The Negotiators Who Knew Too Much: Transaction Costs and Incomplete Information

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Abstract.
Two parties can at some future date 2 negotiate about whether or not to collaborate in order to generate a surplus. Yet, the negotiation stage will be reached only if at date 1 both parties pay their respective transaction costs. We show that the expected total surplus may be larger when at date 1 the parties do not yet know the size of the surplus that can be generated at date 2. Moreover, joint ownership can be optimal under incomplete information even when it would be suboptimal under complete information.

Keywords: transaction costs; property rights; bargaining; incomplete information; joint ownership

JEL Classification: D23; D86; C78; L14; L24

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1 Introduction

The property rights approach to the theory of the firm developed by Grossman and Hart (1986) and Hart and Moore (1990) is widely regarded as a major advance in microeconomics.[1] The Grossman-Hart-Moore theory shows that when contracts are incomplete, ownership matters. Due to contractual incompleteness, there will be negotiations in the future. While these negotiations lead to an ex-post efficient outcome, the division of the surplus depends on the threatpoint which is determined by the ownership structure. Hence, ownership influences the incentives to make surplus-enhancing investments.

The property rights approach has been criticized for its focus on investment incentives. For instance, Moore (2016, p. 12) has recently argued that "Hold-up is important, but looking around the world, it seems that ex-post inefficiencies are even more important." Similar arguments have been brought forward by Williamson (2002), who emphasizes that transaction cost economics is focused on ex-post inefficiencies.[2] In the present paper, we thus consider a variant of the Grossman-Hart-Moore setup without investments. Instead, we introduce transaction costs as modelled by Anderlini and Felli (2006), which may imply that negotiations do not take place, so ex-post inefficiencies can occur.

Two parties, A and B, can collaborate in order to generate a surplus V. From an ex-ante point of view, V is a random variable. Yet, in the first of two scenarios that we will consider, both parties know the realization of V from the outset. Following Anderlini and Felli's (2006) insightful paper, we assume that the negotiations between the two parties take place only if each party pays its transaction cost $c > 0$.[3] If the negotiations do not take place or if the parties do not reach an agreement, each party gets its default payoff, which is determined by the ownership structure. The second scenario that we will consider is identical to

[1] Andrei Shleifer has recently pointed out that the "Grossman-Hart incomplete contracts approach represents perhaps the most influential advance in economic theory in the last thirty years" (see the back cover of Aghion et al., 2016). The property rights theory has been successfully applied in various fields such as industrial economics, corporate finance, organizational economics, international trade, privatization theory, and political economy.

[2] See also Hart and Moore (2008, p. 2), who argue that "the emphasis on noncontractible ex-ante investments seems overplayed: although such investments are surely important, it is hard to believe that they are the sole drivers of organizational form."

[3] The transaction costs can be interpreted as the time spent 'preparing' for the negotiations. For example, the parties must conceive of a suitable language to describe the states of nature, they must gather information about the legal environment, and they have to spend time arranging a way to meet (for more details, see Anderlini and Felli, 2006, pp. 226-228).

the first scenario, except that there is incomplete information; i.e., the realization of V is learned by the parties only after they have decided whether to pay their transaction costs.

At first sight, one might guess that incomplete information can only be harmful. Yet, this is not the case. Specifically, suppose that there is joint ownership; i.e., the parties' default payoffs are zero (cf. Hart, 1995). Suppose party A has bargaining power $\lambda \in (0,1)$. Thus, when the negotiations take place, party A gets λV and party B gets $(1-\lambda)V$. Party A is willing to pay its transaction costs only if $c \leq \lambda V$, while party B is willing to pay its transaction costs only if $c \leq (1-\lambda)V$. If $\lambda = 1/2$, the negotiations take place whenever $2c \leq V$, which is efficient. Yet, when in the wording of Anderlini and Felli (2006) there is a sufficiently strong 'mismatch' between the (unequal) bargaining powers and the (equal) transaction costs (e.g., if $\lambda < c/V$), then an ex-post inefficiency may occur (the negotiations do not take place even though $V - 2c > 0$). Now observe that under incomplete information, the parties pay their transaction costs if $c \leq \lambda E[V]$ and $c \leq (1-\lambda)E[V]$. Since $c/E[V] < \lambda < c/V$ may hold for some realizations of V, from an ex-ante point of view the expected total surplus can be larger under incomplete information. Under complete information, the parties may sometimes "know too much" for the negotiations to take place.

We also consider sole ownership by party A or party B, such that the owner can make a positive profit (smaller than V) without collaboration. We will show that under incomplete information joint ownership can yield a strictly larger expected total surplus than sole ownership, even when sole ownership would be optimal under complete information.

Related literature. To the best of my knowledge, Müller and Schmitz (2016) is the only paper so far in which transaction costs as modelled by Anderlini and Felli (2006) have been introduced into the Grossman-Hart-Moore property rights theory. However, in contrast to the present paper, Müller and Schmitz (2016) do not consider incomplete information (instead, they focus on the interplay of transaction costs and investments).[4] The present paper also contributes to a growing literature which shows that joint ownership can be optimal in variants of the Grossman-Hart-Moore setup. See Gattai and Natale (2016) for a recent survey of this literature.[5]

[4] See also Schmitz (2006) for an extension of the Grossman-Hart-Moore theory to the case of asymmetric information. In this model, private information can be beneficial because information rents may enhance investment incentives.

[5] The Grossman-Hart-Moore theory has been criticized because their standard model cannot explain joint ownership. For example, Holmström (1999) has stressed that joint ventures have

2 The model

Consider two risk-neutral parties, A and B, who at date $t = 2$ can negotiate about whether to collaborate. If the parties agree to collaborate, they can generate a date-2 surplus V. We assume that $V \in [0, 1]$ is a random variable with cumulative distribution function $F(V)$. If the negotiations do not take place or if no agreement is reached, at date $t = 2$ each party $i \in \{A, B\}$ obtains only its default payoff $d_i^o \geq 0$, where $o \in \{A, B, J\}$ denotes the ownership structure (see Table 1). Specifically, if there is sole ownership by party $i \in \{A, B\}$, the owner's default payoff is εV with $\varepsilon \in (0, 1)$, while the non-owner's default payoff is zero. Hence, the owner can make a positive profit, but collaboration would yield a larger surplus. In accordance with the property rights approach (Hart, 1995), joint ownership ($o = J$) means that each party has veto power such that both parties' default payoffs are zero.

	d_A^o	d_B^o
$o = A$	εV	0
$o = B$	0	εV
$o = J$	0	0

Table 1. The parties' date-2 default payoffs.

Note that due to the symmetry of the default payoffs, under A-ownership and B-ownership the total surplus will be the same. Hence, in what follows we focus on the comparison between sole ownership and joint ownership.[6]

2.1 Scenario I: Complete information

We consider two scenarios. In Scenario I, there is complete information (see Figure 1). Hence, the parties know the realization of V from the outset. At date 1, each party decides whether to incur transaction costs $c > 0$.[7] Let $x_A \in \{0, 1\}$ denote party A's decision and let $x_B \in \{0, 1\}$ denote party B's decision. As in Anderlini

always been an important part of the corporate landscape. The close relationship between the notion of joint ownership in the property rights theory and characteristics of joint ventures in practice has been empirically confirmed by Gattai and Natale (2013).

[6] It is straightforward to generalize the model by assuming that under A-ownership party A's default payoff is $\varepsilon_A V$, while under B-ownership party B's default payoff is $\varepsilon_B V$, where $\varepsilon_A \neq \varepsilon_B$.

[7] We focus on the symmetric case to simplify the exposition. It is straightforward to generalize the model such that party A's transaction costs are c_A and party B's transaction costs are c_B.

and Felli (2006), the negotiation stage is reached only if both parties pay their transaction costs ($x_A = x_B = 1$).

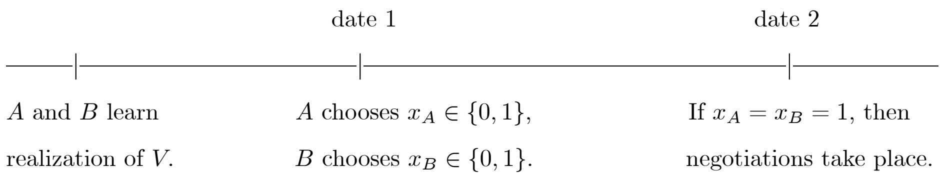

Figure 1. The sequence of events in Scenario I.

If the date-2 negotiations take place, then the outcome of the negotiations is given by the generalized Nash bargaining solution, where $\lambda \in (0, 1)$ denotes party A's bargaining power and the threatpoint is given by the parties' default payoffs. Thus, under ownership structure o, party A's payoff is

$$u_A^o(V) = \begin{cases} d_A^o + \lambda(V - d_A^o - d_B^o) - c & \text{if } x_A = x_B = 1, \\ d_A^o - c & \text{if } x_A = 1,\ x_B = 0, \\ d_A^o & \text{otherwise,} \end{cases}$$

and party B's payoff is

$$u_B^o(V) = \begin{cases} d_B^o + (1 - \lambda)(V - d_A^o - d_B^o) - c & \text{if } x_A = x_B = 1, \\ d_B^o - c & \text{if } x_A = 0,\ x_B = 1, \\ d_B^o & \text{otherwise.} \end{cases}$$

If a party does not pay its transaction cost, then it is the best reply for the other party also not to pay its transaction cost. However, if $c \leq \lambda(V - d_A^o - d_B^o)$ and $c \leq (1 - \lambda)(V - d_A^o - d_B^o)$, then there is a second equilibrium in which both parties pay their transaction costs. Following Anderlini and Felli (2006), we assume that the latter equilibrium is played whenever it exists, because it Pareto-dominantes the former equilibrium.[8]

Under sole ownership, both parties pay their transaction costs whenever $c \leq \min\{\lambda, 1 - \lambda\}(1 - \varepsilon)V$. Under joint ownership, both parties pay their transaction costs whenever $c \leq \min\{\lambda, 1 - \lambda\}V$. The expected total surplus levels S^o can thus be characterized as follows.

[8] We thus assume that the parties coordinate on Pareto-perfect equilibria (cf. Fudenberg and Tirole, 1991). Alternatively, as has also been argued by Anderlini and Felli (2006), we could assume that the parties have to pay their transaction costs sequentially (so there would be no multiplicity of equilibria and the same results would be obtained as under the assumption of Pareto perfection).

Proposition 1 *Consider Scenario I. The expected total surplus is*

$$S^A = S^B = \begin{cases} \int_{\frac{c}{\min\{\lambda,1-\lambda\}(1-\varepsilon)}}^{1} (V-2c)dF(V) + \int_0^{\frac{c}{\min\{\lambda,1-\lambda\}(1-\varepsilon)}} \varepsilon V dF(V) & \textit{if } c \le \min\{\lambda, 1-\lambda\}(1-\varepsilon), \\ \varepsilon E[V] & \textit{otherwise,} \end{cases}$$

under sole ownership and

$$S^J = \begin{cases} \int_{\frac{c}{\min\{\lambda,1-\lambda\}}}^{1} (V-2c)dF(V) & \textit{if } c \le \min\{\lambda, 1-\lambda\}, \\ 0 & \textit{otherwise,} \end{cases}$$

under joint ownership.

2.2 Scenario II: Incomplete information

Next, consider Scenario II. This scenario is identical to Scenario I, except that there is incomplete information when the parties decide whether to pay their transaction costs (see Figure 2).[9]

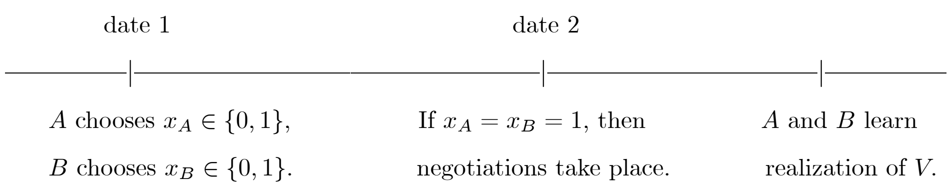

Figure 2. The sequence of events in Scenario II.

In this case, party A's payoff reads

$$\tilde{u}_A^o = \begin{cases} E[d_A^o] + \lambda E[V - d_A^o - d_B^o] - c & \text{if } x_A = x_B = 1, \\ E[d_A^o] - c & \text{if } x_A = 1,\, x_B = 0, \\ E[d_A^o] & \text{otherwise,} \end{cases}$$

and party B's payoff is

$$\tilde{u}_B^o = \begin{cases} E[d_B^o] + (1-\lambda) E[V - d_A^o - d_B^o] - c & \text{if } x_A = x_B = 1, \\ E[d_B^o] - c & \text{if } x_A = 0,\, x_B = 1, \\ E[d_B^o] & \text{otherwise.} \end{cases}$$

Under sole ownership, the parties pay the transaction costs whenever $c \le \min\{\lambda, 1-\lambda\}(1-\varepsilon)E[V]$. Under joint ownership, the parties pay the transaction costs whenever $c \le \min\{\lambda, 1-\lambda\}E[V]$. Thus, the expected total surplus levels $\tilde{S}^o$ can be characterized as follows.

[9]Note that the realization of V is learned by the parties only after the bargaining stage. We could alternatively assume that the parties learn the realization of V between dates 1 and 2, which would yield the same expected surplus levels.

Proposition 2 *Consider Scenario II. The expected total surplus is*

$$\tilde{S}^A = \tilde{S}^B = \begin{cases} E[V] - 2c & \text{if } c \leq \min\{\lambda, 1-\lambda\}(1-\varepsilon)E[V], \\ \varepsilon E[v] & \text{otherwise,} \end{cases}$$

under sole ownership and

$$\tilde{S}^J = \begin{cases} E[V] - 2c & \text{if } c \leq \min\{\lambda, 1-\lambda\}E[V], \\ 0 & \text{otherwise,} \end{cases}$$

under joint ownership.

3 Implications

First, we explore the optimality of joint ownership for a given information structure.

If $\lambda \to 0$ or $\lambda \to 1$, then regardless of the information structure the expected total surplus is zero under joint ownership, while it is $\varepsilon E[v]$ under sole ownership. Hence, joint ownership cannot be optimal if the 'mismatch' between the transaction costs and the bargaining power is too strong.

Now consider the case $\lambda = 1/2$ and $c < (1-\varepsilon)E[V]/2$. In this case, according to Proposition 1

$$\begin{aligned} S^A - S^J &= \int_{\frac{2c}{1-\varepsilon}}^{1} (V - 2c)dF(V) + \int_0^{\frac{2c}{1-\varepsilon}} \varepsilon V dF(V) - \int_{2c}^{1} (V - 2c)dF(V) \\ &= \int_{2c}^{\frac{2c}{1-\varepsilon}} \left[\varepsilon V - (V - 2c)\right] dF(V) + \int_0^{2c} \varepsilon V dF(V) > 0, \end{aligned}$$

so joint ownership is suboptimal given complete information. Yet, Proposition 2 implies that in the case under consideration, if there is incomplete information, the expected total surplus is $E[V] - 2c$ regardless of the ownership structure. Hence, joint ownership is among the optimal ownership structures. Moreover, if $\lambda \neq 1/2$, then under incomplete information joint ownership can even yield a strictly larger expected total surplus than sole ownership, while under complete information sole ownership would still be optimal. As an illustration, see Figure 3. Observe that under complete information joint ownership is optimal only for small ranges of the bargaining power λ, while under incomplete information joint ownership is optimal for larger parameter ranges.[10]

[10] Our finding that joint ownership can be optimal under incomplete information even when it would be suboptimal under complete information is in line with Pisano's (1989) observation that joint ventures are particularly prevalent in the context of R&D activities (where incomplete information is likely to play an important role).

Corollary 1 *(i) If* $\lambda \to 0$ *or* $\lambda \to 1$*, then sole ownership is optimal, regardless of the information structure.*

(iii) For intermediate values of λ*, joint ownership can be optimal, regardless of the information structure. Moreover, joint ownership can be optimal under incomplete information even when it is suboptimal under complete information.*

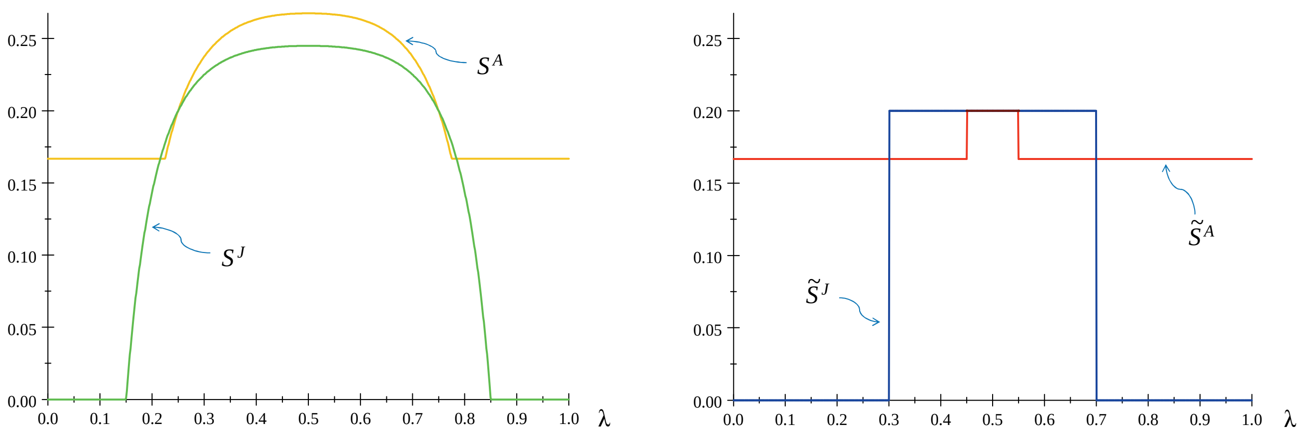

Figure 3. Expected total surplus levels in the case $F(v) = v$, $\varepsilon = 1/3$, and $c = 0.15$.

Next, we investigate the effects of the information structure for a given ownership structure.

If $\lambda \to 0$ or $\lambda \to 1$, then under sole ownership the expected total surplus is $\varepsilon E[V]$, while under joint ownership it is zero, regardless of the information structure. Moreover, if $\lambda = 1/2$ and $c < (1-\varepsilon)E[V]/2$, then

$$\begin{aligned} S^A - \tilde{S}^A &= \int_{\frac{2c}{1-\varepsilon}}^{1} (V-2c)dF(V) + \int_{0}^{\frac{2c}{1-\varepsilon}} \varepsilon V dF(V) - \int_{0}^{1} (V-2c)dF(V) \\ &= \int_{0}^{\frac{2c}{1-\varepsilon}} [2c - (1-\varepsilon)V]\, dF(V) > 0, \end{aligned}$$

and

$$\begin{aligned} S^J - \tilde{S}^J &= \int_{2c}^{1} (V-2c)dF(V) - \int_{0}^{1} (V-2c)dF(V) \\ &= \int_{0}^{2c} [2c - V]\, dF(V) > 0. \end{aligned}$$

Hence, in this case the expected total surplus is larger under complete information than under incomplete information. Yet, the opposite result may also hold; i.e., the parties may "know too much." If under sole ownership $\lambda = \frac{c}{(1-\varepsilon)E[V]} < 1/2$, then

$$\begin{aligned}
S^A - \tilde{S}^A &= \int_{E[V]}^{1} (V-2c)dF(V) + \int_0^{E[V]} \varepsilon V dF(V) - \int_0^1 (V-2c)dF(V) \\
&= \int_0^{E[V]} \left[2c - (1-\varepsilon)V\right] dF(V).
\end{aligned}$$

This expression is negative if c is sufficiently small. Similarly, if under joint ownership $\lambda = c/E[V] < 1/2$, then

$$\begin{aligned}
S^J - \tilde{S}^J &= \int_{E[V]}^{1} (V-2c)dF(V) - \int_0^1 (V-2c)dF(V) \\
&= \int_0^{E[V]} \left[2c - V\right] dF(V),
\end{aligned}$$

which is negative for small transaction costs. Figure 4 illustrates the fact that the expected total surplus can be strictly larger under incomplete information than under complete information. This effect occurs for larger parameter ranges when there is joint ownership.

Corollary 2 *(i) If $\lambda \to 0$ or $\lambda \to 1$, then for a given ownership structure the expected total surplus does not depend on the information structure.*

(ii) If $\lambda = 1/2$, then the expected total surplus is larger under complete information than under incomplete information, regardless of the ownership structure.

(iii) If $\lambda \neq 1/2$, then the expected total surplus can be larger under incomplete information than under complete information, regardless of the ownership structure.

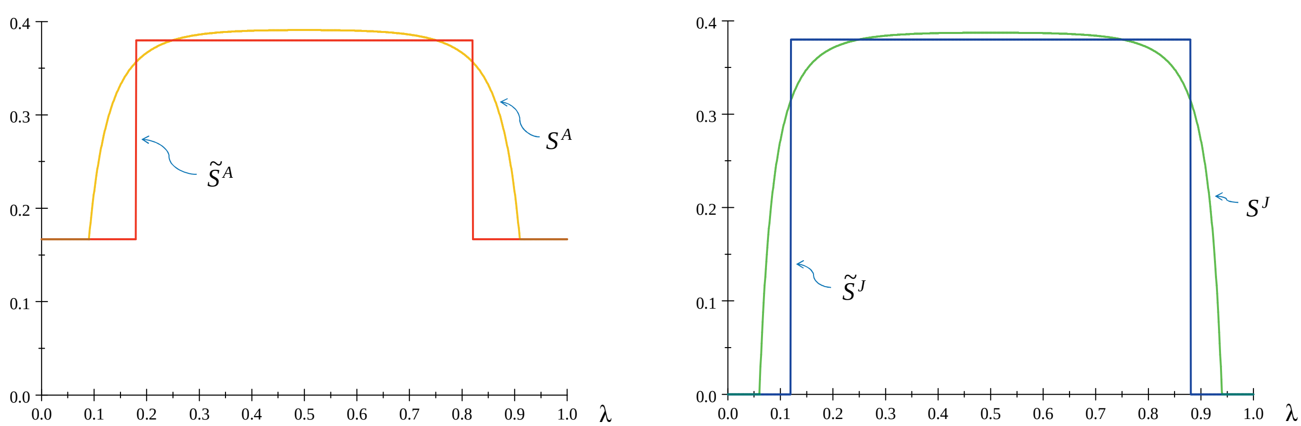

Figure 4. Expected total surplus levels in the case $F(v) = v$, $\varepsilon = 1/3$, and $c = 0.06$.

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