November 2001 - Oliver Hart

Lecture 3, Munich

- Joint work with John Moore (forthcoming)
  Provisional title: "More Foundations of Incomplete Contracts"
- General recognition in the last few years that contractual incompleteness important for understanding a number of things: institutions, corporate finance . . . .
- Basic idea behind incomplete contracts: because future complex and there exist thinking, negotiation and enforcement costs, ideal state contingent (Arrow-Debreu) contracts can't be written. Asymmetries of information not central here. Rather state of world is "observable" but not "verifiable" (i.e., not ex ante contractible).
- This idea doesn't seem that controversial, but formalizing it turns out to be surprisingly hard. The reason is that ingenious mechanisms can be used to complete incomplete contracts. These mechanisms are subtle versions of the following: the parties are asked to reveal the state of the world ex post and are punished if they lie (e.g., they have to pay a fine to a third party). Such mechanisms are highly unrealistic. Yet they are hard to rule out.

- In this lecture I argue that one way to rule them out is to suppose that parties have short-run commitment ability. [More precisely, once the state of the world has been realized, the parties play a commitment game: each tries to be the first to commit to play a particular strategy in the mechanism (one party always wins the race).] The ability to make commitments will be taken as exogenous. It could be that third parties are used; or it could be that someone can convince himself and others that he is intransigent: if you announce that you will play a certain strategy, then it may be costly if you back down (you have lied, you lose face). (Psychological, experimental, empirical evidence for this? Short-run vs. long-run commitment . . .)
- I will argue that short-run commitments render ingenious schemes, based on sub-game perfection, useless and return us to the world of simple and incomplete contracts.
- Structure of talk: use a series of examples to illustrate literature and role that short-run commitment can play to rule out complex mechanisms (formal analysis and proofs will be found in forthcoming paper).

- Basic setup: Assume that a seller S and a buyer B meet at date 0, and trade zero or one (more generally, $0 \leq q \leq 1$) widgets at date 1. S's cost = 0. B's value = $\bar{v}$ or $\underline{v}$, where $\bar{v} > \underline{v} > 0$. Assume v is observable at date 1 to (B and S) but not verifiable and so contracts cannot be made conditional (directly) on v.
- Clearly trade should take place (q = 1) for both values of v. Suppose we want the widget price P to be independent of v--could be because B can take actions to increase v or because S is risk averse and B is risk neutral. Easy way to achieve this: specify q = 1 and P = $\bar{P}$ (specific performance).
- Now consider the other extreme. Suppose we want P to vary with v on a one-for-one basis. This could be because S can take actions to increase v or because S is risk neutral and B is risk averse. The following contract works. S is given the right to make a take-it-or-leave-it (TIOLI) offer at date 1. This implies $P(\underline{v}) = \underline{v}$, $P(\bar{v}) = \bar{v}$. (S could make an up-front payment to redistribute some surplus to B.)

- So far nonverifiability of v hasn't been much of a problem. However, an obvious difficulty with a TIOLI offer is that B can turn it down and renegotiate. Suppose the gains from renegotiation are split 50 : 50. Then $P(\underline{v}) = \frac{1}{2}\underline{v}$, $P(\bar{v}) = \frac{1}{2}\bar{v}$, and $\Delta P = \frac{1}{2}(\bar{v} - \underline{v}) < \bar{v} - \underline{v}$.
- From now on I will suppose that we want to maximize ΔP (e.g., because S's actions are important or S is risk neutral). With renegotiation, a TIOLI contract achieves $\Delta P = \frac{1}{2}(\bar{v} - \underline{v})$. So does the null contract. Are there contracts that make $\Delta P > \frac{1}{2}(\bar{v} - \underline{v})$? Che-Hausch, 1999, show that the answer is no. Note also that some contracts are strictly worse than the null contract; e.g., a contract that specifies $q = \bar{q}$, $P = \bar{P}$, where $0 < \bar{q} \leq 1$ makes ΔP anything from $\frac{1}{2}(\bar{v} - \underline{v})$ to 0.
- So now we seem to have achieved a justification for contractual incompleteness. If the goal is to maximize ΔP and parties can always renegotiate, then the optimal contract is simple and incomplete: it is the null contract!

- Unfortunately, this is far from the end of the matter. Several objections have been made to the above reasoning. First, some people have argued that the parties could always commit not to renegotiate and achieve $\Delta P = \bar{v} - \underline{v}$. In response others have argued that any commitment to renegotiate could be circumvented and hence is not credible. I don't want to revisit this debate here. For the rest of the talk I will assume that the parties cannot commit not to renegotiate.

- Even in this case, there are possibilities that we haven't considered. We have ignored third parties. In the current setting, third parties can make a huge difference: they can allow $\Delta P = \bar{v} - \underline{v}$.

- Consider the following variant of a Moore-Repullo, 1988, mechanism (see also Maskin-Tirole, 1999). For simplicity, suppose $\bar{v} = 14$, $\underline{v} = 10$. Let B and S include a third party T in the initial contract. At date 1, B announces the value of v. If he says "high," then B pays 14 for the widget. If he says "low," then S can challenge. If S does not challenge, B pays 10 for the widget. If S challenges, B pays a large amount F to T. B is then offered the widget for 6. If B accepts the widget, S receives F from T (and also the 6 from B). If B refuses the widget, S pays F to T.
- The clever feature of this mechanism is that, if v = 10 and B says so, S won't challenge since B would refuse the widget: he would prefer to renegotiate (privately with S) and get it for 5 (½ 10). However, if v = 14 and B denies it, S will challenge since B will accept the widget rather than renegotiate and get it for 7 (½ 14). (So the above mechanism is renegotiation proof.)

- The above mechanism is rather devastating. It suggests that many things are possible once third parties are allowed. It is true that the mechanism is vulnerable to collusion between S and T. However, it is hard to argue that there aren't some honest third parties in the world (and if there are not, and the parties are risk averse, Eric Maskin has shown that random mechanisms can substitute for third parties . . .)

- We now come to the role of short-run commitment. Suppose that with probability ½ B has the power to commit to a strategy in the date 1 mechanism (and to make a TIOLI offer in any post-mechanism renegotiation); and with probability ½ the roles are reversed: S has these powers. (So as before the gains from renegotiation are split 50 : 50 on average.) Then the Moore-Repullo (Maskin-Tirole) mechanism fails.

- To see this, suppose v = 10. Then with probability ½, B has full power and will announce "low" and the price will be 10; while with probability ½ S has full power and will tell B that unless B says "high" S will challenge--knowing this, B will say "high" and the price will be 14. So B pays on average 12.

  Now suppose v = 14. Then with probability ½ B has full power and will announce "low," telling S that if S challenges B will reject the widget at price 6. On the other hand, with probability ½, S has full power and will tell B that he will challenge B unless B says "high"--hence B will say "high." So B pays on average 12.
- We see that B pays the same amount whether v is high or low. This is worse than no contract from the point of view of S's incentives! (C.f. Che-Hausch.)
- This turns out to be a general conclusion for the above model. With short-run commitment, if the goal is to maximize ΔP, the optimal contract is the null contract!

- The above model provides a rather particular justification for incomplete contracts. Other things than the null contract are feasible--it just turns out that if, say, the goal is to maximize ΔP, the null contract is optimal.
- A more "robust" justification of contractual incompleteness is based on the notion of complexity developed in Segal, 1999, and Hart-Moore, 1999. To understand this approach suppose that there are N widgets (rather than just one). One is the special widget that yields v = 10 or v = 14 and costs nothing to produce. The others are generic widgets whose value is spread evenly between 0 and 14 and whose cost = value (so the value of the nth generic widget = $\frac{n}{N}$ 14).
- Each widget is equally likely to be the special widget or the generic widget. (Only one widget can be traded.) The state of the world--that is, the identities of all the widgets and whether the special widget is worth 10 or 14--is observable but not verifiable. All widgets can be described at date 0. (Alternatively, there is no uncertainty but it's impossible to describe widgets at date 0.)

- Hart-Moore, 1999, show that, if the parties cannot commit not to renegotiate and there are no third parties, every contract has $\Delta P \simeq \frac{1}{2}(\bar{v} - \underline{v}) = 2$. (This is a stronger result than Che-Hausch.) Sketch argument . . . Consider specific performance; case where B chooses widget; case where S chooses widget.
- However, as with previous model, third parties can change things hugely: $\Delta P = (\bar{v} - \underline{v})$ can be achieved. (See Hart-Moore, 1999.)
- Now bring in short-run commitment. Then the schemes involving third parties can be shown to be useless. Conclusion that $\Delta P \simeq \frac{1}{2}(\bar{v} - \underline{v})$ for all contracts is restored: the null contract is approximately optimal.
- Final observation. A final part of the literature argues that $\Delta P = \bar{v} - \underline{v}$ can be achieved using options that never lapse (see Ellman, 1999, Lyons and Rasmussen, 2000, Noldecke-Schmidt, 1998, Watson, 2001; Hart-Moore, 1988, is related to this). Short-run commitment renders these schemes useless too.

  [Two types of options . . . .]

Summary and Conclusions

- There is little dispute that in reality contracts are highly incomplete. However, formalizing this has been very difficult. The reason is that ingenious mechanisms based on challenges and sub-game perfection can complete otherwise incomplete contracts.
- In this lecture I have argued that assuming that parties have the ability to make short-run commitments rules out these mechanisms and in simple cases returns us to the case of highly incomplete contracts (e.g., the null contract).
- Important to note that, even with short-run commitment, quite sophisticated contracts are possible in general, e.g., option contracts of various kinds. Characterizing the optimal contract under short-run commitment in a variety of settings is an interesting topic for future research (some results will be found in Hart-Moore (forthcoming)). (Don't know yet whether third parties have any role.) The work of Maskin-Moore, 1999, and Segal-Whinston, 2001, is also related to this.