

## OUTSIDE OPTIONS AND INVESTMENT

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This paper examines the familiar hold up problem where one or both parties must make relation specific investments in order to generate some surplus that they can share between themselves. Each party is reluctant to invest since after the investment there may be no alternative except to deal with this partner, since the investment being relation specific has little value in any other relationship. In other words, although before the investment the agent may have had many choices of who to deal with, after the costly specific investment the only alternatives are either to continue the relationship or forgo some or all of the value of the investment by instead dealing with another agent. The consequence is diminished bargaining power within the relationship and therefore a diminished ability to obtain a substantial share of the surplus. Anticipating this outcome, the agent decides to put less at stake by investing less in the first place, and certainly less than the first best optimal amount.

In our model we assume that some investment must occur in order to create a surplus. After the investment stage, they bargain to determine the shares that they will receive. In case of break down of bargaining, we assume that although the investments are relation specific, there is some salvage value for the two parties, which depends on their own investment. In addition, for generality we also allow for the possibility that an agent can capture some of the value of the other agent's investment when they choose to opt out or quit the relationship. The salvage values will serve as outside options and will also depend on which player initiated the opting out. If the options are credible, they will affect the bargaining outcome. We shall see that under some specific option values, first best levels of investment will be achieved in a subgame perfect equilibrium of the model.

We first analyze the subgame perfect solutions to the bargaining problem when both sides have (possibly different) outside options. Both the situations where the options can be exercised sequentially, and when they are simultaneously available are considered. Our main finding is that generally there are multiple equilibria in the bargaining stage, and these multiple equilibria can serve to regulate behavior in the investments stage. Moreover, in situations where the discount factor is sufficiently large, some of the multiplicity is in the form of delayed agreement which can be Pareto inferior to other immediate agreement equilibrium (such as agreeing immediately on the Nash Bargaining solution shares).

Our argument is similar to the implicit cooperation results in repeated games. The existence of multiple equilibria in the second stage facilitates efficient investment by providing a way to punish players that do not invest efficiently. Specifically, an agent that does not invest at the efficient level, can be punished by playing a bargaining equilibrium with a sufficiently low payoff for that player. Thus, there are two major findings: first the full specification of subgame perfect outcomes in bargaining with two sided outside options that may be different for the two players; and second the characterization of conditions under which first best outcomes can be obtained in the hold up problem.