Relation specific investment in structured bargaining

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Full understanding of individual behavior in bargaining situations is essential given its applications in relevant economic and political related problems. Often, crucial economics interactions are, in fact, the result of a bargaining process. For example climate negotiation, wage bargaining, selling price of durables and real estate, or negotiations between trade unions and firms. Generally, in bargaining games, parties negotiate over the division of a value or the so called "pie". However, parties' contribution to create this value may be unequal. For instance, one party may have incurred a large investment cost to create the value while the other have not. These contributions are sunk when negotiations start, and they are called relationship-specific if they have no value outside of the match.

The present work tests experimentally whether outside options and subjects' contributions to the production value influence the outcome of a structure bargaining game. In standard theory the distribution of contributions to the value is irrelevant for the bargaining outcome.[1] The irrelevance of the distribution of contributions holds for cooperative bargaining models (Nash Jr (1950); Kalai and Smorodinsky (1975)) as well as for non-cooperative bargaining models (Rubinstein (1982)). However, these standard approaches differ in the predicted effect of outside options. In Rubinstein's model outside options matter only when they are binding. While the Nash bargaining solution predicts that players will pocket their outside options and then bargain over the division of the remaining pie. In a seminal paper, Binmore et al. (1989) found that non-binding outside options have no impact on the bargaining outcome.

The contribution of the present study is threefold. First, we replicate Binmore et al. (1989) findings and further show that this result holds also when the outside option is earned in the lab through an effort task. We then propose an experimental design to test whether relation specific investments matter for behavior. In our experiment, subjects bargain in an alternating offer protocol with indefinite length and discounting, where the second mover can take her outside option and end the game when she is a responder. We find that relative contributions to the project value shape bargaining behavior in the lab. Finally, we introduce a Rubinstein (1982)-type model with loss aversion. We assume that players have symmetric preference with loss aversion where the individual relative contribution to the pie serves as reference point. The loss aversion creates an asymmetry in how monetary outcomes are evaluated in a game. Any outcome for a player below her reference point is then weighted down as she perceives a loss of

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[1]By "standard theory" we refer to models in which bargainers are rational and care solely about their own material payoffs.

getting less than her contribution; the larger the loss the less acceptable a player is to an offer. In fact, a player that has contributed a large share is more patient than a player with a smaller share. This is taken into account by rational players so in equilibrium a player's outcome (offer) share is increasing (decreasing) in her relative contribution.

We use a 2x2 experimental design. In the first set of treatments, which we call Control, players are randomly matched into pairs and bargain over a value that is fixed over all matches. As this value is without any reference to the players, we interpret this as that the players contribute equally to the value (either by contributing nothing with no endowment effect or by contributing half each). Hence, in the Control there is not difference in predictions from the standard model and our loss aversion model. In the second set, which we call Treatment, contributions are explicit and may vary between parties. Players are explicitly informed about their own and their opponent's contribution to the pie. The second dimension in our design is to add earnings by costly effort, such as as in Anbarci and Feltovich (2012), to test whether the results are influenced by strengthening potential entitlement effects.

Our finding are in line with previous literature when we look at outside options. We successfully replicate Binmore et al. (1989) showing that outside options impact the bargaining outcomes only if they are binding.[2] Further, earnings do not influence the results in this case.[3] Secondly, we find no difference between the Control with zero outside options and the Treatment with equal contributions. Thus, we conclude that the contextual introduction of contributions does not seem to influence behavior in itself. Lastly, we find that the relative contributions of players do matter for behavior in the bargaining process. Specifically, we find that the bargaining outcome shifts significantly in the direction predicted by the loss aversion model; the outcome share is increasing in the contribution share of a player. Moreover, this relationship is even more pronounced when the contribution to the pie are earned through the effort task than when they are randomly allocated.

However, there are features of the data that are not predicted by our loss aversion model. On average subjects are observed to strike deals at a later date if contributions are specified rather than unspecified, and particularly if they are earned. We also observe that delays increase when contributions to the value are unequally distributed. Thus, asymmetry in contributions seem to cause a significant loss in efficiency compared to the case when the total pie is exogenous and contributions are not specified. This outcome is not predicted by Rubinstein's model, independently of the preference structure assumed, but in line with Babcock and Loewenstein (1997)'s discussion of self-serving bias. In an extension of the paper, we introduce self-serving biases in the alternating offer protocol. Such biases account reasonably well for the observed patterns of delay.

That contributions to the project value matters for bargaining outcomes may shed new light on hold-up type problems. In situations with relationship-specific investments and incomplete contracts, there may be underinvestment as investors do not get a sufficient share of the project value in the ex-post bargaining process. Another relevant example is underinvestment in relationship-specific training in situations with wage bargaining. If ex-post bargaining outcomes are influ-

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[2]An outside option is binding if the holders valuation of the option is larger than his value of the equilibrium share in the absence of an option.

[3]Note that the notion of value and the notion of surplus in bargaining are the same when there are only zero outside options. When there are positive outside options these notions may differ. However, this doesn't matter for our purpose as we have defined the reference point of the loss aversion preference to be on the contribution to the value. If one suspects that the reference point should be set according to a surplus, net of outside options, one should expect to observe an effect of non-binding outside options in the Control. Further, this effect should maybe be strengthened by earnings. Neither is observed.

enced by individual contributions, incentives to invests ex ante may be strengthened, and this may help alleviate hold-up problems.

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