MARKETING CO-OPERATIVES: AN INCOMPLETE CONTRACTING PERSPECTIVE

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MARKETING CO-OPERATIVES:
AN INCOMPLETE CONTRACTING PERSPECTIVE

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Abstract

Marketing co-operatives (MCs) are analysed from an incomplete contracting perspective. The requirement of the domination of control by the members of a MC is a threat to the survival of a MC in markets where the level of asset specificity at the processing stage of production is increasing. However, a MC may remain an efficient governance structure when the increasing level of asset specificity is compensated for by a sufficient increase in the extent of product differentiation.

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MARKETING CO-OPERATIVES: AN INCOMPLETE CONTRACTING PERSPECTIVE

1 Introduction

Several agricultural and horticultural marketing co-operatives (MCs) have recently changed their governance structure.[1] Some MCs are moving in the direction of a conventional, profit maximising firm by issuing some kind of outside equity. Other MCs are relaxing the uniform treatment of the members. Zwanenberg et al. (1992) report about Kerry (1987), Avonmore (1988), Waterford (1988), and Golden Vale (1992) in Ireland. Examples in the Netherlands are Campina Melkunie, with its introduction of participation shares in 1991 (Campina Melkunie, 1991), pharmacist co-operative OPG, with its stock market listing in 1992 (Zwanenberg, 1992), dairy co-operative Friesland Frico Domo, with the introduction of personal financial shares for members in 1994 (NRC Handelsblad, 1994), and the merger of nine fruits and vegetables auctions into The Greenery International in 1995. Cook (1995) reports about the emergence of New Generation Co-operatives in the United States of America. They entail a reorientation of the activities of MCs from a supply to a demand driven perspective.

This article formulates a theory regarding the choice of governance structure in an agricultural chain of production. Some aspects of the viability of a MC will be investigated with the theory of incomplete contracts.[2] This theory is geared towards the institutional aspects of organisations in the form of property rights. A governance structure serves the role of providing investors with the confidence that the benefits of their investments are not captured by other parties. This approach is in line with the common view that the members of a MC own and decide upon the assets at the processing stage of production, whereas the shareholders own and decide upon these assets in an investor oriented firm (IOF). The main difference between a MC and an IOF is therefore that the input suppliers have the formal authority regarding investment decisions at the processing stage of production in a MC, whereas the processor has this right in an IOF. The implications of this difference for the efficient choice of governance structure will be analysed. An explanation is formulated for the emergence of the MC at the end of the nineteenth century as well as its current problems.

Section two highlights some aspects of the theory of incomplete contracts and applies it to an agricultural chain of production. Section three formulates the hypotheses of the paper. Section four concludes and indicates topics for future research.

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[1] This article is concerned with one-product co-operatives. Many co-operatives in Europe and California are like this. Co-operatives like in the Midwest of the United States of America are quite different.

[2] Kreps (1990) classifies economic theories according to the assumptions made with respect to the degree of rationality and self-interest orientation. The theory of incomplete contracts is characterised by bounded rationality and an opportunistic orientation.

2 The theory of incomplete contracts

The starting point in the theory of incomplete contracts is the observation that the complexity of the real world makes it too costly to describe all relevant contingencies regarding the exchange in a contract. Contracts are therefore necessarily incomplete. The issue of control in a governance structure is framed in terms of the problems associated with the specificity of investments. The incompleteness of contracts causes problems in situations with specific investments, because it prevents that the division of the surplus can be specified ex ante. The ex post division of the surplus will depend on the distribution of bargaining power and the ex post bargaining positions. The distribution of bargaining power and the ex post bargaining positions are determined by the choice of governance structure. This will have an effect on the investment decisions.[3]

The standard way of modelling these ideas is to employ a three stage non-co-operative game. The first stage consists of the choice of governance structure, where each governance structure is associated with a specific distribution of bargaining power. The second stage consists of the (relation-specific) investment decision. The investment decision determines the bargaining positions in the third stage of the game. The third stage consists of the choice between honouring the contract and renegotiating it.

Section 2.1 examines the relationship between the second and the third stage of the game, given a particular choice of governance structure in the first stage. Second 2.2 will use these results in order to analyse the relationship between the first and the second stage of the game. A definition of a MC is formulated which is in line with the incomplete contracting perspective. Section 2.3 presents two hold-up problems in the relationship between the farmer and the processor.

2.1 Hold-up problem

The incompleteness of contracts entails that not all eventualities can be described ex ante in a contract. Unforeseen contingencies which are not described in the ex ante contract will give rise to ex post opportunistic behaviour regarding the remaining surplus. An incomplete contract can only consist of clauses which are observable and verifiable by a third party. Clauses which are observable but not verifiable have to be left out the contract because they are not enforcable. Contractual obligations which are explicitly described in the ex ante contract have to be carried out, and if necessary enforced ex post, e.g. by the court.[4]

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[3] The incomplete contract literature (Grossman and Hart (1986) and Hart and Moore (1990)) provides an attempt to model transaction costs economics (Williamson, 1985) formally. An advantage of incomplete contract theory over transaction costs theory is that the behavioral assumption of opportunism is maintained in the analysis of all governance structures, whereas this is not the case in transaction costs economics. Another advantage is that it has sharpened the transactions costs argument by suggesting that the crucial difference between governance structures resides in the allocation of residual decision rights.

[4] The complete contracting approach does not make the distinction between observable and verifiable contracts. All observable actions are also verifiable. An ex post problem like the

The incompleteness of contracts causes problems when the parties involved in the exchange make specific, irreversible investments.[5] This puts the investor in a weak bargaining position regarding the division of the ex post surplus. However, the investor anticipates that the other party may take advantage of the incompleteness by claiming a larger share of the ex post surplus than initially agreed upon. This fear for ex post opportunistic behaviour prevents that the investor chooses the project with the highest surplus. This is the (inefficient) hold-up problem (Klein, et al., 1978).

A numerical example may illustrate the hold-up problem. Suppose a farmer considers buying new equipment at costs 40. The level of sunk costs (or the irreversible component of this investment, or the level of asset specificity) is equal to k_f. A processor is willing to pay 50 for the raw material produced by the farmer. The efficient decision of the farmer is therefore to invest, because there is a surplus of 50-40=10 to be realised.

The farmer and the processor sign a contract before investment takes place. A contract may specify that each party receives half of the surplus, i.e. the contract specifies a price 45. If the processor honours (H) this contract ex post, then each party earns 5. The problem with this contract is that situations may arise for which the contract does not specify anything, e.g. consumer demand is lower than expected. The processor will argue credibly that the quasi-surplus instead of the surplus has to be divided, because the investment in specific assets has weakened the bargaining position of the farmer. This will result ex post in the acceptance of these new terms regarding the exchange. The subgame perfect equilibrium strategy of the processor is therefore to renegotiate the ex ante contract. The processor claims half of the quasi-surplus, where the quasi-surplus is equal to the sum of the surplus and the sunk costs. The quasi-surplus is $10+k_f$. The ex post price will therefore be $40-k_f+(10+k_f)/2=45-k_f/2$. The payoff of the farmer is $45-k_f/2-40=5-k_f/2$ and the processor earns $5+k_f/2$.

The farmer anticipates that the incompleteness of the contract encourages ex post opportunistic behaviour by the processor. He responds by not accepting the contract when the level of asset specificity is above a certain level, even though it would be efficient. The farmer will not invest when $5-k_f/2\leq 0$, i.e. the value of k_f is above 10. The subgame perfect equilibrium strategy of the farmer is N, i.e. the farmer will not invest in specific assets, when the sunk costs are higher than 10. Figure 1 presents a situation where $k_f=20$. Hold-up is represented by the R-branch, whereas the hold-up problem is represented by the N-branch[6].

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hold-up problem and issues of governance have no role in a complete contracting approach because there are no contingencies which are not covered by the contract. The focus is on ex ante problems in the complete contracting approach, whereas ex post problems are at center stage in an incomplete contracting setting.

[5] These investments have a significant higher value within the relationship than in alternative uses.

[6] This example is extreme in the sense that there is either the efficient investment decision or no investment at all. Grossman and Hart (1986) have shown that there will be in general underinvestment.

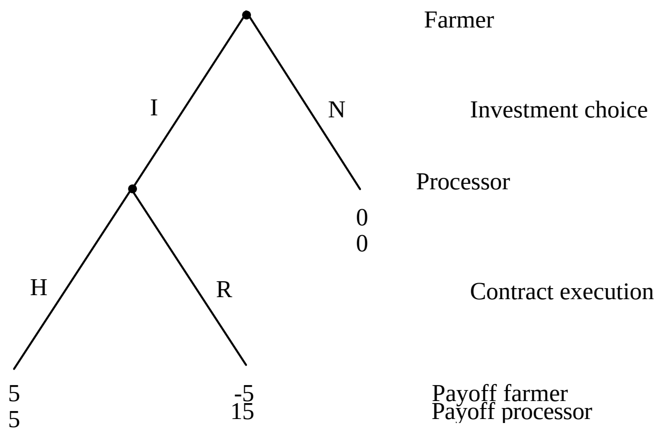

Figure 1: Hold-up problem

2.2 Governance choice and investment

The above example has been silent about the institutional setting in which the ex ante and the ex post price are established. It is assumed that the distribution of bargaining power is such that the (quasi-)surplus will be divided 50-50. This division of the surplus is associated with an IOF or market governance in the seminal contributions of Grossman and Hart (1986) and Hart and Moore (1990)[7].

The main point of incomplete contract theory is that the distribution of bargaining power depends on the choice of governance structure. Represent the distribution of bargaining power by a number S, where S is the share of the (quasi-) surplus received by the farmer. The ex post price in the governance structure with bargaining power distribution S is therefore equal to $40-k_f+(10+k_f)S$, because the subgame perfect equilibrium strategy of the processor is to renegotiate the ex ante contract price after the investment has been made.

The choice of governance structure can be included in figure 1 by incorporating an additional decision stage at the beginning of the extensive form. A governance choice is associated with the choice of a number S. Figure 2 presents the payoffs associated with the choice of governance structure and the choice of investment. The third stage of the game, i.e. the contract execution stage of the game, is summarised by the payoffs which are associated with the subgame perfect equilibrium strategy R. If the farmer invests in governance structure S, then he earns $40-k_f+(10+k_f)S-40=(10+k_f)(S-1)+10$.

[7] Hart and Moore (1990) use the co-operative game theoretic solution concept Shapley-value in order to derive that market governance is associated with the 50-50 split of the (quasi-)surplus.

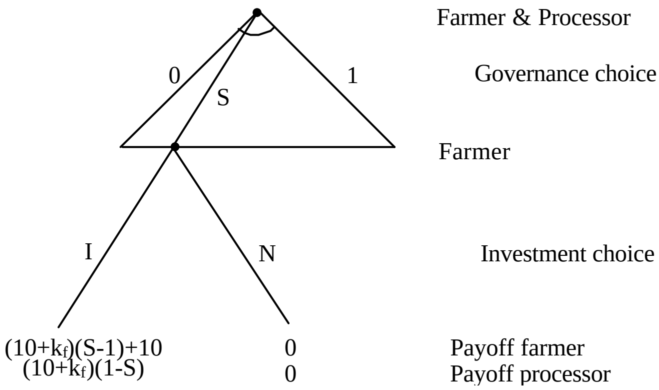

Figure 2: The choice of governance structure and investment

Three governance structures are distinguished: MC, IOF, and P(rocessor) I(ntegration). The IOF is characterised by control of the processor over the assets and inputs at the processing stage of production, whereas the farmers have control over investments at the farm. The value of S of an IOF is equal to 1/2. A MC is defined by the control of the input suppliers over the assets at the farming as well as the processing stage of production. The farmers are the residual claimants and they have decision authority in a MC regarding contingencies which are not described in the incomplete contract with the processor. They decide with respect to renegotiating the ex ante agreed upon input price for the processing stage of production. The value of S of a MC is equal to 1. Finally, PI entails control by the processor over investments at the farming as well as the processing stage of production, i.e. the processor decides with respect to unforeseen contingencies regarding investments at the farming stage of production. The value of S of a PI is equal to 0.[8] Table 3 summarises the difference between the three governance structures in terms of ownership in each stage of production.

Production stage	MC	IOF	PI
Farming	Farmer	Farmer	Processor
Processing	Farmer	Processor	Processor

Table 3: The allocation of ownership in various governance structures.

2.3 Hold-up problems in the farmer-processor relationship

Two assets are involved in the evaluation of the MC as an efficient governance structure. First, investments are made at the farm. A farmer has to invest in (specific) assets

[8] The only important aspect of this specification for the subsequent analysis is the ranking of the bargaining power of the farmers in the various governance structures. It is diminishing when there is a switch from the MC to the IOF and diminishes further when the IOF is replaced by the PI. The exact value of S does not matter, only the ranking is important for our analysis.

regarding land (fertiliser), labour (effort, knowledge) and capital (equipment, housing) in order to increase the likelihood of a good harvest. Second, specific investments at the processing stage of production are needed in order to process the harvest into final products.

Each specific investment is associated with a hold-up problem. First, the perishability of the harvest and the specificity of the assets at the farming stage of production puts a relatively small farmer in a weak bargaining position when a price has to be negotiated with a relatively large company processing the harvest. The fear of the farmer is that there will be hold-up in the negotiation process. Second, the investor at the processing stage of production fears hold-up regarding its investments when the farmers have all the bargaining power.

There are several ways of dealing with a hold-up problem. The most famous one in the agricultural world is the creation of countervailing power. It is created by downstream/forward integration of many small private entrepreneurs into a MC. The fear of farmers for hold-up has been the driving force behind the emergence of the governance structure MC in the past. Nourse (1922) writes:

> "Let us say that a small fruit-producing section has just been brought to bearing. The area is far from any large market, the product is perishable, and hence both risk and expense are high. Volume is not large enough to attract a private distributor. But success or failure, the salvaging of their investment, or the continuance of their life work may be at stake on the part of the growers. Hence it is argued (and demonstrated in practice) that the co-operative association of producers frequently achieves results where private outside entrepreneurship fails."

Each member of a MC owns assets at two stages of production. First, the farmer takes his own investment decisions and owns the resulting assets at his farm. Second, the farmers own the assets at the processing stage of production. The governance structure MC resolves the first hold-up problem, but the second hold-up problem remains unresolved.

The governance structure IOF eliminates the second hold-up problem. However, the first hold-up problem is not dealt with in satisfactory way by an IOF. The distribution of bargaining power is such that the fear for hold-up of farmers undermines the incentive of the farmer to invest.

The claim of this article is that the attractiveness of a MC reduces when final product markets require more specific investments at the processing stage of production in order to develop differentiated products. The reason is that farmers have to decide about investments at two stages of production when they are organised in a MC. They choose individually the farm investments and collectively the non-farm or MC investments. There is a tendency that the optimal investment decision with respect to bringing the produce to value at the processing stage will not be chosen by a MC because the investment decisions of the farmers are geared towards bringing farm output and MC output jointly to maximum value. Control over assets in an IOF is assigned to the party whose investment (with a high level of asset specificity) matters most at the processing stage of production, whereas it is not in a MC. These claims are made more precise in the next section.

3 MC versus IOF

This section extends the above example and provides a new way[9] of graphically representing the choice of governance structure from an incomplete contracting perspective when there are two hold-up problems.[10] We start with one hold-up problem.

Figure 4 is an alternative way of presenting figure 2. It depicts the relationship between the choice of governance structure and the hold-up problem regarding farm investments for various levels of asset specificity k_f. The downward sloping line presents all possible divisions of the surplus of size 10 between the farmer and the processor. The origin O reflects the ex ante bargaining positions of the farmer and the processor, whereas summarises the ex post bargaining positions. A governance structure is represented by an upward sloping line starting in ($-k_f$, 0). If the angle of this line is V, then the distribution of bargaining power in this governance structure is equal to S=(90°-U)/90°. The governance structure with S=(90°-X)/90° separates the set of efficient governance structures from the set of inefficient governance structures.

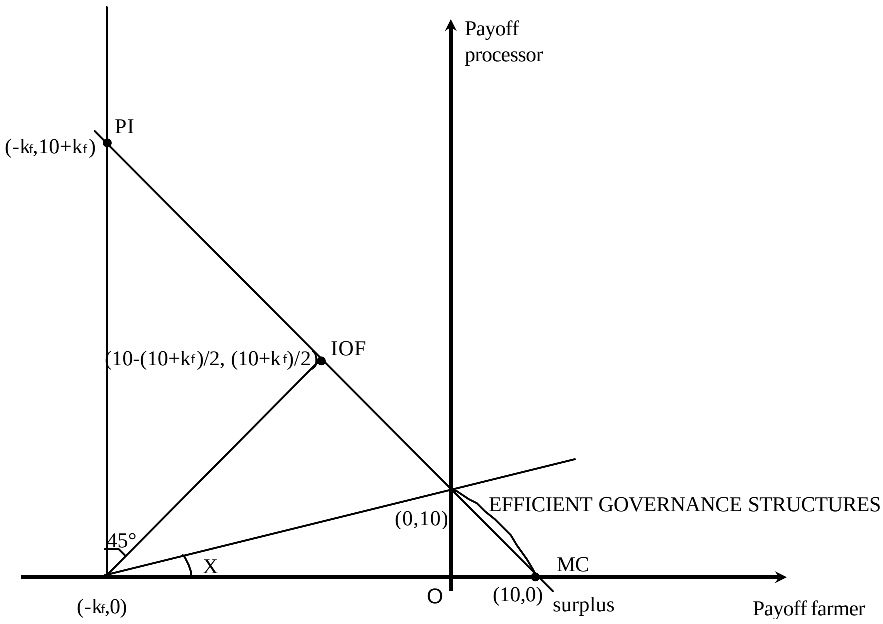

Figure 4: Governance structure and specific farm investments

A governance structure selects a point on the surplus line. The selection of a point on the surplus line is influenced by the distribution of bargaining power as well as the bargaining positions. The distribution of bargaining power, i.e. a particular line with a positive slope, is

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9 Grossman and Hart (1986) present their results in terms of a figure with the level of investment at each stage of production on the axes, whereas we put the payoffs of the two parties on the axes.

10 Insightful contributions from the closely related transaction cost approach are Royer (1995), Shaffer (1987) and Staatz (1987).

determined in the first stage of the game. This is summarised by the choice of the value of S. The choice of investment in the second stage of the game determines the bargaining positions in the final stage. This is summarised by the point ($-k_f$, 0). The point on the surplus line is determined by the intersection of the surplus line with the line with ($-k_f$, 0) on it and angle U, where S=(90°-U)/90°.

It is assumed in the theory of incomplete contracts that an efficient governance structure is chosen in equilibrium. Efficient governance structures are located in the north-eastern quadrant. Governance structures in the north-western quadrant violate the participation constraint of the farmer, i.e. the farmer will not invest because his payoff will be negative. Similarly, governance structures in the south-eastern quadrant violate the participation constraint of the processor, i.e. the processor will not invest in valuable, specific investments because the resulting payoff will be negative.

A switch from (0, 0) to ($-k_f$, 0) captures the fundamental transformation (Williamson, 1985) which takes place when investments in farm specific assets are made. An ex ante competitive situation is moved into an ex post bilateral monopoly problem. It implies a change in the bargaining positions. The bargaining is ex ante about the surplus 10, whereas the ex post bargaining is about the quasi-surplus $10+k_f$. The implications for the choice of governance structure differ for the ex ante and ex post situation. Every governance structure will ex ante result in the efficient investment choice, i.e. every value of S results in a division of the surplus which is in the north-eastern quadrant. However, the investment choice of the farmer is much more sensitive to the choice of governance structure in the ex post situation. Only governance structures with a value of S above a certain level will result in investment by the farmer. To be more precise, only governance structures with S ≥ (90°-X)/90° will result in investment by the farmer. If the selected point is outside the north-eastern quadrant, then there will be no investment by the farmer. The prospect of hold-up by the processor lowers the payoff of the farmer in these cases to such an extent that the farmer decides not to invest. This is the hold-up problem.

A number of comparative statics results can be derived from this simple model. First, the set of efficient governance structures shrinks when the level of asset specificity k_f increases. An increase in the level of asset specificity will shift the bargaining positions to the left in figure 4. It entails that the share of the sunk costs in the quasi-surplus is increased. This is bad for the bargaining position of the farmer and therefore the incentives to invest. However, this negative effect can be compensated for by allocating a larger share of the (quasi-)surplus to the farmer. This is established by a governance structure with a larger value of S.

Second, a MC is an efficient governance structure, regardless the level of asset specificity. The reason is that the farmer is the only party considering investment.

Third, a sufficient increase in the size of the surplus may increase the set of efficient governance structures when the level of asset specificity increases. An increase in the size of the surplus reduces the share of the sunk costs in the quasi-surplus. This effect may compensate for the effect that is described by the first comparative statics result.

Figure 5 depicts a situation where specific investments are considered at both stages of production. It is a straightforward extension of figure 4. Define the level of asset specificity of the farmer again as k_f and the level of asset specificity at the processor stage of production as k_p. Bargaining positions change from (0,0) to ($-k_f$,$-k_p$) due to the fundamental transformation. Governance structure, i.e. the value of S, is again important because it determines the way in which the (quasi-)surplus will be divided ex post. This determines the ex ante investment decision. Only governance structures with (90°-Y)/90°≤S≤(90°-Z)/90° are efficient.

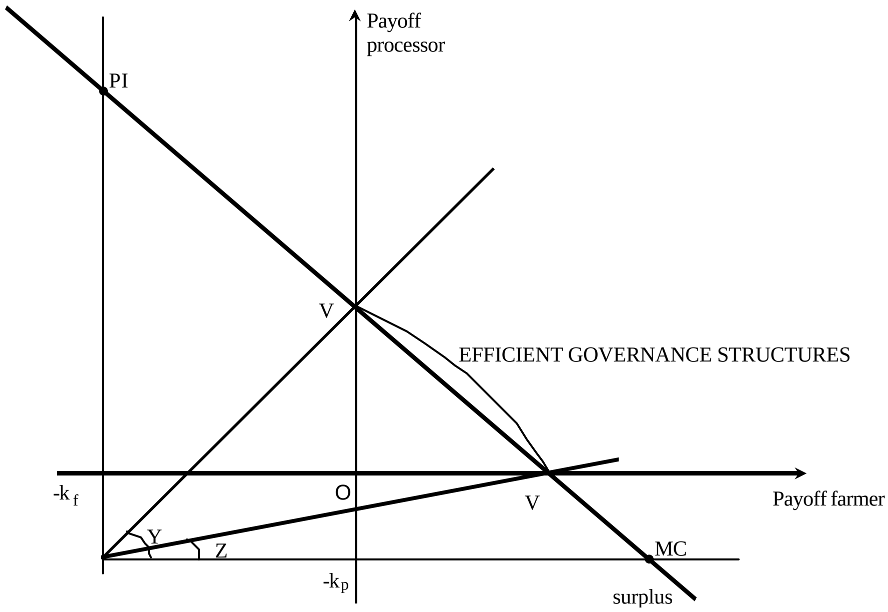

Figure 5: Two hold-up problems and efficient governance

The general presumption of this article is that institutions / governance structures matter. Specific results which follow from the above model will now be developed. Comparative statics results are established by the parameters determining the slopes of the two lines separating the efficient from the inefficient governance structures. The slope of the line with angle Z is $k_p/(k_f+V)$ and the slope of the line with angle Y is $(k_p+V)/\ k_f$, where V is now the size of the joint surplus generated by the two investments.

A first result is that an increase in the value of V will increase the set of efficient governance structures. The larger share of the surplus in the quasi-surplus provides more leeway in the choice of governance structure. Both parties feel secure that their investments will be recouped. An example of an increase in V is more product differentiation.

A second result is that an increase in k_p and/or a decrease in k_f will reduce the attractiveness of a MC as a governance structure. An increase in k_p and/or a decrease in k_f entails that the fear for hold-up regarding specific investments at the processing stage of production becomes relatively more problematic. A MC is not good at dealing with this hold-up problem because it is geared towards advocating and protecting the interests of farmers.

A third result is that an increase in k_p and V increases the upperbound of the set of efficient governance structures. The effect on the lowerbound is not clear. An increase in the specificity of the investments at the processor stage of production and more differentiated markets increases the attractiveness of the IOF. This does not necessarily decrease the attractiveness of the MC. The reason is that the unattractive change in the ex post bargaining position for the viability of the MC may be compensated for by an increase in the size of the surplus. This has been elaborated upon in the third comparative statics result regarding figure 4.

The main hypothesis which is implied by these observations is that an enterprise will not switch from an IOF to a MC when the level of asset specificity at the processing stage of production is increasing.[11] The IOF does not diminish in attractiveness compared to a MC when the efficient level of asset specificity at the processing stage of production is increasing. This is in line with the main result of the Grossman and Hart analysis (1986, p. 708), which states that 'Firm 1 control will be desirable when firm 1's ex ante investment is much more important than firm 2's (so that firm 2's underinvestment under firm 1 control is relatively unimportant) and when overinvestment by firm 1 under firm 1 control is a less severe problem than underinvestment by firm 1'.[12] However, this result does not necessarily imply that the MC is inefficient when the level of asset specificity at the processing stage of production is increasing. It may remain an efficient governance structure and provides an explanation for the coexistence of MCs and IOFs in many agricultural and horticultural markets.

4 Conclusion and further research

This article has investigated some aspects of the viability of the MC from an incomplete contracting perspective. The main difference between a MC and an IOF is that the input suppliers have the formal authority regarding investment decisions at the processing stage of production in a MC, whereas the processor has this right in an IOF. A MC has to address two hold-up problems. First, it has to prevent post-harvest hold-ups of perishable farm products. The countervailing power feature of a MC resolves this problem. Second, a MC has to prevent hold-up regarding the direction of specific investments at the processing stage of production. This second problem is not important when the investments of a MC are not specific, which is the case in markets with homogeneous products. However, a MC may not be the most efficient governance structure in differentiated product markets where high levels of asset specificity at the processing stage of production are required. It is claimed that an increase in the extent of asset specificity at the processing stage of production relative to the extent of asset specificity at the farm will not be accompanied by a switch from an IOF to a MC. A governance structure is predicted in which farmers have less decision power. This seems relevant in the current agricultural and horticultural markets.[13] [14] They require

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[11] Our claims regarding the level of asset specificity of the investments at the processing stage of production are formulated relative to the hold-up problem regarding farm investments. So, a statement in this section like the efficient level of asset specificity has increased can be interpreted as the efficient level of asset specificity of the investments at the processing stage of production has increased relative to the efficient level of asset specificity at the farming stage of production.

[12] Notice that it also follows immediately from figure 4 by replacing the word 'processor' by 'government' that farm ownership by the government (as in the former communist societies) is also not an efficient governance structure.

[13] American Crystal Sugar is an example of an IOF which was converted to a MC. Red River Valley Sugar Beet Growers Association acquired the IOF American Crystal Sugar in 1973. Volkin and Bradford (1975) write that ′What grower association leaders really feared was the possibility that American Crystal would close one or more of its four plants in Minnesota and North Dakota. This concern was supported by observations that ′factory

nowadays specific investments in products with brand names in order to meet the specific demands in the many niches of the market.[15] The attractiveness of a MC decreases with respect to the adoption of efficient investment projects at the processing stage of production because members will also take considerations regarding return on farm investments into account when decisions are made.

It is obvious that the above model is a simplified account of a MC. For example, the model specifies one farmer and one processor. However, every MC includes a number of (different) farmers. This feature can be incorporated without changing our results, because the only important aspect of our characterisation of a governance structure is the ranking of bargaining power of farmers in each governance structure. A second topic which is not addressed is whether the processor accepts the total harvest or a contracted quantity. Normally, an IOF will contract a specific quantity, but in many circumstances a MC will have to accept the total production of a farmer. This is an important distinction. However, a much more detailed specification of the production technology and the demand side of the market is needed to deal with this aspect in a satisfactory way. This is not done in this article in order to keep the analysis as simple as possible. Third, MCs have also been set up in order to do a more effective and efficient processing and marketing than existing IOFs. Hendrikse (1998) addresses some aspects of this issue. Fourth, the costs of the change of a governance structure are not incorporated in the analysis. We have followed in this the standard assumption in the theory of incomplete contracts, i.e. it is assumed that the efficient governance structure is chosen in equilibrium. However, the nature of the modelling approach is such that it does not prevent that this issue is addressed. Many other topics besides these extensions are relevant, e.g. financial contributions of members, legal status, fiscal regime, member involvement, ethical attitudes and (diversification) strategy. Including such issues may of course change some of our conclusions. However, our simple model generated already some interesting relationships.

An important topic for future research is to investigate the possibilities regarding the design of a governance structure which on the one hand maintains the special character of a MC and on the other hand eliminates the inefficiencies associated with this governance structure. Most solutions which are nowadays considered within the MC consist of some differentiation in the financial terms being offered to members. Examples are preference shares and quantum discounts. They take account of the variety between the members. However, this does not solve the second hold-up problem. A governance structure has only

upkeep was not being maintained for most efficient operations' and ′Steps had to be taken to protect growers' long-term sugar beet production patterns, which had meant so much to their livelihood'. The change at American Crystal Sugar does not undermine our theory because it provides an example of increasing importance of the first hold-up problem, without making any references to the final product market. If the first hold-up problem becomes more important and the second does not, then our theory predicts that switches from an IOF to a MC are to be expected.

[14] It is claimed that the perishability of crops is nowadays not as much a problem anymore due to technological developments. This observation strengthens our claim, because it suggests that the first hold-up problem has diminished in importance compared to the second hold-up problem.

[15] A brand name is characterised by a very high level of asset specificity.

one degree of freedom in the above model, i.e. the value of S, in order to solve two hold-up problems. An additional degree of freedom has to be created in order to be able to deal with both problems. The emergence of new governance structures (grower associations, participation companies) or new financial instruments (by exploiting the distinction between income and decision rights) seem to be promising developments in this direction.

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