Journal of Economic Behavior & Organization 77 (2011) 203–211

Contents lists available at ScienceDirect

Journal of Economic Behavior & Organization

journal homepage: www.elsevier.com/locate/jebo

Commitment and compromise in bargaining

Duozhe Li*

Department of Economics, Chinese University of Hong Kong, Shatin, N.T., Hong Kong

ARTICLE INFO

Article history:
Received 19 February 2010
Received in revised form 25 October 2010
Accepted 25 October 2010
Available online 5 November 2010

JEL classification:
C78
D74

Keywords:
Bargaining
Commitment
Compromise
Impasse

ABSTRACT

This paper studies observable and irrevocable commitment in bargaining. We investigate when commitment tactics can cause an impasse and when compromise is feasible. In the static model in which a player's commitment decision is made simultaneously with his choice of bargaining stance, compromise becomes unattainable (Ellingsen and Miettinen, 2008). We first analyze a static bargaining model, in which the players decide whether to attempt commitment after announcing their demands. In contrast to the aforementioned strong result, our model accommodates both incompatible commitments and compromises as equilibrium outcomes. We then extend our analysis to a dynamic setting. It is shown that compromise is possible if the players can alter their demands quickly and the chances of successful commitment are low.

1. Introduction

Impasses periodically arise in real-life bargaining situations, causing significant efficiency losses. As mutually beneficial agreements often exist, it is puzzling to see negotiating parties agree to disagree. In his seminal works, Schelling (1956, 1960, 1966) argues vividly that impasses may occur because rational bargainers are often willing to commit themselves to aggressive bargaining stances to increase their share of the available surplus.

Based on Schelling's view, Crawford (1982) investigates the role of commitment tactics in bargaining using a static game theoretic model. In his model, commitment is observable and retractable with a cost. Crawford shows that when the costs of backing down are likely to be high, compromise at the demand stage is feasible; when these costs are likely to be low, commitments to incompatible demands occur, inducing a positive probability of impasse.[1] This analysis confirms Schelling's intuitive arguments. More recently, Ellingsen and Miettinen (2008) (EM2008 henceforth) also study a static model in which costly commitment is observable and irrevocable, showing that compromise is impossible even when successful commitment is highly likely. This result is rather strong and puzzling: when the probability of success for a commitment attempt is close to 1, impasse occurs almost with certainty. As Ellingsen and Miettinen remarked, "If anything, the model produces incompatible commitments all too readily."

Whereas conflicts arising from incompatible commitments are often observed in reality, compromise among negotiating parties is not a rare occurrence either. Thus, the first goal of this paper is to identify the critical conditions for the strong

* Tel.: +852 2609 8183; fax: +852 2603 5805.
E-mail address: duozheli@cuhk.edu.hk

[1] Crawford's model generally admits multiple equilibria. Muthoo (1996) obtains efficient compromise as the unique equilibrium outcome in a model with partial commitment, i.e., the commitment can be revoked at a cost that is not prohibitive.

0167-2681/$ – see front matter
doi:10.1016/j.jebo.2010.10.008

result reported in EM2008. We modify their model in a realistic way and demonstrate that both incompatible commitments and compromises are possible as equilibrium outcomes.

More specifically, in contrast to the two aforementioned models in which the players' decisions about commitment are made simultaneously with those about demands, we consider a two-stage game with sequential decision making. The players announce their demands in the first stage, and, following incompatible demands, they then decide in the second stage whether to attempt commitment. When the probability of successful commitment is low, the prediction in EM2008 prevails, as both players try to commit themselves to the demand of the entire surplus. When the success probability is high, in contrast, their prediction does not apply: a player may refrain from committing to his demand for the fear of causing an impasse. The simultaneous timing of demand and commitment is thus crucial to the no-compromise result.

The basic premise underlying the formulation of the two-step decision making is that immediate commitment is difficult to obtain. Even when a player can always make the two decisions at the same time, whereas his demand is announced instantly, it often takes time for him to achieve commitment. Hence, a player may be willing to withdraw his commitment attempt after learning his rival's demand. If withdrawal is indeed feasible, then this is equivalent to making the decisions in two steps.

A crucial assumption of the static model is that bargaining concludes automatically with a predetermined settlement when the players' demands are incompatible and neither achieves commitment. As this assumption seems somewhat *ad hoc*, the second goal of this paper is to extend the analysis to a dynamic setting in which the predetermined settlement is replaced by the continuation of bargaining.

In our dynamic model, each player can alter his demand frequently and can attempt commitment repeatedly. A commitment attempt will succeed with positive probability within a certain period of time. Bargaining concludes either with an agreement of compatible demands or with an impasse due to successful incompatible commitments.

Equilibrium continues with both players persistently attempting commitment to incompatible demands until one or both succeed. Such an equilibrium is obviously inefficient, given the positive probability of impasse and lengthy delay. Nevertheless, when the players can alter their demands sufficiently quickly and the likelihood of a successful commitment is low, there are also efficient equilibria with immediate agreements provided that at least one player is either impatient or strictly risk averse. The intuition behind this result is straightforward. Put simply, the dynamic bargaining game is analogous to the repeated Prisoner's Dilemma game, in which cooperation can be sustained by the grim trigger strategy.

An important message of our dynamic analysis is that uncertain and irrevocable commitment need not lead to an impasse if bargaining can continue indefinitely and the parties involved can adjust their stances frequently. Hence, the insights built upon analysis of a static model do not extend to a dynamic setting in a certain sense.[2]

The rest of the paper is organized as follows. Section 2 analyzes a static bargaining model that is a modified version of the two-stage game in EM2008. Section 3 extends the analysis to a dynamic setting in which the players can alter their demands frequently and can attempt commitment repeatedly. Section 4 concludes the paper. All proofs are relegated to the Appendix A.

2. A static bargaining model

Two parties, players 1 and 2, bargain over a surplus of size 1 in the following two-stage game. In stage 1, each player i announces, simultaneously with the other, his demand d_i. If the players' demands are compatible (i.e., $d_1+d_2 \leq 1$), then a settlement is reached and the game ends. Each player i receives from the settlement his own demand d_i plus a share of the unclaimed surplus, say $\alpha_i(1-d_1-d_2)$, where $\alpha_i \in [0, 1]$ and $\alpha_1+\alpha_2=1$. If their demands are incompatible, then the game proceeds to stage 2, in which the players decide simultaneously whether to attempt commitment (denoted as C) to their demands or to stay put (denoted as F). Player i's commitment attempt succeeds with probability $q_i \in (0, 1)$. A committed player cannot revoke his demand, and an uncommitted player remains flexible. The final division depends on who achieves commitment. If player i is committed to d_i and player j is flexible, then the former receives d_i and the latter receives $1-d_i$; if both are committed to incompatible demands, then an impasse occurs and each receives 0; and if both are flexible, then they reach a predetermined efficient settlement $\left(\beta_1, \beta_2\right)$, where $\beta_i \in (0, 1)$ and $\beta_1+\beta_2=1$.[3] Assume that player i's utility function is $u_i(s_1, s_2) = s_i$, where (s_1, s_2) is the final division. Clearly, the difference between our static model and that of EM2008 lies only in the timing of the two decisions, i.e., the choice of bargaining stance and the commitment decision. Whereas in EM2008, these two decisions are simultaneously made, we consider sequential decision making.

Denote as $\mathbb{D} \equiv \left\{(d_1, d_2) : d_i \in [0, 1] \text{ and } d_1+d_2 > 1\right\}$ the set of incompatible demand pairs. Formally, player i's strategy can be written as (d_i, f_i), where $d_i \in [0, 1]$ is the demand announced in stage 1, and $f_i : \mathbb{D} \to \left\{C, F\right\}$ is the action rule employed in stage 2. For simplicity, we focus on the reduced strategy in which $f_i(\cdot)$ is a function of $d_j \in (1-d_i, 1]$. We characterize the

[2] This position is in the spirit of Yildiz (2003): although conventional wisdom suggests that optimism may cause inefficient bargaining delay, Yildiz shows that an immediate agreement is obtained if the optimism lasts for a sufficiently long time.

[3] One can view the static model as the reduced-form representation of a bargaining situation in which commitment takes place before negotiation (i.e., offers and counteroffers). Then, the assumed efficient settlement $\left(\beta_1, \beta_2\right)$ can be interpreted as the anticipated equilibrium outcome from the negotiation after both players fail to achieve commitment. However, as the analysis in Section 3 shortly demonstrates, this assumption turns out not to be innocuous.