Relational Contracts and Adaptation: Application to a Pork Producer Contract

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ABSTRACT

In this article, we apply a formal theoretical model of adaptation to an empirical setting within specialized pig production. The objective is to allocate decision rights ex ante so that actual decisions taken ex post will optimize the profit accruing to both parties in a contractual or integrative relation. Motivated by the situation in the market for piglets in Denmark, we focus on an analysis of a vertical partnership between a piglet producer and a finisher. By applying a model of adaptation to the particular setting, we provide a solid basis for discussions on both the importance of efficiently allocating decision rights and the usefulness of the partnership as an organizational form between specialized pig producers. [JEL classifications: D21, L2, Q1]. © 2008 Wiley Periodicals, Inc.

1. INTRODUCTION

Contractual arrangements are a very common form of governance in agri-food chains. Contracts are used to coordinate production and distribution of agricultural products and inputs in many sectors, of which some examples are in broiler (Vukina & Leegomemonch, 2006) and in pork (Reimer, 2006). In this article, we apply a model of relational contract between two Danish pork producers.

Contracts between pork producers are more common than those between growers and slaughterhouses or between growers and feed companies (Rhodes, 1995). Although the later types of contracts cannot be ignored, the contracts between producers are of particular interest. They are often based on informal agreements and are repeated silently over time. It is very rare that they involve any transfer of ownership because they maintain close links between the partners.

The theory of the firm and ample empirical evidence has suggested that it is not always necessary to transfer ownership of an asset for a firm or any agent to acquire control. It is very common among firms that decision rights are transferred without exchange of ownership of an asset. Many examples exist in the economics literature (Arruñada, Garicano, & Vázquez, 2001; Elfenbein & Lerner, 2003; Lerner & Merges, 1998). These are usually referred to as “relational contracts,” and the business forms are usually termed “alliances,” “hybrids,” or “networks.” Common among these arrangements is the fact that although decisions can cross firm borders, asset ownership may remain within the firm. For example, the type and quantity of animal feed, or similarly that of fertilizer or chemicals to be applied on a crop, are decisions
that may rely on a processor or even a retailer or some government authority. At the same time, ownership of the animal and other assets may remain the sole property of the farmer.

The model of Grossman and Hart (1986), Hart (1996), and Hart and Moore (1990) has been the pioneering work in modeling incomplete contracts where decision rights are distinguished from asset ownership. In the Grossman and Hart (1986) model, contracts are incomplete ex-ante; however, once the state is realized, decisions are contractible ex-post. The parties negotiate the decision to be taken by the party with the decision right (or obligation), and also negotiate a side payment to the decision maker. What drives the results of the model is the fact that the allocation of decision rights affects the size of the side payment, which affects the parties’ incentives to make specific investments ex-ante. The question raised here is: “Are all decisions contractible ex-post?” Gibbons (2005) and Baker, Gibbons, and Murphy (2006) offered an alternative view: Decision rights are contractible ex-ante, but actual decisions are not contractible either ex-ante or ex-post. For example, a farmer and a processor may decide that the farmer should provide a certain type of feed to the animals; however, what the farmer actually decides to provide each day is not contractible. It is important to stress here that decisions are made daily; that is, decisions are state-contingent. Furthermore, the decision has to be made at a specific moment and cannot be postponed. Both of these characteristics of decisions are key elements of this model.

In the Baker et al.’s (2006) model, the parties negotiate over decision rights ex-ante. The challenge is to allocate the decision rights ex-ante such that optimal decisions are taken ex-post. The first such model was introduced by Simon (1951), and was recently developed further by Baker et al. (2006). They termed this a model of “adaptation.” Spot adaptation, where parties take self-interested spot decisions, is examined as is “relational” adaptation, where parties consider their reputation in repeated interactions. We introduce the model in the next section, illustrate an actual producer contract in Section 3, and we conclude in Section 4.

2. A MODEL OF RELATIONAL ADAPTATION

In this section, we envisage the situation in a relational contracting framework and follow Gibbons (2005) and Baker, Gibbons, and Murphy (2002, 2006), MacLeod and Malcomson (1989), Levin (2003), and Karantininis (2007). Let a single decision right (or obligation) be assigned to one of two risk-neutral parties, A (Abattoir) or F (Farmer). The parties have private (inalienable) benefits \( p_A \) and \( p_F \), respectively, which depend on the state of nature \( s \), drawn from the finite set \( S \) according to the probability density \( f(s) \). The states could be various levels of Salmonella outbreaks. The states are observable, but not verifiable, by both parties. The benefits \( p_i (i = A, F) \) also depend on the decision \( d_E \), which is chosen after the state \( s \) is revealed. Decision \( d \) is not contractible even after State \( s \) is revealed; however, the decision right is contractible ex-ante.

The timing of the model is as follows:

1. Decision rights are allocated.
2. \( t_{AF} \) ex-ante payments (i.e., efficiency wage) is paid from Party \( A(F) \) to Party \( F(A) \).
3. State \( s \) is revealed.
4. Post-state (i.e., bribe) payment $\tau_{AF}$ is paid.
5. The decision $d_D$ is taken by the party that holds the decision rights.
6. Bonus $T_{AF}$ is paid.
7. Payoffs $\pi_A, \pi_F$, are realized.

The governance structures considered will be only two: Either Abattoir $A$ or Farmer $F$ holds the decision right. The first-best decision is one that maximizes total payoff $\pi = \pi_A + \pi_F$ (where $FB$ denotes first-best):

$$d^{FB}(s) = \arg\max_{d_D} \pi_A(d, s) + \pi_F(d, s) \quad (1)$$

The total payoff at each state then is:

$$V^{FB}(s) = \pi_A[d^{FB}(s), s] + \pi_F[d^{FB}(s), s] \quad (2)$$

The expected payoff is:

$$V^{FB} = E_s[\pi_A[d^{FB}(s), s] + \pi_F[d^{FB}(s), s]] \quad (3)$$

where $E_S$ is the expectation operator over all States $s \in S$.

Now consider the case where each party that has the decision right makes its own self-interested decision, such that it optimizes its own payoff (where $SP$ denotes spot):

$$d^{SP}_i(s) = \arg\max_{d_D} \pi_i(d, s) \quad (4)$$

The total payoff at each State $s$ is then (where $i = A, F$):

$$V^i(s) = \pi_A[d^{SP}_i(s), s] + \pi_F[d^{SP}_i(s), s] \quad (5)$$

Under spot governance, the decision right should be allocated to the party that produces the highest benefit:

$$V^{SP} = \max\{V^A, V^F\} \quad (6)$$

### 2.1 Relational contracts

Relational contracts are self-enforcing contracts enforced by the parties out of concern for their reputations. This is different than the sociological concept of “trust,” where individuals trust each other out of good will. It also is different from the concept of “calculated trust,” which is simply a contradiction in terms (Gibbons, 2000; Williamson, 1993). In this setup, decisions are made under self-interested incentives. Relational contracts are usually unwritten agreements that cannot be enforced by the court and rely instead on parties’ calculation of the long-term benefits of cooperation against the short-term, self-interested benefits of cheating or “defection.” This is a repeated game with trigger-strategy equilibria: If one party cheats, then all parties defect and receive the “spot transaction” payoffs thereafter.

In our simple model, if Party $A$ has the decision right, then this party will be tempted to take a cooperative decision (denoted as $d^{RC}$ for “Relational Contract”) if the present value of the benefits created by $d^{RC}$ outweigh the spot benefits from the self-interested decision $d$ given in Equation 6. We can then define Party $i$’s “reneging temptation” at State $s$ as the benefits forgone if decision $d^{RC}(s)$ is taken instead of $d^i(s)$:

$$RT_i(s) = \pi_i[d^*_i(s), s] - \pi_i[d^{RC}(s), s] \quad (7)$$
Define $RT_i$ as the maximum reneging temptation over all states. It can be easily shown (BGM, 2006; Gibbons, 2005) that the relational contract is implementable if the following condition holds (This is the familiar incentive compatibility constraint):

$$RT_i \geq \frac{1}{r} [V^{RC} - V^{SP}]$$

(8)

Where $RT_i$ is the maximum reneging temptation, $V^{SP}$ is given in Equation 6, $r$ is the discount rate, and $V^{RC}$ is the total payoff if the “relational” decision is taken:

$$V^{RC} = E_S [\pi_A [d^{RC}(s), s] + \pi_F [d^{RC}(s), s]]$$

(9)

where $E_S$ is the expectation operator over all States $s \in S$.

Equation 8 is very intuitive: At any State $s$, the “decider” will consider the present value of the future stream of surplus (over and above “spot” decisions) generated if the “relational” decision is taken. This surplus must exceed the maximum possible reneging temptation—otherwise, the “spot” decision will be taken by the decider, and the relational contract cannot be implementable. The relational contract must generate a surplus higher than the maximum reneging temptation of the decider. Then the parties can negotiate some money transfers to make the decider undertake relational decisions instead of spot decisions.

The relational contract is a second-best outcome. Who should hold the decision right in case the first-best is not a possibility while the second-best is implementable? It is the party that can generate the highest value of a relational contract (provided of course, that the $RC$ is implementable; i.e., Equation 8 holds). One can see this better in the following figures.

In Figure 1, the payoffs are drawn as linear functions of the form:

$$\pi_i(d, s) = a_i + b_i s (i = A, B)$$

(10)
These are actually the net benefits if the decision is made by the corresponding party. It also is assumed for simplicity that the payoffs to each party are zero if the other party makes selfish decisions:

\[ \pi_A(d_F, s) = \pi_F(d_A, s) = 0 \]  

(11)

This construction implies that the schedules \( \pi_i(d_i, s) \) (\( i = A, F \)) also are the reneging temptations for the decider: If the decider chooses any decision other than the spot, the reneging temptation is the payoff that he or she would receive if he or she switched back to spot. Since we assume by Equation 11 that the own payoffs are zero outside the decider’s spot path, the schedule \( \pi_i(d_i, s) \) (\( i = A, F \)) also is the reneging temptation for the \( i \)th decider.

In the following examples, we assume the following limits of values for the parameters:

\[ a_A > 0, a_F > 0; b_A < 0; b_F > 0 \]  

(12)

In Figure 1, this is illustrated with the two lines \( AA' \) and \( FF' \), respectively. The highest reneging temptation for both parties is \( RT_i \).

In a spot (i.e., self-interested) transaction, the payoffs will be the shaded area \( SAA'S^+ \) if the decision right is given to \( A \). Assuming that States \( s \) are uniformly distributed:

\[ V_{SP}^A = \int_{S^-}^{S^+} \Pi_A(d_{FB}^A, s)ds = area(S^-AA'S^+) \]  

(13)

Similarly, if the decision right is given to \( F \), the total payoff is area \( SFF'S^+ \), and with uniformly distributed states:

\[ V_{SP}^B = \int_{S^-}^{S^+} \Pi_B(d_{FB}^B, s)ds = area(S^-FF'S^+) \]  

(14)

The parameters \( a_A, b_A, a_F, \) and \( b_F \) are chosen such that \( S^-AA'S^+ > S^-FF'S^+ \) (i.e., in a spot market transaction, it is best to give the decision rights to \( A \)).

**First-best** The first-best (FB) is the strategy:

\[ d_{FB} = \begin{cases} 
  d_{SP}^A & \forall \ S^- \leq s \leq S^* \\
  d_{SP}^F & \forall \ S^* \leq s \leq S^+ 
\end{cases} \]  

(15)

In Figure 1, this is following the line \( AKF' \). The total payoff is area \( SAKF'S^+ \):

\[ V_{FB}(d_{FB}, s) = \int_{S^-}^{S^*} \Pi_A(d_{FB}, s)ds + \int_{S^*}^{S^+} \Pi_F(d_{FB}, s)ds = area(S^-AKF'S^+) \]  

(16)

**Third-best** Third-best is the spot outcome characterized by Equation 6: The decision right is given to the person who can generate the highest payoff taking the self-interested decision (In our case, this is \( A \)).

**Second-best: Relational contracts** A relational contract (RC) is a self-enforcing contract. In a repeated game, it is the subgame perfect equilibrium. It is then possible to design a decision rule \( d_{RC} \) such that it produces a higher surplus than
the spot rule:

\[ V(d^{RC}) = E_S[\Pi_A(d^{RC}(s), s) + \Pi_F(d^{RC}(s), s)] > V^{SP} \]  \hspace{1cm} (17)

This would actually entail that the decider would choose according to the other party’s interest at some states. In our example, it follows that the decider would choose according to \( A \) for lower states (since \( \pi_A > \pi_F \) for \( S^- < s < S^* \)) and then switch according to \( F \)’s interest. It follows also that the upper limit of \( V^{RC} \) is the first-best rent: \( V^{RC} \leq V^{FB} \).

Let the critical state be some State \( S^F < S^* \), if \( F \) holds the decision right. In Figure 1, if \( F \) holds the decision right, she will play \( A \) up to State \( S^F \) and will switch to \( F \) afterwards. It is natural that the switching state is lower than \( S^* \): \( (S^F, s^F) \), where the maximum reneging temptation \( RT_F \) occurs. This will generate expected payoff:

\[ V(d^{RC}_F) = \int_{S^-}^{S^F} \Pi_A(d^{RC}_F(s), s)ds + \int_{S^F}^{S^*} \Pi_F(d^{RC}_F(s), s)ds = \text{area}(S^-AK^AKF^FSS^+) \]  \hspace{1cm} (18)

Is this contract implementable? For this contract to be implementable, it must be subgame perfect. In other words, it must generate expected surplus enough to compensate the decider to not switch to spot decisions. The generated expected surplus must be high enough to compensate the decider for the highest possible temptation to renege (i.e., back to spot). Define the maximum reneging temptation of Party \( i \):

\[ RT_{i}^{\text{max}} = \max_S [\Pi_i(d^{SP}_i(s), s) - \Pi_i(d^{RC}_i(s), s)] \]  \hspace{1cm} (19)

It can be shown (BGM; MacLeod & Malcomson, 1989) that for the \( RC \) to be implementable, the following condition must hold:

\[ RT_{i}^{\text{max}} \leq \frac{1}{P} [V(D^{RC}) - V^{SP}] \quad \forall i \in \{A, F\} \]  \hspace{1cm} (20)

The intuition of Equation 20 is straightforward: The two alternatives (other than the FB, which we assume is not implementable—otherwise the whole discussion is void) are:

(a) **Third-best**: Go for spot contract, in which case the parties will choose to give the right to the agent who can generate the highest surplus (Equation 6).

(b) **Second-best**: Go for relational contract \( RC \).

Condition (Equation 20) states that the second-best contract must generate enough surplus over and above the third-best spot contract for the non-deciding parties to agree (and afford) to bribe the decider to undertake the relational contract. It also states that the decider will accept the bribe and will go for the \( RC \) because the bribe can be at least equal to the temptation to renege (i.e., her temptation to not do RC and do spot instead). It then follows that the best \( RC \) is the one that reduces the RT the most: Give the decision right to the party which will have the lowest maximum reneging temptation.

Recall that the reneging temptation for the \( i \)th party that holds the decision right is \( \Pi_i(d^{SP}_i(s), s) \). Additionally, by construction, \( V^A > V^F \), hence (by 6): \( V^{SP} = V^A \). In Figure 1, the \( RC \) will increase surplus relative to the spot by area(KA’F’F) (over and
above the $VASP$), but will reduce it by area($KAKKF$); that is, $V(d^{RC}) - V^{SP}$ is equal to the area ($KA^I F^I - KAKKF$).

We consider here a trigger-strategy equilibrium: If any party reneges, then they all return to spot for the rest of the game. Therefore, we need to calculate the present value of this surplus at infinitum (the right-hand side of Equation 20). We can calculate the $V^{RC}$ by iterations for every possible State $s$. This is shown in Figure 2. The curve $V^{RC}$ in Figure 2 is the iterated surplus $\frac{1}{r}[V(d^{RC}) - V^{SP}]$ whereas $\pi_A$ and $\pi_F$ are the reneging temptation curves. Given Interest Rate $r$, the first-best is infeasible. The second-best $RC$ is feasible, however. If Party $F$ is the decider, she would switch from $A$ to $F$ at state $S^F$ and could generate surplus $RT^F$, equal to the maximum reneging temptation. The fact that $F$ would switch at a state other than the optimal $S^F \neq S^*$ generates a surplus loss equal to the area($KAKKF$) (Fig. 1). This contract, however, generates a surplus over and above the spot contract, equal to area($KA^F KK^F$) (Fig. 1). The net surplus generated by the $RC$ is then area($KA^F KK^F - KFA$) in Figure 1. Taking the discounted present value of this over infinite number of periods at a discount Rate $r$ gives the expected net surplus $ORT^F = \frac{1}{r}[area(KFA^F - KA^F KK^F)] = \frac{1}{r}[V(d^{RC}) - V^{SP}]$ in Figs. 1 and 2.

Why is it that $F$ is better than $A$ in a relational contract, although in a spot transaction $A$ generates more surplus than $F$? The payoff schedules in Figs. 1 and 2 are drawn such that $\pi_F$ is steeper than $\pi_A$ ($|b_F| > |b_A|$). The intuition is that the most efficient relational contract is the one that reduces the reneging temptation of the decider the most.

3. PORK PRODUCTION CONTRACT

During the past decade, there have been some major structural changes in the primary Danish pig production which have been more pronounced especially over the last 5 years (Graversen & Karantininis, 2007):

- The movement towards specialization as either sow keeper or finisher has continually encouraged and perhaps even sped by the introduction of
health-improving housing systems such as multisite and Weaning-To-Slaughter (WTS) based on all in–all out principles.

- An increasing domestic production surplus of piglets has occurred—a surplus which not only seems to be a result of a significant productivity growth but also a result of relatively larger investments in facilities for sows and production of piglets—than in finishing.
- Export of piglets to Germany has increased sharply.
- Declining slaughtering in Denmark has been observed recently, even though the number of piglets produced has been higher than ever.

These changes have led to an increase in specialization and reliance on producer contracts (i.e., contracts between sow-piglet producers and finishers).

3.1 The N–J Partnership

In 2002, N, a former producer of milk and veal, started up pig production as a finisher in a partnership with J, who was producing piglets. N’s motivation for this change (after being a dairy farmer for more than 20 years) was his many years with an unsatisfying income and too many working hours.

The main goal for his future life as a farmer was to improve the turnover on the farm while having more time with his family and for other interests. An improved turnover would require that the production rights offered by the owned farm land were exploited in a beneficial manner. For all of these reasons, a switch from cow to pig production became his choice; however, having no skills in producing pigs, he decided to form a partnership with Farmer J.

Further, from N’s perspective, the main idea behind forming a partnership had two primary purposes: First, N saw an opportunity to benefit from J being a skilled and experienced farm manager and pig producer. Second, N considered that it would be beneficial to focus on how to avoid or minimize the usual contractual discussions on issues such as the delivered quality, prices, terms of termination, and the risk of opportunistic behavior. From his perspective, these were time consuming and involved long, useless discussions. By involving J and choosing a partnership model with a joint company, he feels like he has reached his initial goals.

3.1.1 Organization, decision rights, and payments

The partnership is solely a production company and does not own physical assets such as farm land, houses, and other required facilities. The joint company rents the barn from N and buys piglets at weaning from J. The organization is illustrated in Figure 3. N is the one who took on the investment of the necessary facilities (i.e., house, equipment, and manure storage), and J is the manager who has to make the day-to-day (i.e., operational) decisions.

The partnership is formally established as a so-called I/S, which in the Danish legislation is not considered as an independent legal unit but a construction

1Information on the case was kindly provided by Pig Farmer N (to whom we promised anonymity) through interviews, accounting data, budgets, and contractual agreements. Further, detailed questions on the construction of the partnership and the payment model also were kindly answered by the economic consultant of the partnership. Accounting data, budgets, and written contracts are available by the authors on request.
agreement between two or more partners based on a specific and explicit contractual setup. This form of agreement implies that taxes are not paid by the company but personally by each partner according to their share of the company profit and their personal incomes.

$N$ and $J$ have set up a few basic principles for handling the finances and how they should split the profits. The first level of these principles is that only estimated prices of the inputs provided to the partnership are covered.

$N$ is providing all the production facilities, and he is paid a rent similar to the mortgage payments on a loan of the size of the undertaken investment (variable interest rate, duration 1 year). The rent is adjusted every year in December according to the interest rate for the coming year, as set by the market for bonds. How $N$ is actually having the investment financed does not affect the rent.

$J$ is providing both weaners and labor needed in the production. The pigs are paid according to the costs of producing weaners, as calculated in the formula price. The price is not affected by variations in pork prices but is changed only when the adjusted formula price is published every year in June and in December. Provided labor is paid per hour (Hours are in fact not registered but follow the budgeted workload and an agreed-upon price per hour for the coming year.)

Besides these physical inputs, $N$ is providing the needed production rights, and $J$ is providing the management. None of these inputs are paid directly but only implicitly by their share of the profit in the partnership, which is divided equally between $N$ and $J$ after all other production costs are covered.

3.1.2 Decision rights and actual decisions The following are some decisions in this partnership that are of relevance to our analysis:

- **Daily management:** The management will naturally affect the turnover of the $N$–$J$ partnership. For the benefit of the partnership, $J$, as the most skilled pig farm manager holds all managing decision rights in the production on a daily basis. This makes sense, and since he is only paid for his effort by his share of the profit, we cannot think of a situation in which he would not do the best to make actual decisions focusing an improved turnover of the $N$–$J$ partnership.

- **Quality:** The $N$–$J$ partnership is buying all the weaners from $J$ at a fixed price with no respect to weight, health status, or quality in general. Adjustment of the payment (bonus or the opposite) to $J$ for high or low quality is given only through the performance of the finishing represented as his share of the profit. Given the fact that $J$ also is selling weaners and piglets to others, it might be an opportunity for him to choose whether he would send highest quality to the partnership or to the outside. As it is now, $J$ is holding the decision right on where to send different
qualities, and depending on the level of market prices on piglets, there is no guarantee that he will always make decisions that are to the benefit of the $N$–$J$ partnership.

- **Labor**: Labor is hired per hour from $J$. Based on the actual Figures from the accounting books, it seems like an excellent deal to the partnership. The labor costs are extremely low compared to average as well as budgeting figures: If $N$ should be on his own and hire sufficiently skilled, full-time labor instead, his labor costs would have been higher. On the other hand, decisions on the needed labor are made by $J$ alone. Theoretically, $J$ has the opportunity to cheat by transferring labor costs from his own farm to the $N$–$J$ partnership.

- **Termination**: Both $N$ and $J$ do have the right to decide whether they want to join the partnership. The result to each partner is nevertheless quite different. If the partnership is terminated, $N$ will still have the opportunity to continue finishing the pigs as the facilities are owned by him. $J$, on the other hand, will be out of the finishing business and will only be selling weaned piglets to other finishers—and maybe to $N$ himself.

The quality of piglets and the labor decisions are of most interest to the discussion of allocation of decision rights since actual decisions taken here can significantly affect payoffs from the partnership. The question of termination is in fact already a part of the analysis. Throughout the analysis, we examine whether the present value of the benefits created by $d^{RC}$ (the relational decision) outweighs the benefits from the self-interested decision, $d^{SP}$, given that ongoing self-interested decisions means that the other party will eventually stop the partnership.

In the $N$–$J$ case; allocation of the right to decide whether the input should be the (potentially) high- or low-performance piglet group is only contractible and possible to give to both parties if the quality level is observable by both. This might not be the case, however. Arguably, $J$ will have better opportunities to observe actual quality and hereby also what is decided to be the input to the partnership. When $J$ holds the decision right, $N$ most likely will not be able to observe what is decided; however, the results of the decision are observable, but not verifiable because it cannot be easily observed what quality was delivered to outside buyers.$^2$

### 3.1.3 States

The parties have private (inalienable) benefits $p_N$ and $p_J$, respectively, which depend on the State of Nature $s$. In the example, the states are chosen as a distribution of price/feed ratio levels based on feed prices used in the national formula price in 2001–2006.$^3$ The benefits $p_i$ ($i = N,J$) also depend on the decision $d_{i\in D}$, which is chosen after State $s$ is revealed.

### 3.2. Calculations

Regarding the quality choices, the basic assumptions are: If $J$ transfers piglets of lower quality to the partnership, especially variable (feed) costs will increase within the partnership. This can only be to the interest of $J$ if dividing the weaners into two

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$^2$For more background information on the economic impacts of different quality levels and what could influence the performance at finishing, see Bonefeld and Nørgaard (1999) and Graversen and Nørgaard (2000).

groups will result in a higher price when the highest quality groups are sold to others. The lower performance results in declining profit in the partnership: Half of this loss is born by \( N \). In the calculations, it was assumed that a high-quality bonus of DKK 5 to DKK 10 per weaner can be gained, and weaners of lower quality will result in a 5% increase of variable costs at finishing in the partnership.

Based on accounting data provided and these assumptions, we were able to calculate the profits to each partner under different states (price/feed ratios) for various scenarios. In Figure 4, \( \pi_N \) refers to the excess profit to \( N \) if high-quality piglets are delivered to the partnership relative to low quality. \( \pi_J \) is the excess profit to \( J \) if he delivers high-quality piglets to the partnership. It is intuitive that \( N \) always will prefer that \( J \) sends the highest possible quality to be finished in the partnership (i.e., if \( N \) could decide on quality, they will finish only high-quality weaners). It also is clear that at high states, \( N \) will always prefer to break the partnership, and procure piglets from outside and not share profits with \( J \) (\( \pi_N \) slopes downward and becomes negative at very high states.) Note that both \( \pi_N \) and \( \pi_J \) curves are drawn as the difference of profits made within the partnership minus profit that could be attained outside. Obviously, \( J \) will prefer the partnership at high states so that he can share the high profits, therefore \( \pi_J \) slopes upward.

In this situation, the first-best solution always is implementable: \( J \) will choose his self-interested decision at any state, given that only the gray-shaded area in Figure 4 is the range of the expected possible ratios. Accordingly, giving the right to choose the quality to \( J \) is the most efficient allocation of decision rights. Only at very high interest rates (outside any realistic level in the Danish setup) or at very low states (also unrealistic) would the second-best options be the equilibrium allocation of decision rights.

![Figure 4 Illustration of the Reneging Temptations for the N–J Partnership.](image)

4. CONCLUSIONS AND PERSPECTIVES

By structuring the \( N–J \) case according to the relational adaptation model of Baker et al. (2006), we have achieved some useful insights into the theory, but also—and maybe even more important—some knowledge and insight into the allocation of decision rights and the impact of actual decisions taken at any given state. This gives us a better and deeper insight on why hybrids (in this case, a partnership between two pork producers) may prevail as governance structures.
When designing relational contracts such as this partnership between Farmers N and J, it is usually based on budgets that are rather static based on assumptions regarding average prices and cost levels. To fit into the adaptation framework, we made dynamic budgets showing the payoffs to both parties at various states and with different actual decisions taken after each state was revealed. This exercise in itself seems to be rather valuable. It provides not only insight to the profit accruing to each party given their expectations but also induces the parties to have a detailed discussion on how allocation of the decision rights affects the potential outcome.

Regarding the specific case, we found that they have allocated decision rights in such a manner that actual decisions on quality will be taken to protect the relation and maximize the total shared profit.

For simplicity and to match the adaptation model, some dimensions have been left out. One dimension is the question on labor, where J had an opportunity to cheat by transferring labor costs to the partnership. Another dimension is about the future of the partnership. What if J expands his production and sells more pigs to others? How will this affect his decision on quality? However, having a chance of producing more finishers in the partnership will prevent him from cheating the partnership.

Another dimension left out is the distribution of the states. The distribution cannot be expected to be uniform. Building this into the model will be a natural extension if applied to specific cases in the future.

Throughout the article and in the applied case, we have not considered “rent-seeking” and appropriable rents. This leads to the question of whether it is possible to give decent answers to the fundamental “make, buy, or cooperate” question without considering the specificity of the assets (Whinston, 2003). When taking the first steps toward the adaptation model, Gibbons (2005, p. 209) claimed that “there can be a coherent elemental theory of the firm without specific investments.” In the specific case, however, it can easily be claimed that we indirectly have taken asset specificity into consideration when we calculated N and J’s alternative payoff. In this sense, a fully developed, formal model of adaptation theory might be capable of covering the focus of both “adaptive, sequential decision-making” (Williamson, 1975, p. 40) and asset specificity.

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