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NATIONAL SECURITY GAMES

ABSTRACT. Issues that arise in using game theory to model national security problems are discussed, including positing nation-states as players, assuming that their decision makers act rationally and possess complete information, and modeling certain conflicts as two-person games. A generic two-person game called the Conflict Game, which captures strategic features of such variable-sum games as Chicken and Prisoners' Dilemma, is then analyzed. Unlike these classical games, however, the Conflict Game is a two-stage game in which each player can threaten to retaliate — and carry out this threat in the second stage — if its opponent chose noncooperation in the first stage.

Conditions for the existence of different pure-strategy Nash equilibria, or stable outcomes, are found, and these results are extended to situations in which the players can select mixed strategies (i.e., make probabilistic threats or choices). Although the Conflict Game sheds light on the rational foundations underlying arms races, nuclear deterrence, and other strategic situations, more detailed assumptions are required to tie this generic game to specific conflicts.

1. MODELING NATIONAL SECURITY GAMES

Our analysis of national security problems rests on the assumption that individuals make rational choices in decision-making situations. A thorough justification of this assumption would take us too far afield, so suffice it to say that this assumption does not connote the usual caricature of exquisitely cool, calm, and collected behavior. It simply means that individuals choose better over worse means in trying to satisfy their goals, whatever their goals are.

In Rational Politics, Brams has given a number of reasons to justify, and a plethora of examples to illustrate, the reasonableness of this assumption (Brams 1985a). Although the goals of decision makers vary widely, it is argued, the rational calculations they make to try to achieve these goals pervade all levels of politics, from voting in committees to managing conflict between the superpowers.

In this article, our concern is more specific. Positing states as players in a game, we ask: Can rational choice be imputed to decision makers in the most important strategic situations — arms races, crises that may escalate to nuclear war, and so on — that they are likely to face?

We think the answer to this question is yes, particularly if the

players are nuclear powers (Brams 1985b). The rationality assumption is commonly viewed as being undercut by limited information, misperceptions, restricted choices, and the like. It is not; rather, given these constraints — some of which can be built into models — the rationality assumption states that decision makers choose the best course of action available. But perhaps more to the point in the nuclear case, top decision makers, even if restricted by certain blinders, do not have to be superintelligent or able to calculate perfectly to apprehend the apocalyptic consequences of a nuclear exchange, whether it ends in a nuclear winter or some other end state slightly less dreadful.

That the horrific consequences of nuclear war are so evident, unlike the far less predictable consequences of most conventional conflicts, has been dubbed the "crystal ball effect." This effect, even if the crystal ball is occasionally somewhat cloudy, reinforces the ability of decision makers, making only the crudest calculations of cost and benefit, to be rational. Thereby it buttresses our case for stripping away descriptive details in nuclear conflicts in order to home in on the strategic essentials of such situations.

Doubtless, the austere representations of these situations as formal games will appear quite unrealistic to many. But if the players are nuclear powers, their choices often are stark. Since the parsimonious representation of these choices in games is precisely what enables one to explore their implications rigorously and in depth, the austerity seems both necessary and desirable.

The advantages of parsimony and rigor are considerable. In particular, one can often ascertain the possible stable outcomes in a game, specify those (if any) that lead to desired outcomes, and even chart economical ways to induce their choices. In addition, a spare theoretical structure may allow one to add new rules or constraints without making the resulting games analytically unmanageable. These new games, moreover, often raise entirely new strategic questions that can then be pursued.

Before explicating the concept of rationality in a particular game, let us deal with the simplification that nation-states can be treated as single players. Patently, no reasonably complete description of international behavior can consider nation-states to be unitary actors, with the possible exception of states run by dictators with absolute control. Because there are few if any such autocracies today, this simplifying assumption would appear dubious if not untenable.