role in governance structure choice.

Third, a more restrictive assumption is that only the allocation of ownership is considered. Ownership is crude instrument to align interests. Many cooperatives nowadays spend considerable effort in redesigning their income rights in terms of developing member benefit programs. Examples are quantity discounts, quality premiums, service at cost, offering favorable possibilities to supply financial funds for specific members, and supplying services tailored to the broader interests of specific members. It is in line with the normative implication of the increasing heterogeneity for the efficiency of traditional cooperatives that the impact of the collective features has to be reduced.

Fourth, game theoretic models often have multiple equilibria for various ranges of the parameter values. Sutton (1990) proposes a bounds approach to deal with this multiplicity in empirical research. He adopts two approaches. First, a focus on a single market allows for adding more details, and therefore reducing the number of equilibria. The Greenery is an illustration. Second, results may be formulated that hold across a broad class of industries. This entails excluding as many outcomes as possible as equilibrium outcomes, e.g., based on the incentive considerations outlined in the above model. The focus is on which governance structures disappear because of changes in the exogenous parameters.

Finally, the interaction between complete and incomplete contracting is important for assessing the impact of the trend toward differentiation and innovation on the choice of governance structure. The standard modeling of complete and incomplete contracts represent two extremes (Bajari and Tadelis 2001). The cost of specifying an additional state of nature in complete contracting models is zero, whereas it is infinite in incomplete contracting models. Most realistic is that positive, finite costs are incurred by specifying an additional contractual clause, which may have an impact on the choice of governance structure.

Appendix

Characteristic Functions

Three cases regarding investment are distinguished. Consider first the situation where only grower 1 invests. The creation of value requires a coalition consisting of at least (the produce of) grower 1 and (the outlet of) the wholesaler. Table A.1 presents the characteristic function of the various governance structures. For example, all parties are independent in governance structure I. So, the value $A$ is only generated when at least grower 1 and the wholesaler are present. It implies that only $v(13)$ and $v(123)$ are equal to $A$. All other coalitions have value 0. Governance structure III reflects the situation of forward integration by grower 1 into wholesaling. The only requirement for the generation of value $A$ by a coalition is that grower 1 is part of the coalition. The change from governance structure I to governance structure III shows the effect of increased ownership over assets.

The second case consists of the situation where only grower 2 invests. The characteristic function will not be presented because it is similar to the previous case. Table A.2 presents the characteristic function for each governance structure when both growers invest. Governance structure I shows the effect of excess supply. The wholesaler adds value to the singleton coalitions $[1]$ and $[2]$; i.e., $v(13)$ and $v(23)$ are positive. The difference between $v(13) = A$ and $v(23) = B$ reflects the heterogeneity between the growers. The equality principle regarding revenues as well as delivery is reflected in the characteristic function of governance.
Figure A.2 Extensive Form of Governance Structures IV and V

Table A.1 Characteristic Function Forms When Only Grower 1 Invests

<table>
<thead>
<tr>
<th>x</th>
<th>G</th>
<th>v(1)</th>
<th>v(2)</th>
<th>v(3)</th>
<th>v(12)</th>
<th>v(13)</th>
<th>v(23)</th>
<th>v(123)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1, 0)</td>
<td>I</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>A</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>(1, 0)</td>
<td>II</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>A</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>(1, 0)</td>
<td>III</td>
<td>A</td>
<td>0</td>
<td>0</td>
<td>A</td>
<td>A</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>(1, 0)</td>
<td>IV</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>A</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>(1, 0)</td>
<td>V</td>
<td>A</td>
<td>0</td>
<td>0</td>
<td>A</td>
<td>A</td>
<td>0</td>
<td>A</td>
</tr>
</tbody>
</table>

The difference between these two governance structures is due to the difference in power of the wholesaler.

Shapley Values

Table A.2 presents the Shapley values belonging to the characteristic functions of Table A.1. If only grower 1 invests, i.e., \( x = (1, 0) \), then the incentive to invest for grower 1 in the various governance structures ranks as

\[ I = II < IV = V. \]

Table A.2 Characteristic Function Forms When Both Growers Invest

<table>
<thead>
<tr>
<th>x</th>
<th>G</th>
<th>v(1)</th>
<th>v(2)</th>
<th>v(3)</th>
<th>v(12)</th>
<th>v(13)</th>
<th>v(23)</th>
<th>v(123)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1, 1)</td>
<td>I</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>A</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>(1, 1)</td>
<td>II</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>(A+B)/4</td>
<td>(A+B)/4</td>
<td>(A+B)/2</td>
</tr>
<tr>
<td>(1, 1)</td>
<td>III</td>
<td>A</td>
<td>0</td>
<td>0</td>
<td>A</td>
<td>A</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>(1, 1)</td>
<td>IV</td>
<td>0</td>
<td>B</td>
<td>0</td>
<td>B</td>
<td>0</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>(1, 1)</td>
<td>V</td>
<td>(A+B)/4</td>
<td>(A+B)/4</td>
<td>0</td>
<td>(A+B)/2</td>
<td>(A+B)/4</td>
<td>(A+B)/4</td>
<td>(A+B)/2</td>
</tr>
</tbody>
</table>

The explanation is straightforward. Ownership over assets determines the distribution of bargaining power completely. Grower 1 owns all the relevant assets in governance structures III and V. The relevant assets are shared between grower 1 and another party in governance structures I, II, and IV.

The Shapley values belonging to the second case will not be presented in a separate table because of the similarity with Table A.3. The ranking of the governance structures in terms of the incentive to invest for grower 2 when only grower 2 invests, i.e., \( x = (0, 1) \), is

\[ I = II < III = IV = V. \]

The explanation is identical to the explanation of Table A.3.

If both growers invest, i.e., \( x = (1, 1) \), then the ranking of the various governance structures is more involved. The Shapley values are presented in Table 2 in the main text. It follows from this table that the ranking of the governance structures is

\[ I = II < III < IV = V. \]
structures in terms of the intensity to invest for grower 1 is

\[ IV < I < II < V < III, \quad \text{when } A < 11B/9; \]
\[ II < I < V < III, \quad \text{when } 11B/9 < A < 5B/3; \]
\[ II < I < V < III, \quad \text{when } 5B/3 < A < 7B/3; \]
\[ II < V < I < III, \quad \text{when } 7B/3 < A < 3B; \]
\[ II < V < I < III, \quad \text{when } 3B < A. \]

Similar, the ranking of the governance structures for grower 2 is

\[ III < I < II < V < IV, \quad \text{when } A < 3B; \]
\[ II < IV < V, \quad \text{when } 3B < A < 7B; \]
\[ IV < II < V, \quad \text{when } A > 7B. \]

**Extensive Form**

The extensive form is presented in two figures (Figures A.1 and A.2) because of the large number of possible choices that have to be specified. The payoffs in the extensive form reflect the standard incomplete contracting logic that revenues are distributed according to the distribution of bargaining power between all the involved parties (Shapley value), whereas the (relationship-specific) costs of investment are paid entirely by the investor.

**References**


Bijman, W. J. J. 2002. Essays on agricultural co-operatives; government are paid entirely by the investor.


