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Can contracts solve the hold-up problem? Experimental evidence

Eva I. Hoppe [a,*], Patrick W. Schmitz [a,b]

[a] Department of Economics, University of Cologne, Albertus-Magnus-Platz, 50923 Köln, Germany
[b] CEPR, London, UK

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ABSTRACT

In the contract-theoretic literature, there is a vital debate about whether contracts can mitigate the hold-up problem, in particular when renegotiation cannot be prevented. Ultimately, this question has to be answered empirically. As a first step, we have conducted a laboratory experiment with 960 participants. We consider investments that directly benefit the non-investing party. While according to standard theory, contracting would be useless if renegotiation cannot be ruled out, we find that option contracts significantly improve investment incentives compared to a no-contract treatment. This finding might be attributed to Hart and Moore's (2008) recent idea that contracts can serve as reference points.

1. Introduction

How to induce trading partners to make relationship-specific investments is a central theme in the contract-theoretic literature. A party may have insufficient incentives to make non-contractible investments if it fears that it will be held up by its partner in the future. This hold-up problem is an important ingredient of the incomplete contracting approach, which has become a leading paradigm in institutional and organizational economics.[1] The possibility to solve the hold-up problem contractually has attracted broad interest and has been studied extensively in a vast theoretical literature initiated by Hart and Moore (1988). However, up to now there is scarce empirical evidence about the effectiveness of different contracts in inducing investment incentives. In this paper, we report about a large-scale laboratory experiment designed to explore the role of contracts in mitigating the hold-up problem.

We consider a buyer and a seller who can trade one unit of an indivisible good at some future date 2. It is always ex post efficient to trade. At date 1, the seller can make an observable but unverifiable investment that directly improves the buyer's value of the good; i.e., the investment is "cooperative" in the sense of Che and Hausch (1999). We investigate a cooperative investment, because in the theoretical literature it turned out that the difficulty to find a contractual solution to the hold-up problem is particularly severe in this case.[2]

* Corresponding author.
E-mail addresses: eva.hoppe@uni-koeln.de (E.I. Hoppe), patrick.schmitz@uni-koeln.de (P.W. Schmitz).

[1] See the seminal contributions by Grossman and Hart (1986) and Hart and Moore (1990), which build on the pioneering work by Coase (1937) and Williamson (1975, 1985). Cf. Hart (1995) for a comprehensive textbook exposition.

[2] Specifically, Maskin and Moore (1999) and Che and Hausch (1999) have shown that in the case of cooperative investments there exists no contractual solution at all to mitigate the hold-up problem if the parties cannot commit not to renegotiate. In contrast, Edlin and Reichelstein (1996) have shown that in the case of "selfish" investments (i.e., when the investment directly benefits the investor), the first-best investment can be induced by a suitable contract even if renegotiation cannot be ruled out.

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Suppose first that the parties have not written any contract before the investment stage. Then they will negotiate at date 2 in order to realize the ex post gains from trade. According to contract-theoretic reasoning, in this case the seller may have insufficient incentives to invest because he fears that in the negotiation process he will lose a part of the returns created by his investment. Alternatively, the parties might consider to write a fixed-price contract at an initial date 0. But since this contract specifies that the buyer has to purchase the good from the seller for a fixed price at date 2, the seller has no investment incentives at all, because his revenue is independent of his investment. In contrast, the underinvestment problem can be solved if the parties write a simple option contract at date 0, provided that they can commit not to renegotiate the contract. The idea is that the option contract specifies a strike price such that the buyer will exercise the option only if the seller has chosen the first-best investment level. Anticipating the buyer's behavior, the seller will actually choose the first-best investment level, provided that the strike price at least covers his investment costs. However, if renegotiation cannot be ruled out, the buyer might prefer not to exercise the option, because he anticipates that the ex post inefficient no-trade decision will be reversed and that through renegotiations he will obtain a larger share of the gains from trade. The seller in turn anticipates the buyer's behavior and hence he has the same investment incentives as if there were no contract at all.

Our experimental study consists of two parts. In the first part, we study the investment behavior in the four scenarios just described (no contract, fixed-price contract, option contract, option contract with renegotiation) in four different treatments. For simplicity, in the experiment the seller can choose between only two investment levels, where high investment is first-best. To make the hold-up problem most severe, ex post negotiations are such that the buyer makes a take-it-or-leave-it price offer to the seller. Standard contract-theoretic arguments as outlined above imply that

(1) the fixed-price contract cannot ameliorate the hold-up problem,
(2) the non-renegotiable option contract solves the hold-up problem, and
(3) the renegotiable option contract is less effective in mitigating the hold-up problem than the non-renegotiable option contract; in particular,
(4) investment behavior given a renegotiable option contract is as in the no-contract benchmark.

Our central goal is to find out whether these four predictions are borne out by the data.

We find support for predictions (1) to (3). Yet, we have to reject prediction (4): Compared to the no-contract benchmark, the fraction of high investments turns out to be significantly larger given a renegotiable option contract. This result can be explained neither by standard theory nor by common social preference models in which subjects' utilities depend only on their own and other subjects' final payoffs. This is because in the no-contract treatment and in the option contract with renegotiation treatment the attainable payoff allocations are the same.

We will then investigate whether Hart and Moore's (2008) novel idea that contracts can serve as reference points for trading relationships may shed light on the observed differences regarding the investment behavior in the option contract with renegotiation treatment and in the no-contract benchmark. Hart and Moore (2008) argue that an ex ante contract may shape the parties' feelings of entitlement with regard to ex post outcomes. A party that ex post does not get what it feels entitled to will be aggrieved and may be willing to punish its trading partner, even if this is costly and yields no material gain. For our option contract with renegotiation treatment, this may imply that a buyer might exercise the option (or make a renegotiation offer not too much below the strike price), because he fears that a seller who has chosen high investment feels entitled to the strike price, so that if the option was not exercised, the seller would be aggrieved and hence inclined to reject small offers.

In the second part of our experimental study, we report about additional treatments that we have designed in order to explore whether the observed differences between the option contract with renegotiation treatment and the no-contract treatment may be attributed to Hart and Moore's (2008) idea that contracts can serve as reference points. Specifically, we have conducted variants of the no-contract and the option contract with renegotiation treatments in which instead of making a take-it-or-leave-it offer, the buyer can dictate the trade price. In other words, the seller cannot engage in costly punishment by rejecting offers. Moreover, we have conducted further variants of the original no-contract and the option contract with renegotiation treatments in which the strategy method is used to elicitate the sellers' rejection behavior. The above-outlined arguments in the spirit of Hart and Moore's (2008) reference point theory imply that (5) compared to the no-contract benchmark, an option contract has an effect only if the seller has a punishment opportunity and (6) sellers are more likely to reject small price offers when a renegotiable option contract has been signed than in the absence of a contract. We find strong support for prediction (5) and weak support for prediction (6).

Our paper brings together two different strands of literature. First, our prime motivation stems from the ongoing and extensive debate in contract theory whether clever contractual arrangements such as option contracts can mitigate or even solve the hold-up problem. In particular, does contracting have any value if renegotiation cannot be prevented? Building on Maskin and Moore (1999), several authors have argued that renegotiation undermines the ability of any conceivable contract to create investment incentives (see e.g. Hart and Moore, 1999; Segal, 1999; Che and Hausch, 1999, and Segal and Whinston, 2002). In contrast, other authors such as Nöldeke and Schmidt (1995, 1998) and Lyon and Rasmusen (2004) are