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Abstract

Using a simple bilateral trading example with discrete valuations and costs it is demonstrated that in the presence of private information the efficiency of Coasean bargaining may be strictly enhanced if initially no property rights are assigned.

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1 Introduction

The so-called Coase theorem has attracted many researchers' attention for several decades.[1] "Although this theorem has several variants, it says, in a nutshell, that if rights are fully specified and transaction costs are zero, parties to a dispute will bargain to the same efficient outcome regardless of the initial assignment of rights" (Mercuro and Medema, 1997, p. 67). Recently it has been pointed out by Usher (1998) that in a world of zero transaction costs, efficiency may not only be achieved for any initial allocation of clearly defined property rights, but also without an assignment of property rights at all, i.e., "when property rights are insecure and it is not known in advance which party will prevail" (Usher, 1998, p. 7).[2]

In this note, following the lesson of Coase (1960), a world of positive transaction costs will be considered. It is well known that private information is one particular form of transaction cost that can lead to inefficiency.[3] Proposition 1 of the present note will restate this result in the context of a simple bilateral trading problem with discrete costs and valuations. While assigning property rights to one or the other party inevitably leads to inefficiencies for some parameter constellations, Proposition 2 will demonstrate that initially not assigning property rights can lead to full efficiency for all parameter constellations. In this sense, Usher's (1998) argument will be strengthened, since in the presence of private information not assigning initial property rights may not only be as good as any clearly defined allocation of property rights, it may even be strictly better.

[1] See Coase (1960). Cf. Medema (1999) and the references given there.

[2] Cf. also Schiff (1995) for a verbal discussion of uncertain property rights.

[3] Cf. Samuelson (1984), Schweizer (1988), and Illing (1992).

Intuitively, when initial property rights are clearly defined, bargaining between the parties under private information can fail because the party that has the relevant property right is in the position of a seller (who has an incentive to overstate his willingness-to-pay for the right in order to sell it at a higher price), while the other party is in the position of a buyer (who has an incentive to understate his willingness-to-pay for the right, in order to buy it at a lower price). Yet, when there is no clear initial allocation of ownership, so that it is uncertain who will prevail when the parties go to the court, then a party does not know whether it will be in the position of a buyer or of a seller with regard to the right. Hence, the parties' incentives to overstate or to understate are weakened, which may enable the parties to reach an efficient solution.[4]

2 The model

Consider two risk neutral parties A and B with payoff functions

$$\begin{aligned} U^A &= t - xc, \\ U^B &= xv - t, \end{aligned}$$

where t is a transfer payment, $x \in \{0, 1\}$ is a decision, and $c > 0$ and $v > 0$ denote A's costs and B's valuation in the case of an affirmative decision, respectively ($v \neq c$). In order to relate the variables to a well-known real world example, the decision $x = 1$ could mean that rancher B's cows graze on farmer A's farm, destroying crops. The decision $x = 0$ means that the cows do not graze on the farm, so that the rancher does not receive benefit v

[4] See Lewis and Sappington (1989) for a discussion of countervailing incentives. Cf. also Schmitz (2002) and the literature cited there for somewhat related results in the context of the so-called hold-up problem.

and the farmer does not incur costs c. Of course, the ex post efficient decision is

$$x^*(v,c) = \begin{cases} 1 & \text{if } v \geq c \\ 0 & \text{otherwise.} \end{cases}$$

Assume that c is either c_L or $c_H > c_L$. Following the standard way of modelling private information,[5] suppose that both parties know that nature chooses c_L or c_H with equal probability, but only party A knows the realization of c. Analogously, v is either v_L or v_H with equal probability, but only party B knows its realization.

As a final piece of notation, let $x_0 \in [0,1]$ denote the default probability of an affirmative decision, i.e. the probability that the decision will be $x = 1$ if the parties do not reach another agreement. Of course, if party A has the relevant property right, so that he can make the decision, then $x_0 = 0$. In the example, the farmer would not allow the cows from the ranch to graze on the farm if he were not compensated by the rancher. On the other hand, if party B has the right, then $x_0 = 1$. The rancher would let the cows graze if he did not reach another agreement with the farmer. In addition, following Usher (1998), we will consider the possibility that there is no assignment of rights, so that initially it is not known with certainty who will prevail. It is assumed that both parties think that each party will prevail with equal probability ($x_0 = \frac{1}{2}$) in this case.

The question is whether voluntary bargaining between A and B can result in an efficient decision. Using the well-known revelation principle (see e.g. Myerson, 1982), it is sufficient to consider direct mechanisms $[t(v,c), x^*(v,c)]$ that induce each party to report its type truthfully. The Bayesian incentive

[5]See e.g. Fudenberg and Tirole (1991).

compatibility constraints are

$$\begin{aligned} E_v\left[t(v,c)-x^*(v,c)c\right] &\geq E_v\left[t(v,\tilde{c})-x^*(v,\tilde{c})c\right] \quad \forall c,\tilde{c}\in\{c_L,c_H\}, \\ E_c\left[x^*(v,c)v-t(v,c)\right] &\geq E_c\left[x^*(\tilde{v},c)v-t(\tilde{v},c)\right] \quad \forall v,\tilde{v}\in\{v_L,v_H\} \end{aligned}$$

and the interim individual rationality constraints are

$$\begin{aligned} E_v\left[t(v,c)-x^*(v,c)c\right] &\geq -x_0 c \quad \forall c\in\{c_L,c_H\}, \\ E_c\left[x^*(v,c)v-t(v,c)\right] &\geq x_0 v \quad \forall v\in\{v_L,v_H\}. \end{aligned}$$

The incentive compatibility constraints mean that each party is willing to announce its type truthfully given the other party tells the truth. The individual rationality constraints mean that each party voluntary participates in the mechanism (at the interim stage, i.e. knowing its own type but not the type of the other party).

The following proposition says that in the case of clearly defined property rights ($x_0 = 0$ or $x_0 = 1$) there are parameter constellations such that efficiency cannot be achieved.[6]

Proposition 1 *If A has the property right, efficiency cannot be achieved if $v_H > c_H > v_L > c_L$ and $\frac{1}{2}(v_H - c_L) < c_H - v_L$. If B has the property right, efficiency cannot be achieved if $c_H > v_H > c_L > v_L$ and $\frac{1}{2}(c_H - v_L) < v_H - c_L$. Otherwise, efficiency can be achieved.*

Proof. See the appendix. ■

[6] Of course, this result is reminiscent of the famous impossibility theorem of Myerson and Satterthwaite (1983), where continuously distributed valuations are considered. See Matsuo (1989) for the two type version of their result. In these papers, only the case $x_0 = 0$ is analyzed.

Hence, there is no deterministic assignment of property rights that allows the parties to reach an efficient agreement for all constellations of the parameters v_L, v_H, c_L, and c_H.[7] In contrast, consider now a situation in which there is no initial assignment of property rights in the sense of Usher (1998). The next proposition says that in this case efficiency can always be achieved in the example under consideration. Therefore, this proposition is a simple illustration of the fact that in a world of positive transaction costs there are situations in which it may be strictly welfare enhancing not to assign initial property rights at all.[8]

Proposition 2 *If there is no initial assignment of property rights, then efficiency can be achieved for all values of* v_L, v_H, c_L, *and* c_H.

Proof. See the appendix. ■

Notice that –as usual in the mechanism design literature– the existence of a Bayesian incentive compatible and interim individually rational mechanism does not guarantee that the parties' actual bargaining will be ex post efficient in real life. But an ex post efficient outcome is at least consistent with rationality, while following the logic of the revelation principle there exist no bargaining procedures leading to ex post efficiency in the cases characterized in Proposition 1.

[7] In order to see that this may indeed make inefficiencies inevitable in some states of the world, imagine that a welfare-maximizing government has to choose the initial allocation of property rights $x_0 \in \{0, 1\}$ without knowing the exact values of v_L, v_H, c_L, and c_H, while all constellations are possible (or assume that an equal protection clause in the constitution is interpreted such that x_0 may not depend on these parameters).

[8] Formally, the result is related to Cramton, Gibbons and Klemperer (1987). They show a possibility result for the case of identical continuous distributions. Hence, the present note is technically related to their paper in the same way as Matsuo (1989) is related to Myerson and Satterthwaite (1983).

3 Conclusion

The well-known Coase theorem says that in the absence of transaction costs the efficiency of voluntary bargaining between two parties does not depend on whether the first or the second party has the relevant property rights. Usher (1998) has recently argued that in a world of zero transaction costs not assigning property rights at all may be as good as any clearly specified assignment of property rights. In this note it has been illustrated with a particularly simple example that in a world of positive transaction costs in the form of private information not assigning initial property rights may even be strictly welfare improving.

Of course, this is not meant to suggest that the absence of a clear initial assignment of property rights is always beneficial in real life. This note just demonstrates that there are situations in which the transaction costs caused by private information might vanish. Other forms of transaction costs have not been considered. Notice that in real life it is often unclear which party has a certain right, so that the court has an area of discretion, i.e. its decision is uncertain. Here it has been argued that this may in fact help the parties to achieve efficiency through voluntary bargaining.

Appendix

Proof of Proposition 1.

For brevity, define $t_{ij} \equiv t(v_i, c_j)$ and $x^*_{ij} \equiv x^*(v_i, c_j)$, where $i, j \in \{L, H\}$. Consider first the case $v_H > c_H > v_L > c_L$, so that $x^*_{HH} = x^*_{HL} = x^*_{LL} = 1$ and $x^*_{LH} = 0$. The incentive compatibility constraints for the types v_H and c_L imply $t_{HH} - t_{LL} \leq \frac{1}{2}(v_H - c_L)$, and the individual rationality constraints for the types v_L and c_H imply $t_{HH} - t_{LL} \geq (c_H - v_L)(1 - 2x_0)$. Hence, efficiency cannot be achieved if $\frac{1}{2}(v_H - c_L) < (c_H - v_L)(1 - 2x_0)$. If party A has the property right ($x_0 = 0$), this condition is equivalent to $\frac{1}{2}(v_H - c_L) < c_H - v_L$. Consider next the case $c_H > v_H > c_L > v_L$, so that $x^*_{HH} = x^*_{LH} = x^*_{LL} = 0$ and $x^*_{HL} = 1$. Incentive compatibility implies $t_{LL} - t_{HH} \leq \frac{1}{2}(c_H - v_L)$, and individual rationality implies $t_{LL} - t_{HH} \geq (v_H - c_L)(2x_0 - 1)$. If party B has the property right, then $x_0 = 1$. Thus, efficiency cannot be achieved in this case if $\frac{1}{2}(c_H - v_L) < v_H - c_L$. Finally, it can be easily checked that in the remaining cases the incentive compatibility and individual rationality constraints do not lead to a contradiction. ■

Proof of Proposition 2.

In order to prove the proposition, one has to show that for $x_0 = \frac{1}{2}$ there exist transfer payments such that all incentive compatibility and individual rationality constraints are satisfied. Note that six different cases of parameter constellations have to be considered. In the case $v_H > v_L > c_H > c_L$, choose $t_{HH} = t_{LL} = 0$, $t_{LH} = t_{HL} = c_H$. In the case $c_H > c_L > v_H > v_L$, choose $t_{HH} = t_{LL} = 0$, $t_{LH} = t_{HL} = -v_H$. In the case $v_H > c_H > c_L > v_L$, choose $t_{HH} = t_{HL} = \frac{1}{2}c_H$, $t_{LH} = t_{LL} = -\frac{1}{2}c_L$. In the case $c_H > v_H > v_L > c_L$, choose $t_{HH} = t_{LH} = -\frac{1}{2}v_H$, $t_{LL} = t_{HL} = \frac{1}{2}v_L$. In the case $v_H > c_H > v_L > c_L$, choose $t_{HH} = t_{LL} = c_L$, $t_{LH} = -c_L$, $t_{HL} = v_L - c_L$. Finally, in the case

$c_H > v_H > c_L > v_L$, choose $t_{HH} = t_{LL} = -v_L$, $t_{LH} = v_L - c_L$, $t_{HL} = v_L$. It is straightforward to check that given these transfer payments all incentive compatibility and individual rationality constraints are indeed satisfied. ■

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