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Contracts as a Tool for Improving Efficiency in the Norwegian Roundwood Markets

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Abstract

The principal objective of this work was to develop market competence and more efficient trade mechanisms in the Norwegian roundwood markets. The standard delivery contract covers about 90% of the traded roundwood volume in Norway. Information about the functioning of this contract was gathered by interviewing market agents, studying their homepages and arranging a workshop. This information was then used to contrast the standard delivery contract with a set of rules designed for best practice contracting, while at the same time taking into account that most of the roundwood sales are organised by cooperatives. Improvements of the contract are suggested.

Keywords: Contract theory, timber market, roundwood market

1. Introduction

There are almost 120 00 forest owners in Norway, 44 000 of them members of one of the eight regional forest cooperatives, all organised in the nationwide Norwegian Forest Owners' Federation. The cooperatives organise almost 80% of the roundwood supply in Norway. Besides, some of the largest forest properties are organised directly in a separate nationwide association, Norskog. This association organises all its roundwood sales through its daughter company Nortømmer Lmt. Their market share is about 10%. So is the share of SB Skog (Statskog-Borregaard Skogsdrift Lmt), a third major player. Nortømmer and SB skog are companies, not cooperatives. Practically speaking, Nortømmer works somewhat like a cooperative for Norskog's about 200 members (owners with large forest properties). There is little or no competition between the regional cooperatives, but they compete with Nortømmer and SB Skog. Any forest owner is free to deliver roundwood to whomever he wants, no matter membership or not.

The organised collaboration of the cooperatives started about 100 years ago and developed well to balance out market power exercised by the buyers. There

are several additional reasons why the cooperation is still important. First, the average forest owner has a very small market share. Second, the estates are spread over large areas and, third, the average transport costs make a large part of the value of roundwood. This setting calls for investigation of issues such as risk spreading and transaction costs.

Two industries buy almost all the Norwegian industrial roundwood. Sawmills process sawlogs to sawnwood, and pulp and paper mills process pulpwood to paper products. In contrast to the suppliers, the demanders are few.

There is a long tradition of negotiating roundwood prices in Norway. After WWII followed a few years with administratively set and binding maximum prices, but after 1952 the prices were determined annually through central negotiations for about 40 years. Prices for pulpwood and sawlogs were negotiated separately. The Forest Owners' Federation required the members to deliver their roundwood supplies through the regional associations, and the pulpwood buyers organised their demand through their nationwide federation. Considering this case with one annual and nationwide negotiated price and individual quantity responses from about 120 000 independent suppliers and some few demanders market clearing was seldom achieved. Lack of clearing resulted in various types of regulations being implemented, for example ban on new contracts, and a host of bonus and penalty measures.

The price negotiations were decentralised to regional levels for sawlogs in 1984 and for pulpwood in 1992. From then on the national and regional buyers negotiated with the regional forest owner associations and with Nortømmer, and later also with SB Skog. As also the price periods became shorter, at least in some years, the prices became less sticky.

The European Free Trade Agreement (EFTA) Surveillance Authority (ESA) influenced the Norwegian roundwood market somewhat from April 1997 on by opening for more individual contracting, e.g. by abolishing members' compulsory delivery through their associations. This also led to a restructuring of the forest owner associations into fewer and larger cooperatives, implying a change of role from brokers to buyers (and re-sellers).

Almost all roundwood sales in Norway are delivery sales basically regulated by a common agreed framework from 1998. The change of the associations into cooperatives and the increased emphasis on environment and certification of all activities have forced a few modernisations of these regulations, but the basics of the standard delivery contract is still almost identical for all delivery sales. It also serves as a basis for all other roundwood sales, although e.g. stumpage sales need to have a set of additional regulations.

The forest sector seems rather demand-driven. In the short run the shifts in the end-use demand for forest products more or less decide the roundwood price movements. The forest owner cooperatives, Nortømmer and SB Skog aim at high roundwood prices when negotiating with the industries, and they surely also take into account current supply-side information while negotiating, but once roundwood prices and volumes have been decided the major challenge is to provide these quantities. Although there are contracts designed to provide some flexibility in this system the standard delivery contract with its negotiated prices still remains the basic instrument for about 90% of the traded volumes.

The challenge of providing the demanded quantities is a major one. The stakeholders are constantly stressed by changing external factors making it difficult to match supply with demand. Examples of such factors are end-use demand, production costs, logging conditions and storm fellings. But what about the contract? Is it well designed for coordination when the factors shift, does it motivate sufficiently, is it cost effective? In this paper we assess this contract. We do so in a pragmatic way by contrasting it to Bogetoft and Olesens (2002) “Ten rules of thumb in contract design”, also drawing heavily on Bogetoft and Olesen (2004; 2007). In this way we aim first of all to shed some light on pros and cons of this contract, and also to suggest some amendments.

2. Theory and Method

2.1 Strands of Contract Theory

Contract theory may be regarded as a collective term for different approaches, where transaction cost theory, property rights theory and incentive systems theory make different parts (Gibbons 2005; Wu 2006). Assume that a contracting process may be divided into ex ante and ex post, distinguished by the period when uncertainty related to the process is revealed. While property rights theory focuses on (inefficiencies arising from suboptimal) ex ante investments or efforts, transaction costs theory rather has its main focus on ex post rent seeking (as a source of inefficiency). Property rights theory assumes that all decisions rights are contractible ex post, while transaction costs theory does not allow important variables to be contractible even ex post.

Incentive systems theory may be regarded as something flexible in between the two. Like property rights theory it focuses on ex ante investments and efforts to avoid inefficiency, but it allows a greater range of incentives to be used. It assumes that important contractible performance actions and measures are available ex ante (as interim signals) for making incentive contracts. Consequences of revealed uncertainties and contingencies are also contractible ex ante although known only ex post. Table 1 illustrates the scheme.

Table 1. The contracting processes for the theories of transaction costs ($a_c - \sigma_0 - d_N$), property rights ($a_0 - \sigma_0 - d_p$) and incentives ($a_N - \sigma_c - d_A$). Occurrences within incentives theory in bold. Based on interpretations of Gibbons (2005) and Wu (2006).

Period	Stage	Occurrences
Ex ante	1	Governance structure and contracts negotiated
	2	Relationship-specific investments/efforts are made <ul style="list-style-type: none"> • a_0 – observable but not contractible • a_N – not observable actions • a_c – contractible actions
Interim (signals)	3	Performance measures and contingencies are revealed <ul style="list-style-type: none"> • σ_0 – observable but not contractible • σ_c – contractible actions
Ex post	4	Decisions are taken <ul style="list-style-type: none"> • d_p – contractible ex post (but not ex ante) • d_N – not contractible (even ex post) • d_A – contractible ex ante
	5	Payoffs are realised

Standard delivery contracts for roundwood belong to the strand of incentive systems theory, and where payment schemes are the most important incentives because most of the roundwood is sold through the regional cooperatives, and all forest owners have may sell through a cooperative.

The procedure for implementation of the standard delivery contract in the cooperatives runs as follows (cf Table 1). First, in step 1 the governance structure has been formed by the agreement made in 1998 with later amendments and adjustments, mainly technical matters with regard to environment and delivery deadlines. When prices and volumes have been negotiated towards the industry the contracting opens for deliveries within a certain number of months. Contracts are then signed one by one on a first come first served basis. If or when the contracted volumes sum up to the volumes contracted with the industry, the contracting stops. When the contract has been signed the parties make no more relationship-specific efforts (stage 2). No investment like building a forest road or effort like snow clearing is relationship-specific as the roundwood may be supplied to other buyers should the cooperative not perform in accordance with the contract. Some contractible actions may be made, however, when performance measures and contingencies

are revealed (stage 3). Examples are reduction of contracted quantities when the market situation or force majeure conditions make deliveries difficult. When the roundwood has been delivered (ex post, stage 4) decisions are taken on some already ex ante contracted measures. Examples are penalties for delivering too much or too little and breaches of quality standards (with regard to roundwood, to storing and arranging the roundwood for loading, and to the forest road). Ex post equalisation of prices due to unexpected market development is another example. Finally, the main payments are made a few weeks after delivery, while some dividend based on delivered volumes may be paid the following year (stage 5).

2.2 Some Important Aspects in Cooperatives

Many aspects need to be addressed when assessing the performance of a contract. Below we give a very short presentation of some important ones for cooperatives, based on Bogetoft and Olesen (2007). The presentation assumes that the contract includes a payment scheme.

There is reason to believe that forest owners are members of the cooperatives for welfare reasons, and this may be translated into economic reasons without significant loss of precision, and that maximizing the profits in the integrated organisation consisting of the members and the cooperative is an efficient goal. Efficiency may also be reached applying the Pareto criterion, implying that no member can be better off without others being worse off.

Information is a key issue in contracting. Different contract regimes require various levels of information. Information may be costly and it is usually asymmetric for contracting partners. Also its quality varies.

Risk and uncertainty need to be taken well care of in contracting. What are the most important risks and uncertainties? How should the risk be shared, (when/how) is it transferred from seller to buyer, how are costs of risk minimised? How to deal with uncertainties like fires, storms, insects etc.?

Allocation of profit to members is important in any cooperative. First, contracts following from a payment scheme must reflect what is termed a balanced budget, implying that the total payments to members should correspond to the revenue of the cooperative. Second, members of a cooperative need to feel that they are treated equally. But equality is not uniquely defined. It may be applied in several ways. Should all members receive the same part of the profit, should their shares be proportional to their deliveries or share of equity capital etc? Related to this is also the principle of member democracy. A contract with its payment scheme can only be adopted if it is advantageous to the majority of the members.

Individual incentives need to be strong enough for the any member not to leave the cooperative, and no member should gain from deviating from the most efficient plan. Likewise, no group of members should be able to benefit from leaving the cooperative, it should obtain at least as much profit inside the cooperative as it could obtain outside. This is called the stand-alone profit. Further, no group should be able to gain more profit than its contribution to the cooperative, i.e. its incremental profit. Otherwise it is subsidised by the other members. Profit allocations between the stand-alone profit and the incremental profit lie in what is said to be the core. Payment schemes in the core allow viable cooperation based on positive synergies from cooperation.

2.3 The Ten Rules of Thumb

Since many aspects need to be addressed when assessing the performance of a contract we need an approach that can deal with such a complex structure. Bogetoft and Olesens (2002) “Ten rules of thumb in contract design” is a good candidate for individual contracts. It is a set of normative rules that enables us to make a pragmatic approach to contract assessment and design. The rules result from a multicriteria decision analysis of a large set of different criteria, like those mentioned above. The rules are not independent, but rather designed for making well considered trade-offs between the three main objectives of any contract: coordination, motivation and low transaction costs, cf. Table 1.

Bogetoft and Olesen (2004) develop the application of the rules a step further suggesting a holistic approach to contract theory, and Bogetoft and Olesen (2007) dig more specifically into payment schemes in cooperatives. In this paper we draw from all these works. We apply the rules of thumb while putting most emphasis on topics that have specific relevance to cooperatives and payment schemes used with the standard delivery contract for roundwood.

Table 2. The ten rules of thumb. Bogetoft and Olesen (2002).

Main Objective	Number	Rule
Coordination	1	Coordinate production
	2	Balance the pros and cons of decentralisation
	3	Minimise the costs of risk and uncertainty
Motivation	4	Reduce the costs of post-contractual opportunism
	5	Reduce the costs of pre-contractual opportunism
	6	Do not kill cooperation
	7	Motivate long-term concerns
	8	Balance the pros and cons of renegotiating
Low Transaction costs	9	Reduce direct costs of contracting
	10	Use transparent contracts

2.4 Method

In order to contrast the standard delivery contract with the ten rules of thumb we needed to study the contract itself and how it works in practice. This was made through arranging a workshop with representatives from the cooperatives, Nortømmer and SB Skog, by interviewing representatives of four cooperatives and by collecting information from relevant homepages. During this investigation we identified a set of other contracts/incentive schemes/trade mechanisms, most of them designed as additions to the standard delivery contract.

3. Results

3.1 Coordinate Production

Production may be coordinated using central planning or markets. There is tradition for both approaches in the Norway, and for a combination. It may be argued that the forest sector markets have evolved from being more centrally planned in the post WWII era towards more market coordinated in the past.

The first to be checked is to what agree does the contract optimise the whole value chain, in order to maximise the integrated profit. For this to happen right quantities have to be delivered at the right time in the right place, as cheap as possible. The cooperative should share the integrated profit maximisation goals of its owners. Therefore, one may assume that the coordination between

these two parts should be relatively easy to handle. We will see below that this is not necessarily the case. In addition, the wood chain goes beyond the cooperatives, and the coordination becomes more difficult when the secondhand buyers (the downstream industries) are brought into the picture. The mismatch of roundwood supply and demand has been a subject for at least a hundred years. While the cooperatives negotiate both prices and volumes towards the industries, they only offer prices towards the forest owners. Thus their estimates of supply elasticities are crucial in planning and negotiation.

Prices are used as incentives for achieving volumes, and they are usually fixed per cubic metre, reflecting a proportional payment scheme (revenues proportional to deliveries). Due to uncontrollable factors delivery within some $\pm 10\%$ of the contracted volumes are usually accepted without penalty measures.

Although there are still central planning activities influencing the production (e.g. ban on new contracts), prices have become more dynamic, reflecting market changes better than before. There are now 1-4 price periods per year, often with a different number towards different industries. Nevertheless, coordination of the whole chain is still the major challenge for the cooperatives. There is little reason to believe that the price negotiations with the industries result in best prices for the integrated organisation of the cooperative and its members, little reason to believe that these prices will release the expected roundwood supply, and it is impossible for a price period of several months to reflect shorter fluctuations in supply and demand.

Although the cooperatives seem motivated to maximise the integrated profit, utilisation of economies of scale is difficult in a cooperative. The standard delivery contract has no incentives to stimulate fewer and larger deliveries or collaboration between neighbouring forest owners, and the cooperative does not have sufficient information on members' supply functions. Therefore, the cooperative is typically better to minimise costs than to maximise profits.

It should be kept in mind that maximisation of integrated profit may sometimes imply allocations of supply (with related revenues and costs) among members that are perceived as unfair by the majority of the members. In most of these cases the democratic one-man-one-vote governance of the cooperatives ensures "equality" among members by abandoning these more profitable allocations. One example could be that those 49% of the members who have their forests close to the industry should be given priority when signing new contracts. This could have increased the integrated profit, but would probably have been voted down by the remaining majority of 51%. If the 49% are still in the core, they will remain loyal, but if they are outside, they will leave the

cooperative. This is what happened when some members broke out from the cooperative in 1952 and established Skogbruksforeningen av 1952, now better known as Norskog. The standard delivery contract does not have any allocative features, except under force majeure conditions.

The standard delivery contract includes many qualitative regulations. Examples are road standard requirements, deadlines for deliveries and environmental concerns. Although adjustments happen from time to time, these regulations have typically been valid for many years.

Obviously, the standard delivery contract covers a broad spectre of issues in general terms. This probably reflects many years of experience. It also implies that the need for information is limited, and the related information costs are low. Finally, the contracting procedure has been automated to a large extent, implying that also the administrative costs are low.

3.2 Balance the Pros and Cons of Decentralisation

Applying the standard delivery contract the forest owners make the supply decisions, so this is a typical decentralised system.

It is well known that decentralised contracts may increase the risk of uncoordinated decision-making and may create problems of matching and synchronisation in cooperatives (Bogetoft and Olesen 2002). Therefore, the forest owners should make the decisions only if or when they are the most informed part. It is hard to see when this may be the case. A forest stand is easy to store and even yields an interest on root, so there is no risk of quality loss due overripe. It remains in a mature state for many years. Therefore, information about ripeness is not an issue within the contract period, unlike in agricultural contracts. The forest owners are probably best informed about local risks like windfall, insect damages and logging conditions. Nevertheless, price is the main source of risk, and the cooperative is generally better informed about the market than the forest owner. In this regard, it should rather be the cooperative than the single forest owner who makes the short-run harvesting decisions.

The decentralised decision system may require less coordination costs than the centralised one, but this is not obvious. We also note that the standard delivery contract leaves few possibilities for moral hazard and the cooperatives do not play “hold-up” games with their owners.

3.3 Minimise the Costs of Risk and Uncertainty

Since the cooperative is owned by its members risk reduction can only be made to a limited extent. Risk should be allocated to parts that can carry it at the

lowest costs. The lack of information on members' cost and supply functions, and their other assets, makes it impossible to allocate supply in a way that shares the risk optimally, although some general reduction may be made in operations managed by the cooperatives. Also, the cooperatives can do little to minimise institutional risk. They may, however, reduce biological risk and risks related to weather to some extent by accepting force majeure in an affected area and filling up the contracts from non-affected areas. But they are not allowed to re-allocate deliveries just because, e.g. the logging conditions have developed more favourably in one area than in another.

The cooperatives play a role in reducing the unsystematic market risk. First, there are different assortments, all with their own price. This diversification leads to some risk reduction. Second, the use of price periods so that the members know the fixed prices for the months to come reduces their risk and, third, the price matrices presented to the members (transfer prices) may not reflect perfectly the negotiated prices, or the negotiated prices do not reflect perfectly the market demand. In both latter cases some assortments subsidise the others. Risk is sometimes also re-allocated ex post among the suppliers. A required condition for this is that prices shift unexpectedly much within a year. Finally, the equity capital in the cooperative may be used as a buffer to smoothen temporary price fluctuations.

Price risk sharing is relevant only when the members of the cooperative are risk averse. Forest owners may not, however, always prefer less volatile prices. It is the volatility that gives them the opportunity to harvest when perceived prices are high. The average Norwegian forest owner harvest only every seventh year, so it is very likely that he manages to utilise the price volatility to his own advantage. Besides, the risk of side-trading increases if the prices are much smoothed by the cooperative.

The typical forest owner has more assets than forests, and it can be shown that most of the risk sharing should therefore be made at his hand.

3.4 Reduce the Costs of Post-contractual Opportunism

The main incentive in the standard delivery contract is the proportional payment scheme. This scheme (and related non-linear incentives like bonus schemes) is output-based. Because it is influenced by external risks like weather, a risk premium is usually required. Therefore, there is a trade-off between providing incentives and minimising the cost of risk (Bogetoft and Olesen 2004: 30).

The proportional payment scheme is of moderate strength. A reason for being moderate is the assumption that forest owners are risk-averse. As already

mentioned this is not necessarily the case in cooperatives. At the outset, the proportional payment may therefore under-produce. However, this may be offset by the so-called quantity control problem, arising from the fact that proportional payments in cooperatives reflect average rather than marginal revenue, leading to over-production. All in all, there is reason to believe that the offset is not strong enough, as prices are often accompanied by bonus arrangements etc. One should also keep in mind that there is also a trade-off between the strength of incentives and perceived fairness in cooperatives.

The standard contract uses only prices incentives, but these are for deliveries at roadside. Members of cooperatives who have their forests closer to the industries may be tempted to side-trading since they may be offered higher prices from Nortømmer and SB Skog and others. Cooperatives have sometimes reduced this problem by zoning. “Equal price” has been regarded as a cooperative principle in Norway (although it is not a part of the official international cooperative principles), but what is equal in this regard? Some zoning is probably needed from time to time in order to keep almost all members in the core. Side-trading may be reduced by ensuring fairly competitive payment schemes and other incentives, keeping the forest owners loyal. This applies to the cooperatives as well as Nortømmer, SB Skog and others.

Moral hazard related to delivering bad quality is minimised by the use of detailed measurement rules. Quality faults that are invisible and difficult to measure ex ante are finally the risk of the processor, e.g. a sawmill, rather than a risk of the cooperative. Moral hazard in the sense of environmental damage is sought avoided by including a set of rules (Living Forest Standards compatible with PEFC) in the standard contract itself or as an attachment. Although not systematically or being a major matter of moral hazard, breaches of these standards happen from time to time. The reason is probably that the standards imply costs.

3.5 Reduce the Costs of Pre-contractual Opportunism

This kind of opportunism deals with the case where a forest owner has sufficient private information to obtain a contract yielding profit above his reservation value, i.e. the profit from his best alternative option. This behaviour, also called adverse selection, is probably not a big problem in forest owner cooperatives, since these are first of all sales organisations. In addition, the standard delivery contract operates with a large set of prices related to different assortments, and a third part takes care of measurement and quality judgements, implying that cheating on quality is not an option at the pre-contractual stage

either. There are, however, a few situations where pre-contractual opportunistic behaviour may take place also within the cooperatives, but these are related to bonus systems which are not parts of the standard delivery contract, e.g. when fulfilling criteria for several bonuses.

We note that a member of a cooperative may act opportunistic towards Nortømmer, SB Skog and other buyers. Once the price scheme has been published, he may gain profit from side-trading based on private information about his own supply (information rent).

3.6 Do Not Kill Cooperation

Relative performance evaluation may have a negative impact on cooperation between producers. The standard delivery contract has only one such performance measure, namely malus for over-delivery. This is implemented from time to time, but always with care. There are supplementary contracts with relative performance measures, e.g. bonus for large volumes and for thinning, and there are also examples of measures that are valid only for a subset of members (geographically defined) due to requirements defined by a certain buyer. But again, these do not belong to the standard delivery contract.

The cooperatives, Nortømmer and SB Skog have their own websites which are important for spreading information and for communication. Wisely used, these tools may also enhance the cooperation between the forest owners and the organisations, and also among the forest owners “belonging” to one of the organisations.

Since the payment to any member of a cooperative depends indirectly also on the deliveries made by the other members, there are strong group incentives and thus even possibilities for social penalties. Members of the regional cooperatives are also organised in local sections where different kinds of meetings and activities contribute to enhance the team spirit and loyalty.

The effect of the standard delivery contract with its payment scheme on cooperation among members of the cooperative is probably close to neutral, as the proportional payment scheme has a lot of good properties, e.g. typically leaving most members in the core (with the possible exception of delivery prices at roadside). Calculation of possible “winners and losers” with regard to this or that (location, qualities, supply timing etc) is obviously never published.

3.7 Motivate Long-term Concerns

Since the cooperatives are owned by their members, there are few incentives not to motivate long-term concerns. The standard delivery contract may require several specific investments, i.e. assets with a lower value in their best

alternative use. This applies first of all to forest road standards and landing places, but also to specific software. Nevertheless, the risk for hold up is small because there are alternative buyers, meaning that the investments in roads and landings are not relation-specific. Also, hold-ups will lead to bad reputation, which would be destructive to the cooperatives in the long run.

Nortømmer, SB Skog and other non-cooperatives may also gain from motivating long-term concerns, in spite of not having true members. The main goal is simply to increase their market shares. All first-hand roundwood buyers are interested in increased turnover, and they offer various benefits in order to keep or win new roundwood suppliers.

3.8 Balance the Pros and Cons of Renegotiation

Renegotiation makes it possible to obtain more flexibility. The wish for renegotiation may first of all apply to prices and quantities as response to market changes, and thus remove ex post inefficiencies. The standard delivery contract is, however, in general not renegotiable. Nevertheless, it is renegotiated from time to time in the cooperatives. First, the cooperative wants to be flexible with its members and, second, it wants some flexibility itself too. For example, it may reduce the volume down to zero in accordance with the market situation.

The possibility of renegotiation (sometimes done by rejecting the current contract and issuing a new one) is also regarded as a problem, and one often speaks about a lack of contracting culture. Although renegotiation opens the possibility for reducing ex post inefficiencies it opens at the same time for ex ante inefficiencies. Strategic behaviour may take place when the parties know that renegotiation is possible. In practice one may expect that the parties will act according to the incentives in the expected renegotiated contract rather than to the initial contract. It is likely that both parties would contract less volume if renegotiation was impossible. This is so because excess supply is more of a problem than excess demand – to the forest owner, the cooperative, Nortømmer and SB Skog.

3.9 Reduce Direct Costs of Contracting

The standard delivery contract is well known by all parties and the contracting procedure is probably as efficient as can be. Since it is standardized it does not demand individual terms, which is the case for most alternative contracts. The contract itself could therefore have been easily traded had it been divided into standard volumes as well (e.g. 100 cubic meter).

The websites of the organisations make contracting almost automatic. Also the other parts of the system, like follow-up, allocation to buyers, transport and

communication payments are integrated and automated. The parties have long experience in this kind of contracting and it is likely that they have made many of the trade-offs needed in order to keep the contracting costs at a low level.

Any forest owner may write several contracts with the cooperative, and the number of contracts will increase with decreasing number of months the contacting period covers. Therefore, the cost of contracting could be reduced by using longer contract periods. This will, however imply decreased efficiency due to lost market opportunities.

3.10 Use Transparent Contracts

Contracts should be simple, and they should be articulated ex ante. Priceless contracts are, for example, more or less useless unless the parties can make good expectations. Unexpected bonus, as revealed ex post, has no motivational effect. The standard delivery contract has sometimes been used during so-called priceless periods. It then points to the ex post price. Thus, in these cases it depends fully on expectations from both parties.

4. Discussion

Coordination that takes care of efficiency, information, risk, market signals and equality aspects at the same time is obviously the main challenge for the cooperatives, while the other actors may disregard the equality aspect. They all have to make contracts that match prices and volumes towards the industry. The cooperatives find it risky to offer prices for more months than what have already been negotiated with the industries. Managers working for the cooperative have no incentives for taking any sort of risk on behalf of the members. This may restrict the feasible set of contract regimes.

The problems of coordination are evident, and have been so for at least a century. We stated in the previous section that the negotiated prices are unlikely to yield a market clearing or to respond to short run changes. They are typically inefficient, and therefore also subject to analysis for improvement. At the same time the current system is a result of trade-offs already made based on experience over the years. This should be acknowledged and recognised.

Coordination across different forest owners and along the time scale lacks also when it comes to utilising the economies of scale in planning of neighbouring harvests.

So far the cooperatives have approached the coordination problems of the standard delivery contract by employing complementary contracts. The most important ones are:

- Green stock: Gives the cooperative the right and duty to harvest a certain quantity to a fixed price within 6 (or 12) months. Basis is typically February price with a fixed bonus attached.
- 3-years contract: A given volume to be supplied each year for three years. Running prices with a bonus added.
- Stumpage sales: The cooperative buys the right to harvest the roundwood in a defined area within 3 years. The forest owner gets paid in advance. Some other variants of stumpage sales exist.

Other widely used contracts are Thinning bonus; Management agreements; Large supply bonus; FSC bonus.

Green stock loses its role when the number of negotiated price periods approaches the contract horizon, but it is otherwise useful as a flexibility complement to the standard delivery contract. So are the 3-years contract and the stumpage sales, offering some possibilities to adjust the supply to the demand. And they are all simple and easy to understand. Nevertheless, they do not fully solve the important task of coordination, and they have been criticised due to the costs they imply. More importantly though, they are there because the standard delivery contract cannot coordinate well enough.

There is room for some innovation here, first of all in the cooperatives, but also for Nortømmer and SB Skog. The core of the coordination problem is that market signals, mainly due to shifts in the demand, cannot be responded to in the short run. This implies a loss for the whole value chain. What is needed, therefore, is a mechanism that allows more frequent adjustments. This requires increased information flow and flexible instruments.

The forest industries collect information about current and expected demand for their products, they are the best informed part about this and they know their own cost structures. This information is crucial in determining current and future demand for roundwood. The cooperatives and Nortømmer and SB Skog are also well informed, but not like the industries. Finally, the forest owners get their secondhand information from these three firsthand buyers. They do not invest much in gathering information themselves, since income from roundwood sales is marginal to the average forest owner (NOK 8,000 per year).

With their information about current and expected market conditions it should be possible for the industries to reveal their demand at different prices for each of the coming, say 12 months. Each month would then have its own demand curve for each assortment. The cooperatives and to some extent Nortømmer and SB Skog should be able to do the same by checking the

reservation prices vs. related supply quantities from their suppliers for the same number of months. Reservation prices could be mapped simply by letting the forest owners reveal their intended deliveries at different prices in each of the coming 12 months, and then summing up. Clearing would be only a monthly technical exercise, and the parties would be informed about the prices and volumes contracted for each future period. The system would be updated every month. It would, i.e., enable the cooperatives to know exactly the intended amounts of roundwood at different sets of prices before contracting with the industry, and also to suggest some collaboration among forest owners in order to obtain economies of scale in logging and cost reductions in road transport. It is important to notice that all members of a cooperative would still face the same set of prices for a given period.

Because the cooperative is better informed than the single forest owner it could alternatively take the entire responsibility of the timing of individual cuttings. This includes also minimisation of risk related to logging conditions etc, and it might also reduce contract costs. The integrated profit would increase, but the challenge would be to make trade-offs between individual profits in a way that keep all members in the core. It is possible also to integrate this in a more general forest management contract, in line with what has been developed lately by a couple of cooperatives. Or one may also imagine less radical solutions, where only parts of the roundwood supply decisions are left to the cooperative.

All written contracts would be fully binding unless both parts agree to exit. The “traditional” need for the cooperative to reduce the contracts from time to time would be eliminated, and so would most of the needs for additional contracts. And also the logging entrepreneurs would gain from better planning and avoidance of stops. The suggested system would build on technicalities regulated by the current standard delivery contract, but it would expand it with regard to flexibility of prices and volumes.

The forest sector has a long and conservative tradition, where incrementalism is more likely to be successful than innovative jumps. This is why the challenge in implementing a new contract system is a hard part. A relevant question is therefore: Would it be possible to implement this system gradually? We believe it is, and the least resistible way would probably be to start with screening the forest owners for their willingness to supply under different price regimes for the months to come. One may inform the members on the homepages of the cooperatives and let them vote whether or not to implement such a new contract system. If implemented, it would increase the amount of information in the cooperatives, Nortømmer and SB Skog, which is

useful when negotiating towards the industry and it would allow a better coordination of local economies of scale. Then, if this works we believe that also parts of the forest industry would be interested in applying the entire concept, and the others may follow as a consequence of success. Before implementing anything at all there is, however, a need to map the implementation feasibility, first of all by assessing the will and the commitment of the involved parties. An important part of this work would be to estimate the net gains, in order to motivate the parties.

5. Conclusion

The standard delivery contract is based on decades of experience and implies therefore a wise set of trade-offs needed to make it as “optimal” as possible. Nevertheless, realising that matching of prices and quantities is still the major problem, and learning from studies of other agricultural contracts we believe the coordination could be improved by implementing a system revealing intended supplies and demands at different prices for several periods future periods, e.g. for each of the 12 months to come. This system would make use of information which is available but not collected today, and it would help increase the overall earned profits by the way of increasing the efficiency. Right quantities of roundwood would be traded to the right time at the right place because the prices would clear the markets.

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