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Bargaining

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Bargaining is a process by which a voluntary agreement on the division of a good or the terms of a trade or exchange is reached. The object of the exchange can be a physical object (e.g., a commodity), a right, or a change of behavior. Bargaining is a ubiquitous feature of social interactions. Bargaining takes places, for example, among businessmen on the price of commodities, among political parties on the formation of a government, among legislators on the contents of a law, among nations on the resolution of a conflict, among trade unions and employer associations on working conditions, or among an individual employer and employee on working time and salary. The term 'negotiating' is often used synonymously.

We can distinguish between bargaining situations along several dimensions. Bargaining can be formal or informal, bilateral or multilateral, and repeated or limited to one instance. Furthermore, bargaining can take place in a more or less institutionalized context. Bargaining in a legislature, for example, is governed by an elaborated set of rules concerning the process in which proposals are put forwarded, amendments (counter-proposals) are made and a decision is reached. This is not the case for bargaining on a bazaar where the interaction is structured only (if at all) by custom. In settings where decisions are made by a formal vote, agreement can be reached by a simple majority, qualified majority, or unanimity. Bargaining on treaties is usually based on the consent of all bargaining partners, thus the decision rule is unanimity. This gives all parties involved veto power. Bargaining in legislatures, on the

other hand, often uses majority rule, with qualified majorities (e.g., 2/3 majority) for particularly important bills (e.g., constitutional amendments). Subsequently, some members of the legislative body can be overruled by the majority. Furthermore, some members might enjoy procedural privileges such as agenda-setting power. Finally, we can distinguish among bargaining situations based on the nature of the issue(s) at hand. Bargaining can be limited to one issue or involve several issues. The good may or may not be divisible. In the legislative context, policies can allocate funding ([re-]distributive) or set rules (regulatory).

The outcome of a bargaining process can be evaluated in terms of its efficiency and the distribution of benefits. Efficiency refers to the minimization of the costs of the bargaining process (transaction and opportunity costs) and the realization of maximum surplus. The latter includes the avoidance of non-agreement when a trade would have been mutually beneficial (bargaining failure). Distribution refers to the division of the surplus gained from cooperation or coordination (in contrast to unilateral action). The distributive consequences of an agreement are influenced by the bargaining power of the actors involved.

The Negotiator's Dilemma

Bargaining is typically characterized as a mixed-motive situation. Bargaining partners can create value by changing the current situation in a mutually beneficial way but have divergent interests with regard to the exact terms of the agreement. For example, a potential buyer of a commodity might value an object more than its owner. In other words, the reservation price of the seller (the minimum price at which he is willing to sell an object) is lower than the reservation price of the buyer (the maximum price she is willing to pay). The difference between their reservation prices is the potential joint surplus from a trade. If this value is positive, both have an interest in reaching agreement to realize this joint surplus. However, the buyer would like to keep the price as low as possible, whereas the opposite is

true for the seller. In other words, buyer and seller have a common interest in the production of a surplus but diametrically opposed interests with regard to the distribution of it. The tension between the desire to find an agreement to create value and to maximize the individual share of its distribution is referred to as the 'negotiator's dilemma'. Tactics aimed at furthering the latter goal (e.g., misrepresentation of preferences, threats, etc.) might jeopardize the former. This also implies that bargaining tends to be inefficient in the sense that valuable time and resources are spent on a 'dance of concessions' (Raiffa) rather than reaching agreement instantaneously. Bargaining success is also threatened if the involved parties cannot credibly commit to keeping their side of the deal. Recourse to third parties (e.g., a judicial system) can ameliorate this problem. In some instances, third parties can also facilitate reaching an agreement by mediating between the bargaining partners.

The Bargaining Space

Bargaining can only be successful if a common interest exists. Figure 1 illustrates the basic bargaining setting for two actors, A and B, whose consent is necessary for joint or coordinated action.

Figure 1: A bilateral bargaining situation and the Nash Bargaining Solution
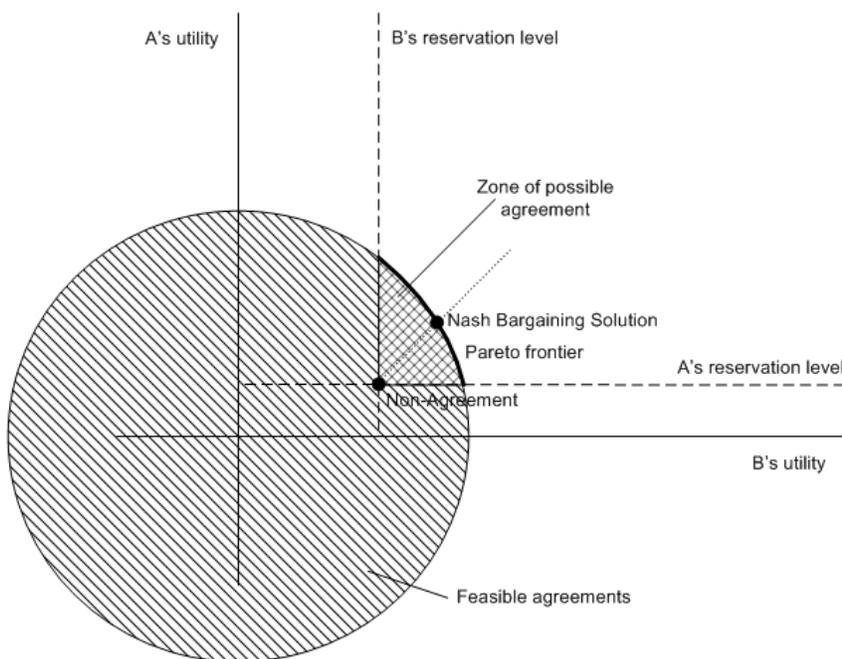
The horizontal axis denotes the utility B would derive from an agreement and the vertical axis denotes A's utility. Thus, any given point shows the utility A and B would derive from a particular agreement. A prefers agreements towards the top of the graph whereas B would like to see an agreement as far as possible to the right. The hatched area represents all feasible agreements. Some agreements might be highly
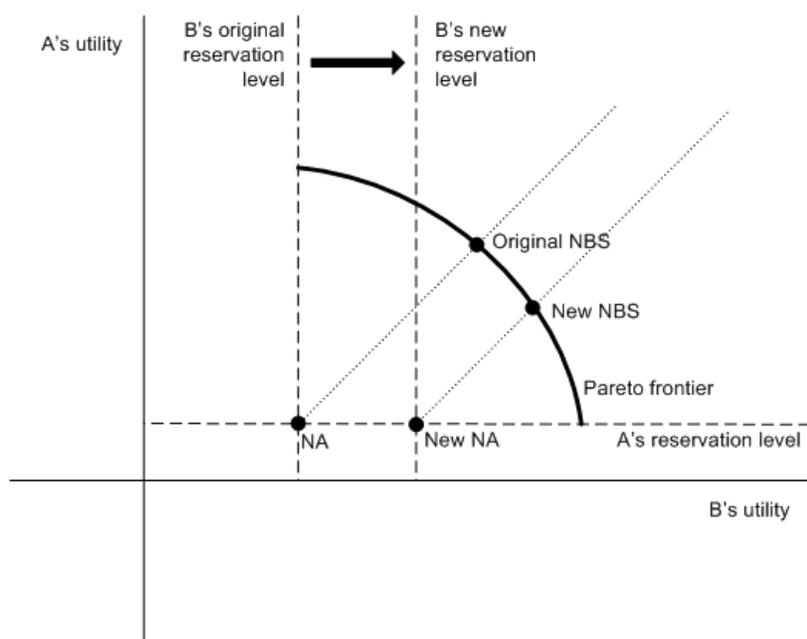
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desirable but are simply out of the reach of the actors. For example, there is a limit to the quantity of a good a firm can possibly produce and thus sell to an interested party because the resources used in the production of the good are finite. Similarly, the price a seller can pay is limited by its budget and credit line. Another example would be logistical difficulties which limit the speed with which armies can be withdrawn from a territory as part of a cease-fire agreement. Note that the utility an actor associates with any given agreement can depend on a number of factors. For example, a buyer's utility from a purchase depends on the price, quantity and quality of a good. Similarly, the evaluation by a government of a disarmament treaty could depend amongst other things on the number and type of arms being reduced, the time frame, and the verification procedure. A widely shared assumption is that bargaining is effectively limited to agreements that make both bargaining partners better off relative to the *B*est *A*lternative *T*o *N*on-*A*greement (BATNA). This could simply be the continuation of the present situation (status quo). The broken lines represent the utility each actor would receive in the absence of an agreement, e.g., from acting unilaterally (reservation level). The zone of possible agreement (or bargaining space) is the subset of feasible agreements which gives all the actors whose consent is necessary a higher utility than they could achieve in the absence of an agreement. This is the cross-hatched area in figure 1. A subset of the zone of possible agreements is the so-called pareto frontier. This is the set of agreements that is pareto-optimal. An agreement is pareto-optimal if any change would make at least one of the involved actors worse off. Movements towards the pareto frontier create value for both parties (although possibly to different degrees) whereas a movement on the pareto frontier would only redistribute value.

Models of bargaining and bargaining power

Several game-theoretic models of bargaining have been proposed to capture the strategic aspect of negotiations. The Nash Bargaining Solution (NBS) is based on cooperative game theory. It derives a unique solution for a bilateral bargaining situation based on a set of axioms. These axioms imply that the actors strive to reach the pareto frontier and disregard irrelevant alternatives (e.g., additions to the feasible set which are pareto-inferior). It is also assumed that the utilities completely reflect the evaluation of various options by the actors (e.g., attitude towards risk). The Nash bargaining solution is the maximum of the product of the gains in utility (relative to the security level) for both actors, possibly weighted by the actor's bargaining power. If both actors have equal bargaining power, they effectively split the difference of the surplus. This equal division of created surplus is represented in figure 2 with the dotted diagonal starting at the point of no agreement. The 45 degree angle indicates that each move towards the pareto frontier gives an equal share of the surplus to both parties. The point where this line crosses the pareto frontier is the Nash Bargaining Solution. If A would have more bargaining power than B, then the line would slope upwards and vice versa. Note that an equal split of the surplus relative to the point of no agreement does not necessarily imply equal utility in absolute terms. John Harsanyi has shown that the Nash Bargaining Solution is equivalent to the outcome of a bargaining model suggested by Zeuthen. In this model both players make proposals until one of them accepts the proposal of the other. If none of them makes a concession (e.g., moves his proposal towards the last proposal of the other player), bargaining breaks down and conflict ensues. According to the Zeuthen-Harsanyi model, the player whose cost of accepting the opponent's suggestion is lower (rather than insisting on his own suggestion), relative to the cost of conflict, makes a concession. Harsanyi offers a psychological interpretation of this bargaining behaviour. A seminal bargaining model based on non-cooperative game theory is Rubinstein's alternating offer model. The bargaining partners alternate in making offers to each other. Actors are assumed to be impatient; the value of later

agreements is discounted relative to earlier ones. If impatience is sufficiently small the solution of this game approaches the Nash Bargaining Solution. David Baron and John Ferejohn have proposed an influential model of multilateral bargaining in which the probability that an actor is recognized to make a proposal differs. Several determinants of the distribution of the surplus have been derived from these and related game theoretical models. In general, the share of the surplus one actor receives increases as his eagerness for striking a deal decreases. Thus, an actor who is patient can stick to maximal demands whereas an impatient actor is more willing to make concessions to reach agreement early. Similarly, a bargaining partner is stronger if she enjoys a valuable inside option. Inside options refer to the benefits an actor receives during the bargaining while the current situation prevails. The distributive properties of bargaining outcomes are not just affected by the valuation the actors attach to various agreements but also to events outside of the negotiations. For example, the less an actor is concerned about exogenous factors which would end the negotiations (bargaining breakdown) the stronger is his bargaining position. Also, new outside options might become available. For example, while a buyer and a seller are bargaining a new customer may make an offer. The position of the bargaining partner is strengthened if the value of the outside option (i.e., the new offer) is higher than the previous best alternative to non-agreement (i.e., no deal).

This is illustrated in Figure 2 where the new outside option increases the value of non-agreement (NA) for B. Subsequently, the outcome as determined by the Nash Bargaining solution (NBS) would change. Relative to the original solution B

Figure 2: The Distributive Consequences of Outside Options

benefits whereas A loses. Similarly, an actor could gain a bargaining advantage by decreasing the reservation level of the other actor (e.g., by foreclosing its outside option). Thomas Schelling has highlighted the use of commitment strategies to influence the distribution of the potential bargaining surplus ('paradox of weakness'). If an actor can eliminate some possible agreements, which are unfavorable to her, as principally 'unacceptable' or unfeasible she can restrict the bargaining space in favour of her position. In international negotiations, for example, a government might credibly commit itself to certain demands vis-à-vis its domestic constituency to tie its hands and gain an advantage at the international stage. This is related to the notion of two-level games in international relations.

Typically bargaining partners do not know each other's reservation level. This gives an incentive to misrepresent it to gain a bargaining advantage. Player B in figure 2 might, for example, just pretend that there was an alternative offer from a third party which lead to a shift in its reservation level. As previously discussed this would probably increase B's share of the surplus.

So far we have assumed that no deals are possible unless they represent utility gains relative to the

Figure 3: Side-payments and issue-linkage
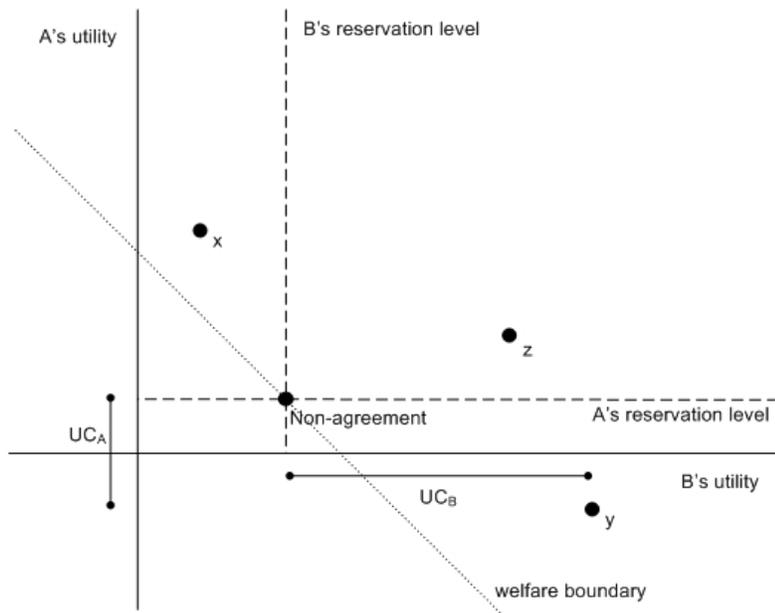
point of no agreement for both bargaining partners. Side-payments and issue-linkage are two mechanisms to allow bargaining partners to increase their welfare even when this is not the case. Consider the scenario in figure 3 where only two agreements (x, y) are feasible. UC_A denotes the change in A's utility if y is adopted, UC_B is the equivalent utility change for B. In this scenario A would not support y because it would make it worse off than

non-agreement. However, B's utility gain from adopting y exceeds A's loss ($|UC_B| > |UC_A|$). Thus, B could get A's approval by compensating it sufficiently via a side-payment. The dotted diagonal represents the welfare boundary. Agreements on this line give the same utility to both bargaining partners jointly as non-agreement. For any agreement to the top and right of the welfare boundary the joint utility exceeds the joint utility of non-agreement and an agreement could be struck with the help of side-payments. Similarly, A and B could agree on both x and y (issue-linkage), which would result in the outcome of z in terms of their utility. The utility gain of B from y would offset its utility loss from x. In the same manner, the utility gain of A from x would offset its utility loss from y. Log-rolling (or vote trading) has the same effect. It is based on the idea that two bargaining partners might value two issues differently and hence are willing to make concessions on one issue in return for the other party's concession on the other issue.

Bargaining involving several bargaining partners (multilateral negotiations) encompass the same issues as discussed before. In contrast to bilateral bargaining the bargaining space tends to be smaller and the transaction costs of bargaining tend to be higher. Furthermore, the formation of bargaining coalition is thought of as a crucial step in multilateral negotiations which is not relevant in bilateral bargaining.

The literature on bargaining in the field of social psychology points out that humans are not the perfectly rational decision-makers that form the basis of game-theoretical models. Several cognitive biases have been identified that can influence bargaining behaviour. For example, bargaining partners are biased by their own position and value self-serving information more highly than they objectively should (egocentrism). Furthermore, humans seem to behave differently towards risk depending on whether they perceive of the bargaining object as gains or losses (framing effect). In addition, negotiators tend to be unduly influenced by the early phases of bargaining (anchoring effect) and do not adjust their perception and behaviour in a completely rational manner. Finally, negotiators can be too

focused on the competitive dimension of bargaining (fixed-pie perception) and subsequently fail to realize mutually beneficial outcomes. Psychologists also argue that the relationship between bargaining partners and the social context influences the bargaining process. Other work addresses the medium of bargaining and the cross-cultural differences.

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